

2014-2015 | **New Reactor Program**



COVER

An aerial view captures the progress at the V.C. Summer Unit 2 and Unit 3 site.

Photo courtesy of South Carolina Gas & Electric Company.

2014-2015 NEW REACTOR PROGRAM



OFFICE OF NEW REACTORS

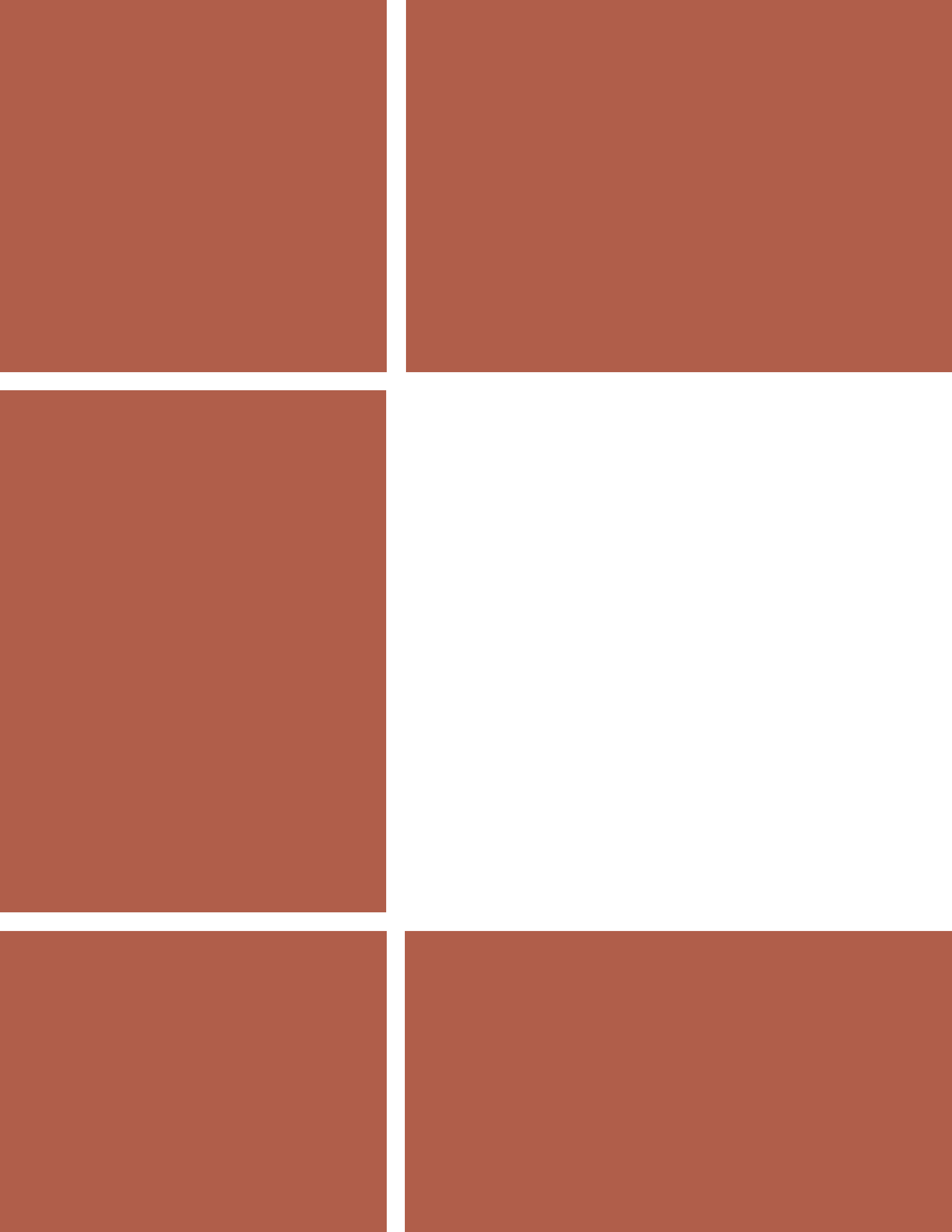
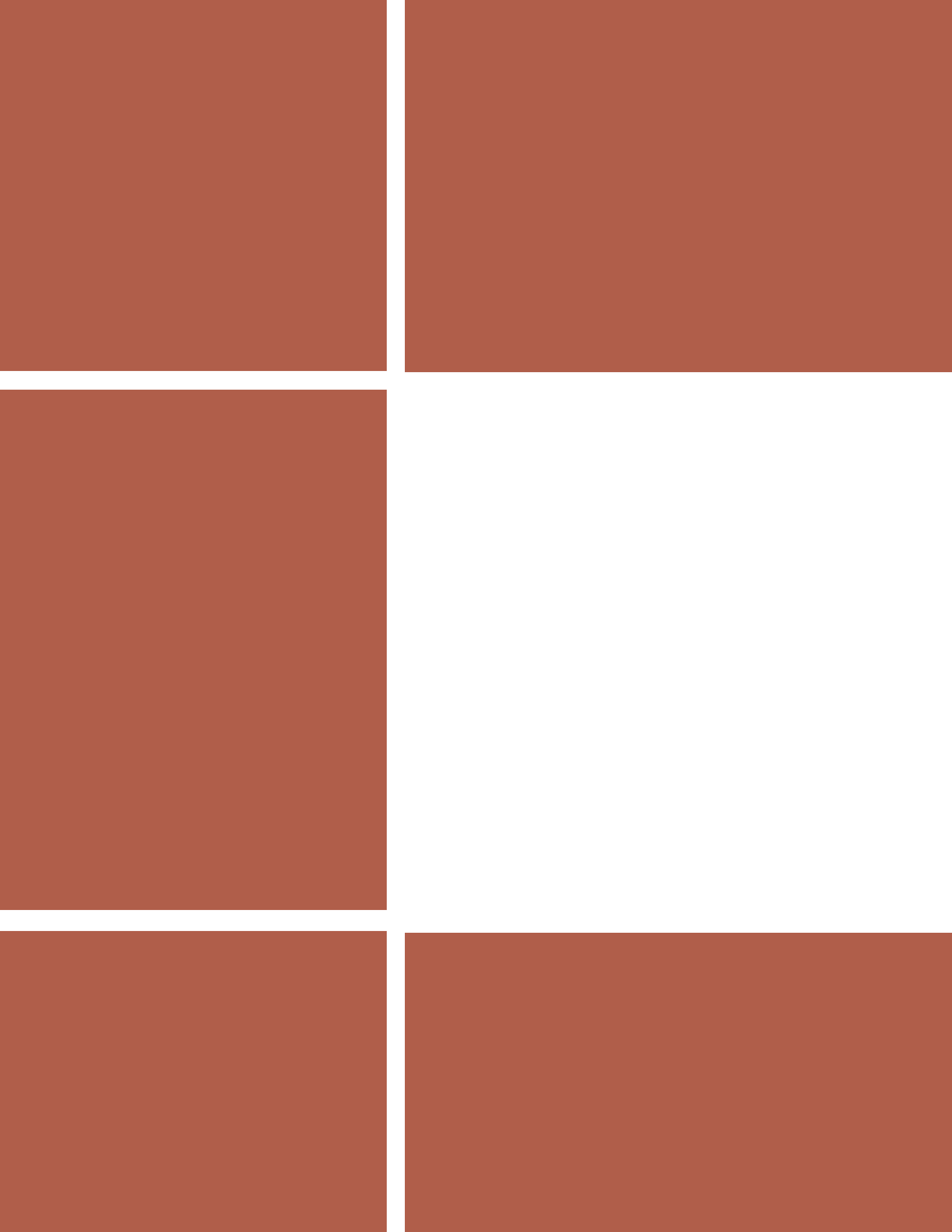


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A MESSAGE FROM THE DIRECTOR

Over the past year, the Office of New Reactors (NRO) and its partner offices continued to meet the U.S. Nuclear Regulatory Commission's (NRC's) mission of protecting public health and safety while enabling the safe, secure, and environmentally responsible use of nuclear power in meeting the Nation's future energy needs. NRO and our New Reactor Program partners remain agile, proactive, and vigilant in safely overseeing licensing, vendor and construction activities, new developments in the small modular reactor and advanced reactor arena, and emerging global interests in our dynamic environment.

In 2014, the New Reactor Program successfully executed the *safe closure* of its highest priority projects – an initiative that provided us with clear objectives and timeliness goals, while enabling us to maintain our steadfast focus on safety *and* complete these crucial tasks. This was accomplished amidst continued environmental volatility resulting from budget uncertainty and fluid applicant business decisions.

Our pivotal accomplishments include: the NRC certification of the ESBWR (Economic Simplified Boiling Water Reactor) design; the completion of the Fermi 3 safety evaluation; careful oversight of construction at the Vogtle Electric Generating Plant, Units 3 and 4, located in Georgia, and the Virgil C. Summer Nuclear Station, Units 2 and 3, in South Carolina, and Watts Bar Unit 2 in Tennessee; the comprehensive and timely reviews of license amendment requests supporting ongoing safe construction at Vogtle and Summer; the Lee final and PSEG draft environmental impact statements; and the initial APR1400 acceptance review, decision and follow-up.

We continue to bolster our regulatory posture for small modular reactor and advanced reactor licensing activities, including pre-application interactions with potential applicants, developing the necessary infrastructure, and addressing policy issues. We foster our robust international rapport with regulatory counterparts worldwide, while sustaining global leadership of the Multinational Design Evaluation Program.

Amidst this flurry of activity, we emphasize the importance of identifying and implementing lessons learned and planning strategically for the challenges that lie ahead. In any and all of these endeavors, we maintain an agency focus and recognize the significant contributions made by our partner offices supporting the New Reactor Program. These include Region II, the Office of the General Counsel, the Office of Nuclear Reactor Regulation, the Office of Nuclear Regulatory Research, the Office of Nuclear Security and Incident Response, the Office of Enforcement, the Office of Investigations, the Advisory Committee on Reactor Safeguards, and the agency's corporate offices.

Now in its 5th year, this annual review serves as a vital communication venue in our ongoing efforts to engage our diverse stakeholders about the latest activities and accomplishments of the New Reactor Program. While the challenges and opportunities that await us may vary, our mission and top priority of safety remains steadfast. In cooperation with our partner offices, the Office of New Reactors continues to be poised to lead the agency's safety mission in meeting the Nation's future energy needs.

A handwritten signature in black ink, appearing to read "Glenn M. Tracy". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Glenn M. Tracy
Director
Office of New Reactors

Photo courtesy of Georgia Power, a Southern Company



OVERVIEW



Top, the pressurizer for the AP1000 reactor arrives at the Vogtle 3 site in Waynesboro, GA.

Above, Frank Akstulewicz, Director of the Division of New Reactor Licensing (DNRL), makes a point at the Commission's Strategic Programmatic Overview of the New Reactors Business Line Briefing.

Right, construction at the Watts Bar Unit 2 FLEX Building. The structure was designed in response to the NRC Mitigating Strategies Order as a result of the events at Fukushima, Japan.



Photo courtesy of Tennessee Valley Authority

We continued to work closely with our U.S. Nuclear Regulatory Commission (NRC) partner offices and the agency's Advisory Committee on Reactor Safeguards, as we safely attained significant achievements over the past year in our core areas of new reactor licensing, construction oversight, advanced reactors, and international cooperation. Despite operating in an increasingly dynamic environment, the Office of New Reactors (NRO) sustained its focus on fulfilling its safety mission.

Leveraging its adeptness in dealing with volatility in the new reactor business line and the challenges associated with first-time implementation of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," the New Reactor Program also continued to demonstrate its agility and effectiveness in analyzing new information, prioritizing its workload, allocating resources, and communicating its decisions with internal and external stakeholders. This is perhaps best illustrated by the staff's successful implementation of the program's Safe Closure initiative, designed to clarify and achieve goals for safety review activities in a timely manner with a strong safety focus amidst the turbulent environment.

Among the most significant accomplishments during the past year was the NRC certification of the Economic Simplified Boiling Water Reactor (ESBWR) design. In October 2014, the agency published the final rule for the ESBWR DC in the *Federal Register*. Additionally, for the Watts Bar 2 Operating License, the NRC issued Supplemental Safety Evaluation Report 27 on December 12, 2014. A decision regarding issuance of the operating license is expected by mid-2015. Elsewhere, the NRC issued the draft environmental impact statement (DEIS) for the Public Service Electric and Gas Company (PSE&G) Early Site Permit application review in August 2014 and expects to issue the final environmental impact statement (FEIS) by September 2015.

At the same time, the staff made important progress in the construction oversight area. The top goal of the New Reactor Program over the past year remained ensuring the safe construction of nuclear reactors. This included Watts Bar Unit 2 in Tennessee, and the oversight of four AP1000 units at the Vogtle site in Georgia and the V.C. Summer facility site in South Carolina. With safety the leading priority in all of these activities, the staff increased inspection

activities to ensure stringent construction oversight. For Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3, construction activities centered on the nuclear island and the ongoing fabrication of steel containment and structural modules. As a result, the NRC focused its activities on the inspection of licensee quality assurance programs, welding, security, civil engineering structures, digital instrumentation, and control system engineering. Additionally, the NRC focused its oversight efforts on the manufacturing of key components, such as squib valves and reactor coolant pumps, for these facilities. The agency maintained rigorous oversight at Watts Bar Unit 2, which is now in its final stages of construction.

Significant momentum also was sustained in our Construction Reactor Oversight Process, (cROP). During the year, the NRC issued SECY-14-0049, "Construction Reactor Oversight Process Self-assessment for Calendar Year 2013." The findings affirmed that the process, in fact, provided effective oversight by meeting program goals and achieving intended outcomes. The staff also identified and acted upon opportunities to strengthen program effectiveness and implementation. The staff will continue to solicit input from internal and external stakeholders to continually improve the cROP based on feedback and lessons learned.



Photo courtesy of South Carolina Gas & Electric Company.

The first of two steam generators for V.C. Summer Unit 2 arrives at the facility, located near Jenkinsville, SC.

Photo courtesy of Vogtle Resident Office.



Top, the Vogtle Unit 4 containment vessel bottom head.

Above, NRO's Amy Beasten, general engineer, inspects pre-cast panels for floors of the Vogtle Unit 3 auxiliary building.

Right, NRC Commissioner William Ostendorff provides insightful comments at an NRO All Hands Meeting.

Photo courtesy of Georgia Power, a Southern Company



OVERVIEW



Meanwhile, activities over the past year validated the growing interest in advanced reactor technology, including small modular reactors (SMRs). To anticipate and meet the challenges associated with this interest and expected near-term application submittals, the New Reactor Program actively continued to bolster its regulatory infrastructure to support planning, licensing, and oversight of new and advanced reactor applications. This includes putting in place timely and pertinent policy decisions. Of historic significance was NRC receipt in December 2014 of a first-of-its-kind Department of Energy draft set of possible general design criteria for advanced reactors for NRC consideration. The agency will use this information to develop staff guidance that could be used for future reviews of applications for non-light-water reactor designs. This is an important step in tailoring a regulatory framework that can be applied to advanced designs.

In the past year, NRO continued to implement several initiatives to comprehensively prepare for SMR applications that may be submitted beginning in 2015. Concurrently, we also enhanced and updated the regulatory guidance for light-water reactors, and continued to review our internal processes in a transparent fashion to strengthen the readiness of the application review process. This includes staff office instructions to conduct a pre-application readiness assessment and an application acceptance review for Part 52 applications, updates of the light-water reactor standard review plan, and guidance to applicants to prepare and submit Part 52 applications. Finally, the staff has provided a paper to the Commission to recommend rulemaking to update the Part 52 licensing process. All of these actions were specified in the New Reactor Licensing Process Lessons Learned Report dated April 2013.

Furthermore, the New Reactor Program achieved significant progress in the area of licensing reviews. By year's end, the NRC was actively reviewing one operating license (OL), two design certifications (DCs), one early site permit (ESP), and eight combined license (COL) applications for large, light-water reactor designs, as well as preparing for the arrival of the new APR1400 DC application. In fact, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd did submit to NRO this application for certification of the APR1400 Reactor Design on December 23, 2014.

Elsewhere, NRO and the agency continue to proactively leverage resources and knowledge with international regulatory authorities while playing an essential role in the worldwide community via mutually beneficial exchanges of information that include the design, siting, and construction of new reactors. In serving this vital role supporting international cooperation, New Reactor Program management and staff continue to lead ongoing efforts under the auspices of the Organisation for Economic Co-operation and Development (OECD)/Nuclear Energy Agency (NEA), the International Atomic Energy Agency (IAEA), and the Multinational Design Evaluation Program (MDEP). The latter entity encompasses leading regulatory authorities from 14 countries, all of which are dedicated to ensuring cooperation regarding the licensing reviews for new reactor designs. The NRC Chairman served as the chair of the MDEP Policy Group, while the NRO Deputy Office Director co-chaired the MDEP Steering Technical Committee. Building on 2014, the New Reactor Program will vigorously engage its international counterparts so that it can continue to contribute to the global community in the foreseeable future. ■



Photo courtesy of Vogtle Resident Office

Chad Huffman, Vogtle Units 3 & 4 Construction Resident Inspector, inspects inside the containment vessel of Unit 3.

ACTIVITIES & ACCOMPLISHMENTS

Photo courtesy of Vogtle Resident Office



Top, Construction Inspector Clint Smith measures fillet welds on a Vogtle Unit 3 CA20 module basemat attachment bracket.

Above, DNRL Director Frank Akstulewicz delivers opening remarks at the ceremony celebrating the NRC certification of the Economic Simplified Boiling Water Reactor design, as NRO Office Director Glenn Tracy and NRC Commissioner Kristine Svinicki look on.

Right, NRC Resident Inspector Patrick Donnelly discusses turbine rotor storage with a licensee engineer at V.C. Summer Unit 3.

Photo courtesy of NRC Resident



New Reactor Licensing

Throughout 2014, the New Reactor Program continued to safely lead, manage, and complete a multitude of activities in an increasingly volatile environment. We reviewed applications for standard design certifications (DCs), early site permits (ESPs), combined licenses (COLs), and operating licenses (OLs). At the end of 2014, the U.S. Nuclear Regulatory Commission (NRC) was actively reviewing one OL, two DCs, one ESP, and eight COL applications for large, light-water reactor designs and preparing for the arrival of the new APR1400 DC application. As previously noted, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd submitted to NRO this application for certification of the APR1400 Reactor Design in December 2014. The applications currently under review were submitted to the NRC under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," with the exception of the Watts Bar Unit 2 application for an OL using 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

The NRO staff made progress on all of the active application reviews during 2014 despite a host of demanding challenges, including significant changes to a number of applicants' business strategies that led to application review delays and slowdowns. As the NRC staff has remained

focused on fulfilling its mission, it has been diligent in raising safety concerns while seeking closure on issues related to ongoing application reviews. Over the course of 2014, the NRC staff worked industriously to implement NRO's Safe Closure initiative. In doing so, the NRC effectively met established objectives and timeliness goals for licensing review activities, while maintaining the agency's safety focus amidst the volatile environment. The NRC will continue its focus on the safe closure of ongoing licensing review activities in 2015 and beyond. Some of the NRC's accomplishments related to new reactor licensing during 2014 follow.

PART 50 OPERATING LICENSE REVIEWS

Watts Bar Nuclear Plant Unit 2 is the only nuclear plant application currently in active review using 10 CFR Part 50. The Tennessee Valley Authority (TVA) received a construction permit for Watts Bar Nuclear Plants 1 and 2 in 1973 and submitted OL applications for both units in 1976. Unit 2 construction was suspended in the mid-1980s and then resumed in 2007. TVA resubmitted an updated OL application in 2009. The NRC is nearing completion of its safety review for the OL application and issued Supplemental Safety Evaluation Report 27 on December 12, 2014. Subject to Commission authorization, the NRC expects to issue a decision regarding issuance of the OL by mid-2015.



Photo courtesy of Georgia Power, a Southern Company

Vogtle Unit 3 CA03 module construction.



ACTIVITIES & ACCOMPLISHMENTS

Top, NRC Executive Director for Operations Mark Satorius, center, and NRO and Region II senior leaders respond to a Commission inquiry at the Strategic Programmatic Overview of the New Reactors Business Line meeting.

Above, Jim Steckel, a project manager in DNRL, provides NRO employees with an update on the office's Open Collaborative Working Environment initiatives.

Right, construction at the Vogtle Unit 3 annex building.



Photo courtesy of Georgia Power, a Southern Company

DESIGN CERTIFICATION REVIEWS

The agency approves a nuclear power plant design independent of an application to construct or operate a plant by issuing a DC. It is valid for 15 years from the date of issuance and can be renewed for an additional 10 to 15 years.

In the past year, the NRC certified the Economic Simplified Boiling Water Reactor (ESBWR) design, a hallmark achievement, publishing the final rule in the *Federal Register*. The NRC also continued reviewing the following DC applications:

- U.S. Evolutionary Power Reactor (U.S. EPR)
- U.S. Advanced Pressurized Water Reactor (U.S. APWR)

In late 2013, AREVA, the applicant for the U.S. EPR design, informed the NRC that it was reevaluating its entire U.S. EPR DC application closure strategy and was in the process of developing closure plans for the U.S. EPR DC project. As part of its revised closure strategy, AREVA organized all of its review areas into three groups (Groups A, B, and C) and prioritized each based on short, medium, and long-term completion. AREVA submitted its closure plan for Group A review chapters in December 2013 and its plan for Group B and C chapters in March 2014. In March 2014, AREVA also stated that it plans to finalize all sections of its application by the end of September 2016. During 2014, the NRC completed the safety evaluations related to all of the Group A chapters and is currently focused on resolving technical issues associated with the Group B chapters. In January 2015, AREVA informed the NRC that continuing evaluation of the EPR certification effort would result in revised business strategies in fiscal year 2015 and beyond. It added that the changed business strategies would cause schedule impacts. AREVA intends to submit its revised submittal plan in Spring 2015.

In late 2013, Mitsubishi Heavy Industries, Ltd. (MHI), the applicant for the U.S. APWR design, issued a letter announcing its decision to implement a coordinated slowdown of the ongoing U.S. APWR DC review activities. This decision allows MHI to focus its resources on supporting Japanese utilities in restarting Mitsubishi-designed PWRs in Japan. In March 2014, the NRC began limiting its review of the U.S. APWR DC application to individual review areas identified by MHI and within MHI's budgeted allowance for the review. The NRC will continue with its limited review activities, in a coordinated manner, until MHI provides further notice regarding a change to the current review pace.

In 2010, the NRC received DC renewal applications from both Toshiba and General Electric Hitachi (GEH) to renew the Advanced Boiling Water Reactor (ABWR) DC. The NRC will establish review schedules once it receives revised applications from both Toshiba and GEH. The NRC currently expects to receive a revised application from GEH no sooner than mid-2015 and from Toshiba no sooner than mid-2016.

In December 2013, following the NRC's thorough acceptance review of the Advanced Power Reactor 1400 (APR1400) DC application, the NRC informed Korea Hydro and Nuclear Power Company (KHNP) and Korea Electric Power Corporation (KEPCO) of its decision not to accept the APR1400 DC application for docketing and regulatory review. During 2014, KHNP and KEPCO continued interactions with the NRC to resolve the issues identified by the NRC during the acceptance review. KHNP and KEPCO resubmitted the APR1400 DC application in December 2014 and the NRC staff has begun conducting an acceptance review.

EARLY SITE PERMIT REVIEWS

As part of the licensing process, the NRC can issue an ESP to approve a site for a nuclear power plant independent of an application for a COL. ESPs are valid for 10 to 20 years and can be renewed for an additional 10 to 20 years. After review, the NRC to date has issued four ESPs to the following applicants:

- System Energy Resources, Inc., for the Grand Gulf ESP site (MS)
- Exelon Generation Company, LLC, for the Clinton ESP site (IL)
- Dominion Nuclear North Anna, LLC, for the North Anna ESP site (VA)
- Southern Nuclear Operating Company for the Vogtle ESP site (GA), which includes a limited work authorization

During 2014, the NRC continued its safety and environmental reviews of one ESP application submitted by PSEG Power, LLC, for a site adjacent to Salem Nuclear Generating Station and Hope Creek Generating Station, which currently are in operation in Lower Alloways Creek Township, Salem County, NJ. In August 2014, the NRC issued the draft environmental impact statement (DEIS) for the PSEG ESP application review and the staff expects to issue the final environmental impact statement (FEIS) by September 2015. The NRC continues to engage in pre-application activities for the Blue Castle Nuclear Power Plant ESP application, although the applicant's plans for submitting it remain uncertain.



ACTIVITIES & ACCOMPLISHMENTS

Top, NRC Region II Regional Administrator Victor McCree fields a question at the Commission's Strategic Programmatic Overview of the New Reactors Business Line Briefing.

Above, DNRL Branch Chief John Segala, second from left, and Division of Safety Systems & Risk Assessment (DSRA) Reactor Systems Engineer Anne-Marie Brady, fourth from left, visit the Olkiluoto Unit 3 construction site in Finland.

Right, Laverne Ortiz, a senior program analyst on the Program Management, Policy Development and Analysis Staff, is honored for her 40 years of Federal service by NRO Office Director Glenn Tracy.



COMBINED LICENSE REVIEWS

A COL authorizes a licensee to both construct and operate a nuclear power plant at a specific site. The application for a COL must contain essentially the same information required in applications for a construction permit and an operating license under the 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," licensing process. The COL application must also describe the inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to ensure that the plant has been properly constructed and will operate safely.

In 2012, the NRC issued the first-ever COLs authorizing the building and operation of new nuclear power reactors to Southern Nuclear Operating Company and its co-applicants for Vogtle, Units 3 and 4, located in Georgia, and to South Carolina Electric & Gas Company and South Carolina Public Service Authority for V.C. Summer, Units 2 and 3, located in South Carolina. By the end of 2014, the NRC had issued 28 license amendments for Vogtle Units 3 and 4, and 22 license amendments for V.C. Summer Units 2 and 3.

To be proactive in the scheduling and timely completion of license amendments supporting construction at both Vogtle and V.C. Summer, NRO has implemented routine scheduling calls and an internal system for actively tracking the status of current and future licensing actions. The staff also has instituted pre-application meetings on potentially difficult license amendments. Through the use of these tools, NRO has been successful at ensuring that all license amendments have been issued ahead of the licensees' requested construction need dates.

During 2014, the NRC continued to actively review 8 COL applications to build and operate 12 new large, light-water reactors throughout the United States at the following sites:

- Bell Bend Nuclear Power Plant (PA) (1 Unit)



Employees attend an NRO quarterly strategy session.

- Calvert Cliffs Nuclear Power Plant (MD) (1 Unit)
- Fermi Nuclear Generating Station (MI) (1 Unit)
- Levy County Nuclear Power Plant (FL) (2 Units)
- North Anna Power Station (VA) (1 Unit)
- South Texas Project (TX) (2 Units)
- Turkey Point Nuclear Generating Station (FL) (2 Units)
- William States Lee III Nuclear Generating Station (SC) (2 Units)

In November 2014, the NRC issued the agency's final safety evaluation report (FSER) for the Fermi Nuclear Power Plant Unit 3 COL application and conducted an uncontested hearing to support a licensing decision on the COL application in February 2015.

In January 2014, PPL Bell Bend, LLC (PPL) requested that the NRC withhold further review of the safety portion of the Bell Bend COL application until further notice. PPL requested that the NRC continue to support the necessary environmental review work leading to the issuance of the FEIS. The NRC expects to issue the DEIS for the Bell Bend COL application in April 2015, followed by the FEIS 1 year later.

By March 31, 2014, the NRC suspended all review activities associated with the Comanche Peak COL application at Luminant's request. At the end of 2014, six COL reviews were in a fully suspended status because of changes in the applicants' business strategies. Information on the current review schedule for new reactor COL applications can be obtained from the NRC public Web site at: <http://www.nrc.gov/reactors/new-reactors/col.html>.



The CA05 structural module is placed at V.C. Summer Unit 2.

Photo courtesy of South Carolina Electric & Gas Company.

Photo courtesy of South Carolina Electric & Gas Company



ACTIVITIES & ACCOMPLISHMENTS

Top, the containment vessel bottom head is placed on the basemat of V.C. Summer Unit 3.

Above, Division of Construction Inspection & Operational Programs (DCIP) Director Michael Cheok, second from left, and DNRL Branch Chief Larry Burkbart, center, tour the Vogtle Unit 3 site. They were guided by Senior Resident Inspector Justin Fuller, far left, Construction Resident Inspector Chad Huffman, and Fred Brown, the Region II Deputy Regional Administrator for Construction.

Right, the first of three containment vessel rings for the V.C. Summer Unit 2 is placed.

Photo courtesy of South Carolina Electric & Gas Company



Oversight

In 2014, the New Reactor Program achieved significant milestones in oversight responsibilities ranging from construction and vendor inspection to quality assurance and licensee performance assessment. The U.S. Nuclear Regulatory Commission's (NRC's) role in new reactor construction oversight includes inspecting (1) construction and operational programs, (2) the licensees' completion of their inspections, tests, analyses, and acceptance criteria (ITAAC), and (3) vendors supplying components and services for construction.

The primary goal of the New Reactor Program in 2014 was to ensure the safe construction of the new reactors: four Advanced Passive 1000 (AP1000) units at the Vogtle and Summer sites, and Watts Bar Unit 2. After the NRC issued combined licenses (COLs) to Southern Nuclear Operating Company and its co-applicants in February 2012 for two AP1000 units at the Vogtle Electric Generating Plant near Augusta, GA, and to South Carolina Electric & Gas Company and South Carolina Public Service Authority in March 2012 for two AP1000 units at the V.C. Summer Nuclear Station, the pace of construction inspection increased significantly. In 2014, construction activities for Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3, focused on the nuclear island and fabrication of steel containment and structural modules. NRC oversight activities focused on inspection of the licensees' quality assurance programs, welding, security, civil engineering structures, digital instrumentation and control system engineering, as well as manufacturing of key components such

as squib valves and reactor coolant pumps. Watts Bar Unit 2 is in the final stages of construction, with completion expected in 2015.

In April 2014, agency staff issued SECY-14-0049, "Construction Reactor Oversight Process Self-assessment for Calendar Year 2013." The staff concluded that the cROP provided effective oversight by meeting program goals and achieving intended outcomes. The staff also identified and acted upon opportunities to strengthen program effectiveness and implementation. The staff will continue to solicit input from internal and external stakeholders to further improve the cROP based on feedback and lessons learned.

The key elements of the cROP process include inspection of construction activities, assessment of licensee performance during construction, and enforcement of noncompliance with regulatory requirements. Similar to Reactor Oversight Process (ROP) practices used for operating nuclear power plants, the NRC periodically meets with interested stakeholders to collect feedback on the effectiveness of the process, which is then considered in making future refinements to the cROP.

The agency's most recent performance assessments show that reactor construction is being conducted safely at all five units. Based on the licensee's performance and the results of NRC inspections in 2014, the agency will continue performing the baseline inspection program, providing a standard level of regulatory oversight. Plant assessments and the latest cROP related information are publicly available on the NRC's Web site, <http://www.nrc.gov/>.



An aerial perspective of the Vogtle Unit 3 and 4 construction site.

Photo courtesy of Georgia Power, a Southern Company

Photo courtesy of NRC Resident



Top, NRC Resident Inspector Patrick Donnelly inspects the V.C. Summer Unit 3 nuclear island rebar.

Above, Alain Artayet, NRC senior inspector, checks the fit-up of the containment vessel lower ring to the bottom head at V.C. Summer Unit 2.

Right, NRC employees and other international regulators gather on the steps of the Friendship Palace in Beijing, China, the site of the 10th Meeting of the Multinational Design Evaluation Programme AP1000 Working Group. NRC employees pictured include Andrea Valentin, Kerri Kavanagh, LaDonna Suggs, Bruce Bavol, Larry Burkhart and Kirk Foggie.

Photo courtesy of NRC Resident



ACTIVITIES & ACCOMPLISHMENTS

Photo courtesy of Getachew Tesfaye



In early 2013, the NRC completed its first year of construction oversight under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” process. To learn from these experiences, an agency working group performed a self-assessment of NRC licensing and inspection requirements, policies, procedures, and practices during the first year of post-COL implementation of 10 CFR Part 52. The NRC conducted an extensive outreach effort to solicit feedback from external and internal stakeholders and performed in-depth reviews of the actions taken by the staff following the issuance of the four COLs. In July 2013, the working group issued a self-assessment report that concluded that the NRC staff conducted regulatory activities with safety as its primary goal, but that efficiency could be improved through some minor changes to the NRC processes. The staff has completed several actions associated with the report and is in the final stages of the remaining actions.

Construction resident inspectors and region-based inspectors conduct the majority of inspection activities, with the support of headquarters staff as needed. NRC Region II has assigned staff to both Vogtle and V.C. Summer construction resident inspector’s offices. Each office now has a construction senior resident inspector and two construction resident inspectors. In addition, Region II routinely sends construction inspectors from the NRC’s Region II office in Atlanta, GA, to conduct team inspections of construction activities at the sites. Over time, the number of full-time construction resident inspectors at the site will increase to mirror the level of construction activity (from three to about five inspectors).

In 2014, the NRC completed its review of eight ITAAC Closure Notifications (ICNs) for the Vogtle Units 3 and 4 and 17 ICNs for Summer Units 2 and 3. ITAAC are identified as those construction activities that, if met, provide reasonable assurance that a facility has been constructed and will operate in conformance with the COL and the NRC’s regulations. The licensee is responsible for completing the ITAAC. The NRC’s inspection program samples the licensee’s processes for ITAAC completion and performs inspections to verify that the licensee has met all ITAAC acceptance criteria. The staff reviews all ICNs to determine whether they contain sufficient information to demonstrate that the ITAAC have been successfully completed. The staff is developing the comprehensive administrative and legal procedures that will be used to conduct

potential hearings associated with the NRC’s decision to authorize loading of fuel in new reactors. These procedures were published for public comment and considered the feedback provided by external stakeholders, and have been presented to the Commission for approval. Based on current construction schedules, the first hearings could occur in late 2016.

New Reactor Program enforcement activities include processing enforcement actions and coordinating reviews with the Office of Enforcement (OE) and regional offices. The Enforcement Policy was revised in June 2012 and again in January 2013 to address, in part, lessons learned during the initial phases of construction. Plans are to issue a new revision to the Enforcement Policy in 2015 to incorporate the guidance contained in Enforcement Guidance Memorandum (EGM) 11–006, “Enforcement Actions Related to the Construction Reactor Oversight Process.” In addition, the Enforcement Manual that provides the staff direction for implementing the policy was revised and issued on September 9, 2013. This revision included the guidance in EGM 11–006, as well as additional guidance based on lessons learned during construction. As part of the periodic cROP self-assessment, the staff will continue to identify lessons learned and evaluate the need for additional NRC Enforcement Policy revisions.

In 2014, the Construction Experience (ConE) Program continued to provide NRC inspectors and the NRO technical reviewers with valuable insights on the design, construction, and testing of new reactors. The ConE program evaluated domestic operating experience (OpE) and ConE related to new reactor design, construction, and testing. This resulted in the issuance of more than 20 newsletters, internal communications, and generic communications. The ConE staff also evaluated past operating and construction experience events to identify recurring issues related to deficient design control, inadequate as-built verification, and inadequate testing. The ConE staff also supported international information sharing by evaluating more than 50 events from the International Reporting System and uploading 20 events to the international Construction Experience database.

VENDOR INSPECTION PROGRAM

Overseeing manufacturers and suppliers of safety-related components is an important aspect of the oversight program. NRC inspectors determine if licensees are appropriately carrying

Photo courtesy of Georgia Power, a Southern Company



ACTIVITIES & ACCOMPLISHMENTS

Top, the Vogtle Unit 4 nuclear island.

Above, DCIP Director Michael Cheok briefs the Commission at the Strategic Programmatic Overview of the New Reactors Business Line Meeting.

Right, Alan Torres, SCE&G General Manager for Nuclear Plant Construction, leads a tour of the V.C. Summer Unit 2 nuclear island during an NRC senior management quarterly visit. Pictured with Torres, left to right, are Region II Regional Administrator Victor McCree, NRO Office Director Glenn Tracy and DCIP Deputy Director Andrea Valentin.

Photo courtesy of NRC Resident



out technical requirements and if they are in compliance with quality assurance and defect reporting requirements. The NRC conducted vendor inspections at manufacturers' and suppliers' facilities principally to examine, through observation of safety significant activities, their compliance with Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," as required by procurement contracts with licensees.

The Vendor Inspection Center of Expertise, housed in the Office of New Reactors, supports procurement-related inspections within the framework of the cROP and ROP, and initiatives to address and deter the potential use of counterfeit, fraudulent, and suspect items (CFSIs) in safety-related applications. It also inspects both new and existing reactor plant vendors to support allegation resolution. In fiscal year (FY) 2014, the staff conducted 35 vendor inspections, three observations, and three assists to other organizations. Of significance, the NRC led inspectors from the United States, United Kingdom, and France on the first Multinational Design Evaluation Program (MDEP) inspection at a manufacturer of steam generator tubes in France. In FY 2014, the center sponsored the 4th Vendor Oversight Workshop, attended by 415 domestic and international stakeholders including industry organizations, regulators, and component and material vendors.

The NRC also observes licensee oversight of manufacturers and suppliers. Licensees typically perform such oversight audits through participation on the Nuclear Procurement Issues Committee. The NRC also performs inspections to determine whether applicants for design certifications, early site permits, or COLs have effectively implemented quality assurance processes and procedures for 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 with selected portions of Appendix B to 10 CFR Part 50.

The agency conducts an annual self-assessment of its vendor inspection program to ensure that it continues to effectively identify emergent issues. The NRC staff is soliciting information from the nuclear industry to expand its internal database of vendor information, which is used to inform inspection activities. The NRC staff continues

to make progress on its rulemaking efforts to clarify 10 CFR Part 21, "Reporting of Defects and Noncompliance," consistent with its proposal in Commission paper SECY-11-0135, "Staff Plans to Develop the Regulatory Basis for Clarifying the Requirements in Title 10 of the *Code of Federal Regulations* Part 21, 'Reporting of Defects and Noncompliance.'" The staff maintained its stakeholder engagement throughout 2014, and is in the process of revising the draft regulatory basis based on feedback from the industry. The staff is also developing draft rule language that it intends to include with the issuance of Revision 1 to the draft regulatory basis.

Additionally, the staff continues to implement the counterfeit, fraudulent, suspect items action items outlined in a 2011 Commission paper that assesses the agency's response to CFSI and provides recommendations for staff implementation. The staff engaged industry in developing practices and providing practical guidance that can be carried out as part of the licensee's quality assurance program to prevent CFSIs from entering the supply chain. In early 2015, the staff published, SECY-15-0003, "Staff Activities Related to Counterfeit, Fraudulent, and Suspect Items," a Commission paper that provided a status of ongoing CFSI activities and assessed the effectiveness of completed actions. Officials from NRO continued to lead a Nuclear Energy Agency (NEA) task group effort to increase information sharing of CFSI incidents among the international community. In addition, a new CFSI section of the agency Web site was launched in late 2014. www.nrc.gov/about-nrc/cfsi.html.

OPERATOR LICENSING

The NRC staff continues to develop and refine the operator licensing process for new reactors. The agency issued the latest revision to NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," in December 2014. This NUREG is used to develop and administer operator licensing examinations that meet all regulatory requirements. This revision incorporates the specific attributes of both the AP1000 and Advanced Boiling Water Reactor designs.

The agency continues to prepare NRC examiners and inspectors for AP1000 construction and operation. In May 2014, the NRC commenced Westinghouse AP1000 simulator and classroom training.



ACTIVITIES & ACCOMPLISHMENTS

Top, Division of Advanced Reactors & Rulemaking (DARR) employees Yanely Malave-Velez, Dennis Galvin, and George Tartal are recognized for their roles in finalizing the ESBWR design certification rulemaking. NRO Office Deputy Director Gary Holaban, far left, and Branch Chief Joseph Colaccino were on hand to help acknowledge the trio.

Above, DARR Director Michael Mayfield offers his insights at the New Reactor Program Commission Meeting.

Right, a schematic of the large pool of water that holds NuScale Power Modules.



Illustration courtesy of NuScale

Advanced Reactor Program

The past year has been an exciting and challenging one for the Office of New Reactors. It continues to enhance its regulatory infrastructure to support planning, and infrastructure development for advanced reactor applications by implementing timely and effective policy decisions.

In fact, the NRC and the Department of Energy (DOE) are working on an initiative to develop advanced reactor design criteria that could be used for the licensing of advanced non-LWR designs. In an historic development, the DOE completed a draft set of possible general design criteria for advanced reactors and submitted it to the NRC in December 2014. The intended outcome of this first-of-a-kind initiative is NRC-issued regulatory guidance for use by NRC staff and future non-LWR applicants.

Although vendors and advocates have approached the NRC regarding a variety of reactor technologies, the NRC staff continues to focus its attention on light-water small modular reactors (SMRs) because of expected near-term application submittals. The NRC staff has undertaken a variety of activities to prepare for the SMR applications that are expected to be submitted beginning in 2015. In addition, NRO staff continues to develop and carry out a strategy to ensure that the NRC is ready for advanced reactor designs.

The following sections briefly describe the status of SMR designs that are currently the subject of pre-application activities with the NRC:

NUSCALE POWER™, LLC

On March 10, 2014, NuScale Power, LLC (NuScale), provided a letter to the NRC entitled, “NuScale Power Updated Response to Regulatory Information Summary (RIS) 2013–18 for Design Certification Application Submittal Date,” which modified the design certification application date previously provided in its response to RIS 2012–12, “Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs,” dated December 28, 2012. NuScale announced a new DC application submittal date for the second half of calendar year (CY) 2016. In support of its application, NuScale was awarded up to \$217 million from the Department of Energy (DOE). NuScale and DOE completed their SMR Cooperative Agreement on May 28, 2014.

NRC and NuScale personnel have continued to discuss various design-specifications, such as steam and power conversion systems, electrical systems, control room and plant staffing, source

term, auxiliary systems, instrumentation and controls, severe accident analysis, emergency planning zone, and containment design. The NRC also is developing a design-specific review standard (DSRS) for the NuScale design and expects to issue a draft in 2015.

GENERATION mPOWER LLC AND BABCOCK & WILCOX COMPANY

Since mid-2009, the NRC staff has been engaged in pre-application interactions with the Babcock & Wilcox Company (B&W), and subsequently Generation mPower LLC (GmP), in preparation to receive an application for certification of the mPower SMR design. On April 14, 2014, B&W announced plans to restructure its mPower SMR Program with a substantial decrease in annual spending. Currently, it is unclear when a design certification application would be tendered for the mPower SMR design.

The NRC has had very limited pre-application interactions with B&W and GmP since Spring of 2014. However, one technical topic has remained under review during this time: the topical report, “Validation of B&W mPower Core Design Methods.” In anticipation of an application related to the mPower design, the NRC staff developed the first DSRS. It functions like the standard review plan addressing safety and risk categorization for the systems, structures, and components of the mPower design. Issuance of the final DSRS is on hold until confirmation is received that the mPower design application will be tendered, and that the tendered design will be sufficiently similar to the assumptions used to develop the DSRS, ensuring adequacy of the new guidance.

TENNESSEE VALLEY AUTHORITY (TVA) CLINCH RIVER

TVA has stated that it currently plans to apply for a 10 CFR Part 52 (“Licenses, Certifications, and Approvals for Nuclear Power Plants”) early site permit (ESP) for the Clinch River site near Oak Ridge, TN, in the Fall of 2015. This application will be based upon a plant parameter envelope characterizing several light-water SMR designs. The NRC staff will be conducting meetings with TVA to discuss site safety and environmental issues in preparation for this application. TVA has also stated that it anticipates submitting a 10 CFR Part 52 combined license application about 6 months after a vendor submits an application requesting certification of the proposed design to be deployed at Clinch River.

Photo courtesy of Georgia Power, a Southern Company



Top, concrete placement in the Vogtle Unit 3 auxiliary building area.

Above, NRC Chief Financial Officer Maureen Wylie addresses the current budget environment at an NRO All Hands Meeting.

Right, a cutaway and outer view of a Holtec reactor vessel.

ACTIVITIES & ACCOMPLISHMENTS

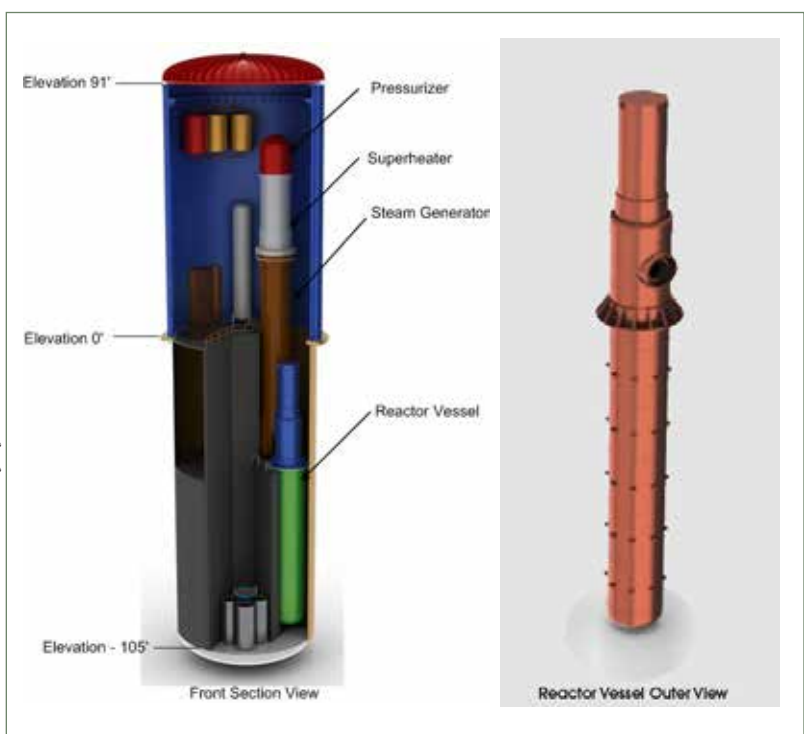


Illustration schematic courtesy of Holtec

HOLTEC

Holtec is developing the Holtec SMR 160 design, which features a 160-MWe power output. On January 30, 2014, Holtec International provided a response to RIS 2013–18, “Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs.” In the response, Holtec noted that the current SMR 160 design project work is focused on the engineering and analysis activities necessary to complete the plant design-specification and underpinning engineering records in advance of preparing a design certification application. Holtec previously communicated plans to submit a design certification application during the fourth quarter of CY 2016 in its RIS 2012–12 response. However, it is now reevaluating this date.

WESTINGHOUSE

Westinghouse is developing a 225-megawatt electric (MWe) power output SMR (WSMR) design and has stated that the smaller scale features of the WSMR are analogous to those of the AP1000 design certified under 10 CFR Part 52.

The NRC staff held pre-application activities with Westinghouse at NRC headquarters on several occasions in past years and discussed topics such as reactor design, security and seismic issues, soil and structures, piping, and safety analysis. In addition, the NRC staff is finalizing a topical report regarding Westinghouse’s identification and ranking of small break loss-of-coolant accident phenomena. Westinghouse responded to RIS 2013–18 and stated that it intends to submit a design certification for the WSMR in the future, but did not specify a date.

OTHER REACTOR TECHNOLOGIES

Several private industry reactor designers and vendors have held discussions with the NRC regarding different non-LWR designs. The NRC staff maintains awareness of DOE’s research programs for non-LWR technologies and the development of non-LWRs within the international community. The NRC will chair a new working group at the Nuclear Energy Agency (NEA) that will focus on policies and safety aspects related to non-light-water reactor designs. This group will consist of regulators from different countries and will allow for proactive information sharing and discussion.



Photo courtesy of South Carolina Electric & Gas Company

The V.C. Summer Unit 2 nuclear island.



ACTIVITIES & ACCOMPLISHMENTS

Top, Jack Zhao, Division of Engineering Senior Electronics Engineer-Digital I&C, shares his insights and observations regarding his rotational assignment in China. Zhao is the first-ever NRC engineer to serve a rotational assignment at the Chinese National Nuclear Safety Administration headquarters.

Above, Scott Flanders, Director of the Division of Site Safety & Environmental Analysis, and NRO Office Director Glenn Tracy listen to a presentation in the Fukushima Daiichi Control Room simulator during an NRC Senior Leadership visit to Fukushima Daiichi.

Right, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd officials submit to NRO an application for certification of the APR1400 Reactor Design. The acceptance review is underway.



International Cooperation

The Office of New Reactors' international mission continues to center on leveraging its resources and knowledge with the experiences of national regulatory authorities around the world. The NRC plays a proactive role in the international community through mutually beneficial exchanges of information on the design, siting, and construction of new reactors.

The New Reactor Program also plays a key role in the NRC's international cooperative activities. NRO management and staff support the Organisation for Economic Co-operation and Development (OECD) / Nuclear Energy Agency (NEA) activities through representation on the Committee of Nuclear Reactor Activities (CNRA), and participation in CNRA-directed working groups and senior-level task groups. The Multinational Design Evaluation Program (MDEP), for which the NEA is the technical secretariat, is one example of the NRC's key international cooperative activities. This international body is comprised of regulatory authorities from 14 countries that cooperate on the licensing review for new reactor designs. In 2014, the NRC Chairman served as the chair of the MDEP Policy Group, and the NRC staff chaired three of the MDEP working groups. NRO staff actively participates in five other MDEP working groups.

NRO also engages counterparts, multilaterally, under the International Atomic Energy Agency (IAEA). NRO staff lead forums such as the IAEA small modular reactor (SMR) forum, which is well underway with its detailed plan for engaging participants and initiating discussions on mutual regulatory issues concerning the licensing of SMRs.

Bilaterally, NRO continues to meet individually with nuclear regulatory authorities from Canada, China, Czech Republic, France, Finland, India, Japan, Republic of Korea (ROK), United Arab Emirates, and the United Kingdom, in the areas of new reactor licensing, construction, and inspection. NRO staff conducted joint inspections around the world with foreign regulatory counterparts from China, France, Japan, and ROK. NRO also provides regulatory assistance to countries such as Indonesia, Lithuania, Poland, and Vietnam, all of which are on a path to develop or expand their nuclear programs.

In addition to NRO's bilateral activities with the previously mentioned countries, NRO continues to foster the NRC's memorandum of agreement with Chinese and Indian regulatory counterparts through the respective Steering Committee and bilateral activities. NRO had the opportunity to send the first-ever NRC engineer to serve on a rotational assignment at the National Nuclear Safety Administration (NNSA) in Beijing. The NRO Office Director leads the U.S. NRC-China NNSA Steering Committee and its annual meetings. The NRO Director of the Division of Engineering co-leads, along with the Deputy Director of the Office of Nuclear Regulatory Research, the coordination of bilateral activities with India. This includes a separate semiannual bilateral meeting and coordination with the U.S. Department of Energy and the U.S. Department of State. In FY 2014, the NRC hosted both the NRC NNSA/China Steering Committee and the U.S. NRC India Atomic Energy Regulatory Board (AERB) bilateral meetings in the United States. In both meetings, each side agreed to continued cooperation in mutually beneficial areas such as siting, construction inspection, and staff exchanges. ■



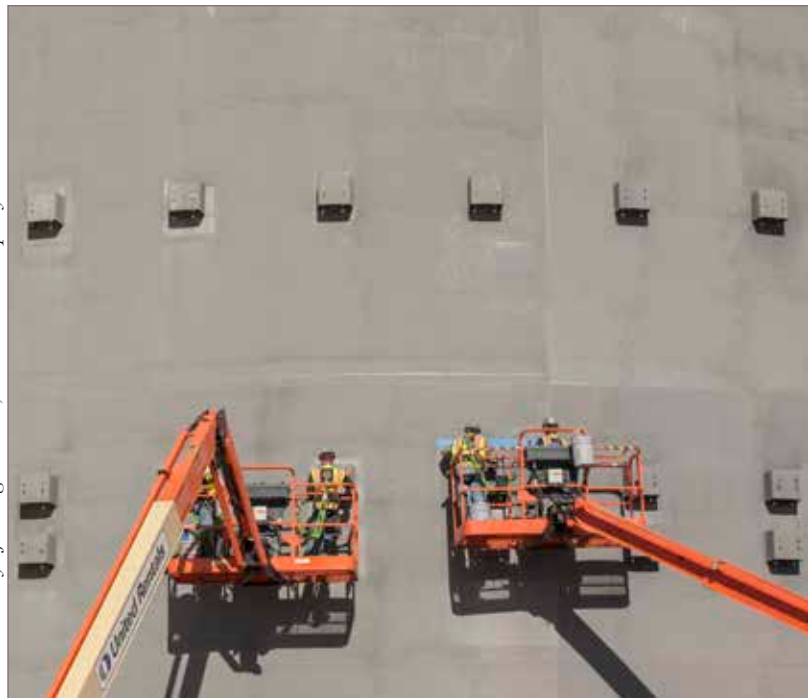
The Chair of the Multinational Design Evaluation Programme AP1000 Working Group, DNRL Branch Chief Larry Burkhart, center, welcomes group members including those from Canada, China, Sweden, United Kingdom and the United States. The group discussed current AP1000 design reviews and assessments, design-related construction issues, manufacturing, and Fukushima lessons learned.

A LOOK AHEAD

Photo courtesy of Vogtle Resident Office



Photo courtesy of Georgia Power, a Southern Company



Governed by our enduring focus on safety, the New Reactor Program steadfastly continues to meet the demanding goals generated by our primary program areas of new reactor licensing, oversight of vendor and construction inspection, advanced reactors, and international leadership and cooperation. During the past year, this was mainly achieved by the safe closure of our top-priority projects, a proven strategy that helped us define clear objectives and timeliness goals amidst a volatile and uncertain environment.

As we look toward the remainder of 2015 and beyond, we fully understand the progressively demanding challenges that await us. We embrace these challenges as an intrinsic part of our responsibilities to help fulfill the agency's mandate to protect public health and safety, the environment, and to promote the common defense and security. Furthermore, we embrace the mission of the New Reactor Program 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.

The hallmark of new reactor licensing efforts will remain an agility centered on comprehensive safety-focused procedures, including our review process. In addition, Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," and the design-centered review approach will help us to further bolster combined license standardization for selected designs while we carry out our regulatory responsibilities across the licensing landscape.

License amendments and other licensing activities will expand the areas of regulatory emphasis to areas such as operator licensing, digital instrumentation and control system design verification, and system and component design requirements. We will build on the significant achievements of the past year during which the New Reactor Program issued 28 license amendments for Vogtle Units 3 and 4, and 22 such amendments for V.C. Summer Units 2 and 3, to support ongoing safe construction.

Meanwhile, our construction inspection activities at the Watts Bar 2, Vogtle 3 and 4, and Summer 2 and 3 sites will remain aggressive and forward looking. As we pursue our top priority of safety, we will continue to inspect and verify inspections, tests, analyses, and acceptance criteria closure, oversee licensing operators, and further develop and implement initial testing program oversight. At the same time, we will enhance our vendor inspector activities to verify the integrity of the supply chain domestically and internationally. In addition, the New Reactor Program will bolster its efforts to maximize its robust partnership with the international community by leveraging its worldwide construction experience to strengthen its knowledge base.

In the advanced reactor arena, we will intensify our multi-faceted approach that includes pre-application interactions with potential applicants, developing the necessary infrastructure, and addressing the seminal policy issues associated with new reactor technologies and designs.

Clearly, the next several years will be decisive ones for the New Reactor Program. A volatile environment, the first-time implementation of Part 52 construction, design changes, modular construction, and the procurement of components are among the key challenges faced by the program. However, we have put in place the necessary strategies to confront them—agility, the implementation of lessons learned, effective communications, current and long range strategic planning, and proactive and cogent international cooperation.

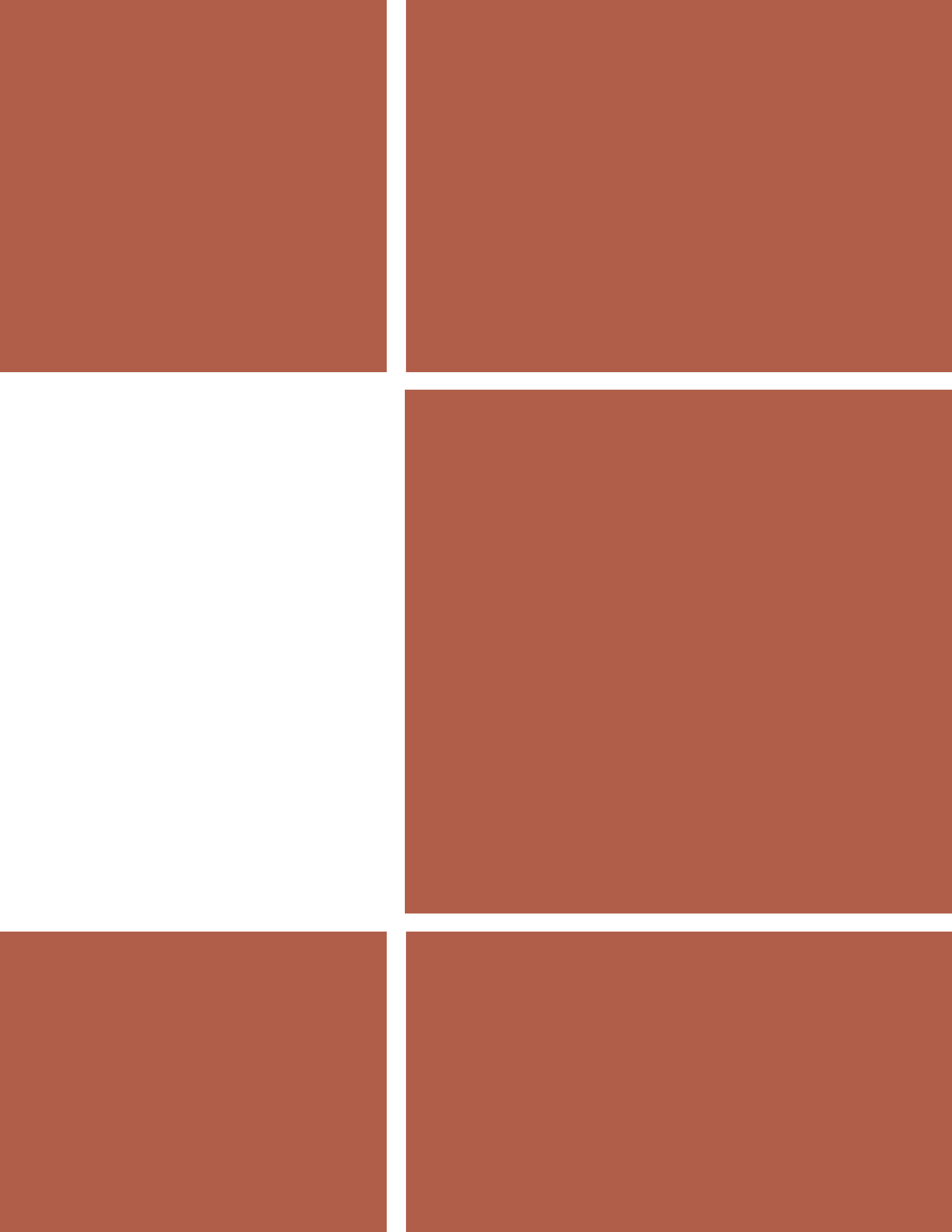
While change will continue to permeate the new reactor environment in the ensuing years and beyond, the mission of the New Reactor Program has not changed since the inception of the Office of New Reactors in 2006. We will continue to serve the public interest by enabling the safe, secure, and environmentally responsible use of nuclear power in meeting the Nation's future energy needs. ■



Photo courtesy of Vogtle Resident Office









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