Protecting People and the Environment

SEMIANNUAL STATUS REPORT ON THE LICENSING ACTIVITIES AND REGULATORY DUTIES OF THE U.S. NUCLEAR REGULATORY COMMISSION

October 2017–March 2018

Note: The period of performance covered by this report includes activities that occurred from the first day of October 2017 to the last day of March 2018. The transmittal letter to Congress accompanying this report provides additional information to keep Congress fully informed on the current licensing and regulatory activities of the U.S. Nuclear Regulatory Commission.

Enclosure

CONTENTS

I. Reactor Oversight Process

The U.S. Nuclear Regulatory Commission (NRC) continues to use the Reactor Oversight Process (ROP) at all nuclear power plants to assess the performance of reactor licensees and to guide the assignment of inspection resources. Using inputs from both self-assessments and independent evaluations, the NRC continuously assesses the ROP to enhance its effectiveness and efficiency. The NRC staff meets with interested stakeholders periodically to collect feedback on the effectiveness of the process and considers this feedback when making improvements to the ROP.

The agency's most recent performance assessments show that all plants continue to operate safely. The staff continues to conduct assessment reviews, communicate changes in the assessment of licensee performance quarterly, and issue end-of-cycle assessment letters. The NRC issued the annual assessment letters in early 2018. The staff has updated the Web site to reflect the latest performance assessments as of the end of the fourth quarter of calendar year (CY) 2017.

II. Implementing Risk-Informed and Performance-Based Regulations

Currently, 46 operating nuclear power reactors have committed to transitioning to the risk-informed, performance-based fire protection licensing basis permitted under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.48(c), also known as National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." Of these 46 reactor units, 41 have already transitioned to the Standard 805 licensing basis, and the NRC staff is currently reviewing 3 other transition plans. The NRC anticipates completing its evaluation of the three plans by the end of the third quarter of fiscal year (FY) 2018. The agency expects to receive one license amendment application for the remaining two reactor units in the third quarter of FY 2018.

The industry communicated its plans to submit, in the near future, many applications under 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." In 2014, the NRC reviewed and approved the pilot application for Vogtle Electric Generating Plant (Vogtle). Currently, the NRC has received eight 10 CFR 50.69 applications. The agency has accepted three applications for review, while the acceptance review process continues for the other five.

After the March 2011 event at the Fukushima Dai-ichi nuclear power plant in Japan, the NRC developed and issued orders to implement a comprehensive set of recommendations. These recommendations would enhance the mitigating strategies for maintaining or restoring core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event. The Commission is also reviewing a draft final rule that would make the order requirements generically applicable. Although the equipment and strategies were specifically intended to mitigate the effects of a beyond-design-basis external event, the NRC recognizes that the equipment can also be used for other functions (e.g., to support refueling outages, as defense-in-depth measures). The NRC staff is evaluating how mitigating strategies equipment (referred to as FLEX) may be credited in various risk-informed regulatory decisions. This evaluation will be informed, in part, by a guidance document from the Nuclear Energy Institute (NEI) 16-06, "Crediting Mitigating Strategies in Risk-Informed Decision Making," which outlines a three-tiered approach for evaluating the potential safety benefits of plant mitigation strategies: (1) qualitative assessment, (2) semiquantitative streamlined assessment, and (3) full probabilistic risk assessment (PRA). NEI has not requested endorsement of this guidance

document; however, the NRC staff reviewed the document and developed a draft staff position for consideration when licensees use the approach for requesting credit in various risk-informed decisionmaking areas.

III. Status of Issues Tracked in the Reactor Generic Issues Program

During this reporting period the staff continued its evaluation of three open generic issues (GIs) and two proposed GIs. For the two proposed GIs, the staff continued its assessment of a potential GI involving the effects of high-energy arcing faults involving aluminum at nuclear power plants to determine whether the issue should proceed to the regulatory office implementation stage of the GI process. The staff is conducting a workshop with stakeholders in April 2018 to discuss future activities to resolve the issue. During this reporting period, the staff received a new potential GI on the adequacy of licensees' procedures to address anticipated operational occurrences. The staff determined that there is no immediate safety concern and is evaluating whether the issue meets all the screening criteria to proceed in the GI program.

The open GIs currently in the regulatory office implementation stage are GI-191, GI-199, and GI-204. The subsections below summarize the actions associated with these three open GIs. Additional information on the status of open GIs can be found on the GI dashboard on the NRC's public Web site at http://www.nrc.gov/about-nrc/regulatory/gen-issues/dashboard.html.

GI-191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance"

GI-191 concerns the possibility that, after a loss-of-coolant accident in a pressurized-water reactor (PWR), debris accumulating on the emergency core-cooling system (ECCS) sump screen may result in clogging and restriction of water flow to the pumps. As a result of GI-191, all PWR licensees increased the size of their containment sump strainers, significantly reducing the risk of debris clogging the strainers. Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004, also considered a related issue: the potential for debris to pass through the sump strainers and enter the reactor core.

In 2008, the NRC staff determined that additional industry-sponsored testing was necessary to resolve this issue, and in 2012, the NRC approved the industry topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," as an acceptable model for assessing the effects on core cooling from fibrous, particulate, and chemical debris reaching the reactor vessel. This included a conservative generic limit on the amount of fiber reaching the core.

The PWR Owners Group developed a methodology to justify higher in-vessel limits using plant-specific analyses and submitted topical report, WCAP-17788, "Comprehensive Analysis and Test Program for GSI-191 Closure (PA-SEE-1090)—Cold Leg Break (CLB) Evaluation Method for GSI-191 Long-Term Cooling." The NRC staff anticipates completing its review of this topical report by the end of 2018.

SECY-12-0093, "Closure Options for Generic Safety Issue-191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance," dated July 9, 2012, proposed three options for closure of GSI-191, and in response, the Commission approved these options

on December 14, 2012. Licensees have since notified the NRC of the option that they have selected and are developing proposed technical resolutions for the staff to review.

There are 36 operating reactor sites subject to GI-191. All of the nine operating reactor sites that chose Option 1 using WCAP-16793 have submitted their evaluations. The NRC staff reviewed these evaluations and closed the issue for these plants.

The remaining operating reactor sites chose Option 2, which involves implementing mitigative measures and selecting a deterministic or risk-informed approach. Most intend to use topical report WCAP-17788 to evaluate in-vessel debris effects. Plants that elect to use a risk-informed approach are following the pilot plant for that method, South Texas Project, which closed the issue in the summer of 2017. No sites are pursuing Option 3, which involves separating the regulatory treatment of the sump strainer and in-vessel effects.

The NRC is currently reviewing closure letters for GL 2004-02 from St. Lucie Plant, Turkey Point Nuclear Generating, Point Beach Nuclear Plant, and Seabrook Station, which it received in December 2017 and January 2018. As of April 2, 2018, the staff had completed 10 of 31 evaluations for PWR operating reactor sites. Based upon current schedules, the staff expects all activities associated with this GI to be completed by the end of 2020.

GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States for Existing Plants"

This GI addresses how current estimates of the seismic hazard level at some nuclear sites in the Central and Eastern United States might be higher than the values used in their original designs and previous evaluations. The scope was expanded later to include Western United States plants. Following collaboration with the Electric Power Research Institute (EPRI), the NRC staff issued a safety/risk assessment report, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants." The NRC staff issued Information Notice 2010-18, "Generic Issue 199, 'Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants,'" dated September 2, 2010.

After the nuclear event at Fukushima, the NRC incorporated GI-199 into the work being performed in response to the accident, which this report discusses further in Section X, "Response to Lessons Learned from the Fukushima Accident in Japan."

As of April 2, 2018, the NRC staff had completed its assessment and closed out actions concerning seismic hazard reevaluations for 42 of the 60 operating reactor sites. Based upon current schedules, the staff expects that it will complete activities associated with this GI by the end of 2020.

GI-204, "Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures"

This GI relates to potential flooding effects from upstream dam failures on nuclear power plant sites, spent fuel pools, and sites undergoing decommissioning with spent fuel stored in spent fuel pools. The NRC is addressing this GI as part of the efforts associated with the NRC response to the Fukushima nuclear accident, which this report discusses further in Section X.

As of April 2, 2018, the NRC staff had completed its assessment and closed out all required actions concerning flooding hazard reevaluations for 36 of the 60 operating reactor sites. Based

upon current schedules, the staff expects that it will complete the activities associated with this GI by the end of 2021.

IV. Licensing Actions and Other Licensing Tasks

Licensing actions related to operating power reactors include orders, license amendments, exemptions from regulations, relief from inspection or component testing, topical reports submitted on a plant-specific basis, or other actions requiring NRC review and approval before licensees can carry out certain activities.

Other licensing tasks for operating power reactors include the following:

- licensees' responses to NRC requests for information through GLs or bulletins;
- NRC review of generic topical reports;
- updates to final safety analysis reports; and
- other licensee actions that do not require NRC review and approval before licensees can carry them out.

The FY 2018 NRC Congressional Budget Justification incorporates two output measures related to other licensing tasks: (1) the number of other licensing tasks completed each year and (2) the age of the other licensing task inventory.

Table 1 shows the actual FY 2014 through FY 2018 results to date and the FY 2018 goals for the NRC Congressional Budget performance indicators for operating power reactor licensing actions and other licensing tasks.

The agency continues to communicate with licensees to maintain relevant information on planned licensing submittals. The NRC's senior management remains fully engaged in monitoring the licensing action workload to maintain target performance goals.

Table 1 Results and FY 2018 Goals for Congressional Budget Performance Indicators

CONGRESSIONAL BUDGET PERFORMANCE INDICATORS						
Output Measure	**FY 2014 Actual**	**FY 2015 Actual**	**FY 2016 Actual**	**FY 2017 Actual**	**FY 2018 YTD**	**FY 2018 Goals**
Licensing actions completed per year	607	792	837	967	510	700
Age of inventory of licensing actions	87% ≤1 year and 99% ≤2 years	88% ≤1 year and 99% ≤2 years	95% ≤1 year and 100% ≤2 years	96% ≤1 year and 99% ≤2 years	98% ≤1 year and 99% ≤2 years	95% ≤1 year and 100% ≤2 years
Other licensing tasks completed per year	765	461	641	644	109	300
Age of inventory of other licensing tasks	87% ≤1 year and 100% ≤2 years	87% ≤1 year and 97% ≤2 years	90% ≤1 year and 99% ≤2 years	100% ≤1 year and 100% ≤2 years	98% ≤1 year and 100% ≤2 years	90% ≤1 year and 100% ≤2 years

V. Status of License Renewal Activities

During this reporting period, the NRC reviewed six license renewal applications (LRAs) and conducted the acceptance review of one subsequent LRA for a total of nine power reactors.

Applications Currently under Review

The sections below discuss the status of each application under review during the reporting period.

Indian Point Nuclear Generating, Units 2 and 3

On April 30, 2007, Entergy Nuclear Operations, Inc. (Entergy), submitted an LRA for Indian Point Nuclear Generating, Units 2 and 3, to extend the operating licenses for 20 years beyond the current license periods. In December 2015, the staff issued for public comment a second draft supplement to the December 2010 final supplemental environmental impact statement (SEIS) to address new information and other developments since it published Supplement 1 to the final SEIS in June 2013. The staff has received a new biological opinion, concluding consultation with the National Marine Fisheries Service, and expects to issue the final SEIS supplement in the third quarter of FY 2018. On November 6, 2014, the staff issued Supplement 2 to the safety evaluation report (SER). The staff briefed the Advisory Committee on Reactor Safeguards (ACRS) on SER Supplement 2 on April 23, 2015. A final SER supplement is expected to be issued in the third quarter of FY 2018. Additionally, activities related to the Atomic Safety and Licensing Board (ASLB) hearing process have concluded. On February 8, 2017, the parties to the legal proceedings filed an unopposed motion before the ASLB seeking permission to withdraw the remaining contentions pursuant to a settlement agreement in which Units 2 and 3 will cease operations no later than April 30, 2024, and April 30, 2025, respectively. On March 13, 2017, the ASLB granted that motion and terminated the adjudicatory proceeding and that decision became final on July 11, 2017.

The operating license for Indian Point Nuclear Generating, Unit 2, was set to expire on September 28, 2013, and the operating license for Unit 3 was set to expire on December 12, 2015. Given the timely submittal of the LRA for both units, NRC regulations and the Administrative Procedure Act permit continued operation of the units until the NRC determines whether to issue renewed licenses. Entergy has implemented aging management programs for both Units 2 and 3, as described in the LRA, and the NRC continues normal reactor oversight to ensure safe operations. The NRC expects to make a decision on renewing the operating licenses for both units in the fourth quarter of FY 2018.

Diablo Canyon Power Plant, Units 1 and 2

On November 24, 2009, Pacific Gas and Electric Company (PG&E) submitted an LRA for Diablo Canyon Power Plant, Units 1 and 2, to extend the operating licenses for 20 years beyond the current license periods. In June 2016, the applicant announced that it had reached an agreement with interested parties not to seek license renewal for Units 1 and 2 and asked the staff to suspend its review of the LRA pending approval of the agreement by the California Public Utilities Commission (CPUC). The applicant further stated that, if CPUC approves the agreement, PG&E would withdraw its LRA. In July 2016, the staff informed the applicant that it had suspended its review of the LRA. The CPUC held a public meeting on January 11, 2018, during which it approved PG&E's proposal to close Diablo Canyon Power Plant in 2025. On March 7, 2018, PG&E requested withdrawal of its LRA. The NRC staff recently issued a response granting PG&E's request and described its response in a *Federal Register* notice.

Seabrook Station, Unit 1

On June 1, 2010, NextEra Energy Seabrook, LLC (NextEra), submitted an LRA for Seabrook Station, Unit 1, to extend the operating license for 20 years beyond the current license period. In July 2015, the staff issued the final SEIS. Additionally, the staff completed activities related to the ASLB hearing process, and no adjudicatory matters are pending before the Commission or the ASLB on the Seabrook LRA. The safety review remains in progress to resolve a technical issue regarding the alkali-silica reaction (ASR) that affects some concrete structures; all other open items documented in the staff's June 2012 SER are closed. In August 2016, NextEra submitted a license amendment request to address ASR in its current licensing basis. The license amendment would revise the current licensing basis to adopt a methodology for the analysis of seismic Category I structures with concrete affected by ASR. This methodology is also the cornerstone for the aging management program being evaluated under the LRA review. Therefore, the staff needs to complete its review of this methodology in the license amendment request before it can reach a decision on the LRA. In addition, on October 6, 2017, the ASLB granted a hearing request admitting one contention on the license amendment request. On October 31, 2017, NextEra appealed the ASLB's admission of the contention. On April 12, 2018, the Commission affirmed the ASLB's decision to admit the contention. This issue remains pending before the ASLB. The staff currently anticipates making a decision on renewing the operating license by April 2019.

Waterford Steam Electric Station, Unit 3

On March 30, 2016, Entergy submitted an LRA for Waterford Steam Electric Station, Unit 3, to extend the operating license for 20 years beyond the current license period. During the reporting period, the staff has continued to work on the safety and environmental LRA reviews and has been addressing specific questions on the Waterford neutron fluence time-limited aging

analysis. The applicant submitted a license amendment request in November 2017 that requested approval of its plant-specific neutron fluence methodology, which is applied to the reactor vessel neutron fluence embrittlement analysis referred to in the LRA. The NRC has completed the acceptance review of this license amendment request, and its safety review is currently underway. The staff estimates that this review will take approximately 1 year. The LRA fluence methodology review is dependent on the approval of the license amendment request. The staff expects to make a decision on renewing the operating license in the third quarter of FY 2019.

River Bend Station, Unit 1

On May 31, 2017, Entergy submitted an LRA for River Bend Station, Unit 1, to extend the operating license for 20 years beyond the current license period. During the reporting period, the staff completed its operating experience, scoping and screening, and aging management program audits. The staff issued requests for additional information and started drafting the SER and environmental impact statement (EIS). Additionally, a petition to intervene and request for hearing were filed in connection with this proceeding. The ASLB ruled the petitioner's contentions inadmissible and denied the petition in January 2018; no appeal was filed from the decision.

Turkey Point Nuclear Generating, Units 3 and 4

On January 30, 2018, Florida Power & Light Company submitted the first subsequent LRA for renewal of the licenses for Turkey Point Nuclear Generating, Units 3 and 4. On February 26, 2018, the NRC staff began the acceptance review for docketing the application. The NRC staff recently determined that the application is acceptable for docketing and issued the application review schedule. The NRC staff has issued a notice of opportunity for hearing to the Office of the Federal Register for publication.

VI. Summary of Reactor Enforcement Actions

The reactor enforcement statistics in the tables below are arranged by region, half FY, FY to date, and two previous FYs for comparison purposes. These tables provide the nonescalated reactor enforcement data, as well as the escalated enforcement data associated with both traditional enforcement and the ROP. The severity level assigned to a violation (i.e., traditional enforcement) generally reflects the significance of a violation. However, for most violations, the significance of a violation is assessed using the significance determination process under the ROP, which uses risk insights, where appropriate, to assist the NRC in determining the safety or security significance of inspection findings identified within the ROP.

These tables are followed by brief descriptions of the escalated reactor enforcement actions associated with traditional enforcement and the ROP (as well as any other significant actions) taken during the applicable fiscal half year.

Table 2 Nonescalated Reactor Enforcement Actions

NONESCALATED REACTOR ENFORCEMENT ACTIONS						
		Region I	Region II	Region III	Region IV	TOTAL
Cited Severity Level IV or Green	1st Half FY 18	2	1	0	2	5
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	2	1	0	2	5
	FY 17 Total	2	5	2	2	11
	FY 16 Total	4	6	2	3	15
Noncited Severity Level IV or Green	1st Half FY 18	43	35	62	73	213
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	43	35	62	73	213
	FY 17 Total	116	120	146	179	561
	FY 16 Total	169	137	171	190	667
TOTAL Cited and Noncited Severity Level IV or Green	1st Half FY 18	45	36	62	75	218
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	45	36	62	75	218
	FY 17 Total	118	125	148	181	572
	FY 16 Total	173	143	173	193	682

Note: The nonescalated enforcement data above reflect the cited and noncited violations either categorized at Severity Level IV, the lowest level, or associated with Green findings during the indicated time periods. The numbers of cited violations are based on Enforcement Action Tracking System data that may be subject to minor changes following verification. The monthly totals generally lag by 30 days because of the time needed for inspection reports and enforcement actions. These data do not include Green findings that do not have associated violations.

Table 3 Escalated Reactor Enforcement Actions Associated with Traditional Enforcement

ESCALATED REACTOR ENFORCEMENT ACTIONS ASSOCIATED WITH TRADITIONAL ENFORCEMENT						
		Region I	Region II	Region III	Region IV	TOTAL
Severity Level I	1st Half FY 18	0	0	0	0	0
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
Severity Level II	1st Half FY 18	0	0	0	0	0
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
Severity Level III	1st Half FY 18	0	1	0	0	1
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	1	0	0	1
	FY 17 Total	1	3	0	1	5
	FY 16 Total	1	0	1	1	3
TOTAL Violations Cited at Severity Level I, II, or III	1st Half FY 18	0	1	0	0	1
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	1	0	0	1
	FY 17 Total	1	3	0	1	5
	FY 16 Total	1	0	1	1	3

Note: The escalated enforcement data above reflect the Severity Level I, II, or III violations or problems cited during the indicated time periods.

Table 4 Escalated Reactor Enforcement Actions Associated with the ROP

ESCALATED REACTOR ENFORCEMENT ACTIONS ASSOCIATED WITH THE REACTOR OVERSIGHT PROCESS						
		Region I	Region II	Region III	Region IV	TOTAL
Violations Related to Red Findings	1st Half FY 18	0	0	0	0	0
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
Violations Related to Yellow Findings	1st Half FY 18	0	0	0	0	0
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
Violations Related to White Findings	1st Half FY 18	0	1	2	0	3
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	1	2	0	3
	FY 17 Total	2	1	4	3	10
	FY 16 Total	2	0	0	0	2
TOTAL Related to Red, Yellow, or White Findings	1st Half FY 18	0	1	2	0	3
	2nd Half FY 18	0	0	0	0	0
	FY 18 YTD Total	0	1	2	0	3
	FY 17 Total	2	1	4	3	10
	FY 16 Total	2	0	0	0	2

Note: The escalated enforcement data above reflect the violations or problems cited during the indicated time periods that were associated with either Red, Yellow, or White findings. These data do not include Red, Yellow, or White findings that do not have associated violations.

Reactor Escalated Enforcement Actions and Other Significant Actions Taken

The information below includes security-related enforcement actions and confirmatory actions not included in Tables 2, 3, and 4. The NRC does not make details of security-related violations publicly available.

Entergy Nuclear Operations, Inc. and Entergy (Grand Gulf Nuclear Station), EA-17-132, EA-17-153

On March 12, 2018, the NRC issued a confirmatory order (CO) to Entergy Nuclear Operations, Inc., and Entergy Operations, Inc. (collectively referred to here as Entergy), to formalize commitments made as a result of an alternative dispute resolution mediation session held on February 6, 2018. The commitments were made as part of a settlement agreement between Entergy and the NRC, based on evidence gathered during two separate investigations in which the NRC had identified multiple examples of apparent violations of the NRC's Deliberate Misconduct Rule by lower level employees at the Grand Gulf Nuclear Station. Entergy first reported the apparent willful violations to the NRC. The violations included (1) an examination proctor providing inappropriate assistance on general employee training examinations given to nonutility (contractor) personnel, and (2) nonlicensed operators failing to tour all required areas of their watch station and entering inaccurate information into the operator logs. In response, Entergy agreed to complete additional wide-ranging and fleetwide corrective actions and enhancements, as fully discussed in the CO. In consideration of the corrective actions and commitments outlined in the CO, the NRC agreed not to issue a Notice of Violation or an associated civil penalty relating to the notice of apparent violations.

Exelon Generation Company (Clinton Power Station), EA-17-203

On February 22, 2018, the NRC issued a notice of violation to Exelon Generation Company (Exelon) for a violation of Criterion XVI, "Corrective Action," of Appendix B, "Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities," at Clinton Power Station, associated with a White significance determination process finding. Contrary to the requirements, Exelon failed to ensure that a condition adverse to quality was corrected. Specifically, Exelon failed to correct a degraded condition identified during an evaluation performed as a result of a Division 3 shutdown service water pump failure in 2014. This failure resulted in a subsequent failure of the pump to run when tested in June 2017. Additionally, there are associated violations of Technical Specification 3.5.1, "ECCS-Operating," which requires high-pressure core spray to be restored to operable within 14 days, and Technical Specification 3.7.2, "Division 3 Shutdown Service Water (SX) Subsystem," which requires the high-pressure core spray to be declared inoperable immediately when SX is inoperable.

Southern Nuclear Operating Company, Inc. (Vogtle Electric Generating Plant, Units 1 and 2), EA-17-166

On February 20, 2018, the NRC issued a notice of violation and proposed imposition of civil penalty in the amount of $145,000 to Southern Nuclear Operating Company, Inc. for a Severity Level III problem at Vogtle Units 1 and 2. At least 13 nonlicensed operators failed to complete their rounds as required by plant procedures but entered data into an electronic log indicating they had completed equipment status checks and area inspections, thereby violating 10 CFR 50.9, "Completeness and Accuracy of Information"; 10 CFR Part 50, Appendix B, Criterion V, "Procedures"; and 10 CFR Part 50, Appendix B, Criterion XVII, "Quality Assurance Records."

Wolf Creek Nuclear Operating Corporation (Wolf Creek Generating Station), EA-17-149

On December 20, 2017, the NRC issued a notice of violation to Wolf Creek Nuclear Operating Corporation, for a violation associated with a Greater-than-Green significance determination process finding at the Wolf Creek Generating Station. The details of the finding are official use only—security-related information.

Tennessee Valley Authority (Sequoyah Nuclear Plant), EA-17-164

On December 13, 2017, the NRC issued a notice of violation to Tennessee Valley Authority (TVA), for a violation associated with a Greater-than-Green significance determination process finding at the Sequoyah Nuclear Plant. The details of the finding are official use only—security-related information.

Exelon Generation Company (Clinton Power Station), EA-17-098

On November 27, 2017, the NRC issued a notice of violation to Exelon Generation Company (Exelon) for a violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," at Clinton Power Station, associated with a White significance determination process finding. Contrary to the requirements, Exelon failed to review for suitability of application replacement relays essential to the safety-related functions of the Division 1 emergency diesel generator (EDG) room ventilation fan. Specifically, Exelon failed to evaluate the change in the actual dropout voltages for replacement relays associated with the Division 1 EDG room ventilation fan, resulting in the safety-related fan becoming inoperable during undervoltage conditions. Additionally, there is an associated violation of Technical Specification 3.8.1, "AC Sources-Operating," for one standby diesel generator being inoperable for longer than the allowed outage time of 14 days.

Dominion Nuclear Connecticut, Inc. (Millstone Power Station), EA-17-077

On November 21, 2017, the NRC issued a CO to Dominion Nuclear Connecticut, Inc. (Dominion), to formalize commitments made as a result of an alternative dispute resolution mediation session held on September 20, 2017. The commitments were made as part of a settlement agreement between Dominion and the NRC, based on evidence gathered during an investigation in which the NRC had identified multiple examples of two apparent violations. The violations involved a (now-former) contract security officer who was employed by G4S Secure Solutions, USA, Inc. as an armorer at Millstone who deliberately failed to (1) perform required maintenance of site weapons and (2) properly conduct monthly inventories of out-of-service weapons. The NRC also determined that the contract security officer deliberately falsified records related to both issues. Because licensees are responsible for the actions of their employees and contractors, the NRC concluded that the contract security officer's actions placed Millstone in violation of NRC requirements and the NRC-approved Millstone Security Plan. In response to the incident, Dominion agreed to complete additional corrective actions and enhancements, as fully discussed in the CO. In consideration of the corrective actions and commitments outlined in the CO, the NRC agreed not to pursue any further enforcement action (including issuance of a civil penalty) relating to the notice of apparent violations, dated July 20, 2017.

Duke Energy Corporation (Catawba Nuclear Station, Unit 2), EA-17-122

On October 16, 2017, the NRC issued a notice of violation to Duke Energy Corporation for a violation of Technical Specification 5.4.1.a, "Procedures," and 10 CFR Part 50, Appendix B, that were associated with a White significance determination process finding at Catawba Nuclear Station, Unit 2. Specifically, the licensee failed to develop adequate preventive maintenance strategies for the EDG excitation system. As a result, a condition adverse to quality associated with elevated diode temperatures was uncorrected. This caused the 2A EDG output breaker to trip open during monthly surveillance testing.

VII. Security and Emergency Preparedness and Incident Response Activities

The NRC continues to maintain an appropriate regulatory infrastructure and perform its licensing and oversight functions to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The NRC's security and emergency preparedness and incident response programs contribute to fulfilling this mission.

Security

The NRC continues to conduct force-on-force (FOF) inspections at each nuclear power reactor and Category I fuel cycle facility on a regular 3-year cycle. Each FOF inspection includes both tabletop drills and exercises that simulate combat between a mock adversary force and the licensee's security force. These inspections assess the ability of power reactor licensees to defend against the design-basis threat (DBT) of radiological sabotage. Category I fuel cycle facilities use a similar process to assess the effectiveness of the licensees' protective strategy against two DBTs—one for radiological sabotage and another regarding theft or diversion of special nuclear material. FOF exercises also provide valuable insights that enable the NRC to evaluate the effectiveness of licensee security programs.

In response to Commission direction, the staff completed, in October 2017, an assessment of the NRC's security baseline inspection program, including FOF. The assessment found that the overall program remains effective; however, the staff identified potential efficiencies and improvements that could be applied throughout the program. Specifically, the staff committed to reviewing and updating the security baseline inspection program significance determination process; reviewing and potentially revising associated inspection procedures; addressing whether crediting operator actions, the use of diverse and flexible mitigation capabilities equipment, or response by Federal, State, and local law enforcement would improve the realism of FOF exercises; and assessing next steps for the existing integrated response program. The October assessment also recommended modifying the FOF inspection program to consist of one NRC-conducted FOF exercise and an enhanced NRC inspection of a licensee-conducted annual FOF exercise. This recommendations is under review by the Commission.

Recently, Entergy and NextEra ended their memberships with NEI. One result of this development is that the NEI-managed mock adversary force is no longer available for NRC FOF inspections at Entergy and NextEra facilities. As of April 2018, the NRC staff has rescheduled five FOF inspections at Entergy and NextEra facilities to accommodate this change.

The NRC has approved a joint proposal from Entergy and NextEra to provide an alternative mock adversary force (the Joint Composite Adversary Force) to enable NRC FOF inspections in CYs 2018 and 2019. Each utility will use its own adversary team for the exercises at its

facilities, but will exclude personnel who work at the site being evaluated. Force directors will be assigned from the corresponding peer company to help avoid conflicts of interest. The NRC will provide increased oversight of the Joint Composite Adversary Force to verify a clear separation of functions between that force and the host site's guard force. The NRC has determined that Entergy and NextEra's proposal is a reasonable near-term alternative to the NEI-managed mock adversary force that would allow the NRC staff to complete scheduled NRC FOF inspections. This alternative will also provide time for the staff to assess other potential long-term solutions for effective and efficient implementation of the NRC FOF program.

Separately, the NRC is developing a final rule that would, in part, amend security requirements in 10 CFR Part 73, "Physical Protection of Plants and Materials," to implement the statutory authority provided to the Commission under Section 161A of the Atomic Energy Act of 1954, as amended (AEA). This authority allows the Commission to designate the classes of facilities eligible to apply for NRC authorization to use various types of weapons and large-capacity ammunition-feeding devices, notwithstanding State, and local, and certain Federal firearms laws and regulations prohibiting such possession and use. The NRC's final rule, currently under development, establishes the requirements that licensees must meet when applying for this authority. The NRC has worked closely with the U.S. Department of Justice's Office of the Attorney General; the Federal Bureau of Investigation; the Bureau of Alcohol, Tobacco, Firearms, and Explosives; and other interested stakeholders in developing the rulemaking. In advance of the final rulemaking, eight licensees at seven sites requested permission to use the authority granted the Commission under Section 161A of the AEA. Between September 2015 and January 2016 the Commission issued seven confirmatory orders to these eight licensees authorizing them to use the Commission's Section 161A authority. In addition, the final rule will revise the regulations in 10 CFR Part 73 to include enhancements identified through a comprehensive review of the regulations for notification of physical security events.

Finally, the NRC staff has recommended publication of a proposed rule that would amend the drug testing requirements of 10 CFR Part 26, "Fitness for Duty Programs," to better align NRC drug testing requirements with those of the 2008 version of the U.S. Department of Health and Human Services' report "Mandatory Guidelines for Federal Workplace Drug Testing Programs." Specifically, the proposed changes would broaden the panel of drugs to be tested during required drug testing; lower cutoff levels for certain types of drug testing; improve the testing methods to identify subversion attempts; and improve the clarity, organization, and flexibility of the rule language.

The NRC continues to participate in the Integrated Response Program, which is a partnership between Federal Government agencies and the nuclear industry to improve the tactical responses of Federal, State, and local law enforcement to beyond-DBT events at nuclear power plant sites.

Cybersecurity

Under 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks," the NRC requires nuclear power plant licensees and new license applicants to provide high assurance that digital computer and communication systems and networks are adequately protected against cyberattacks. These licensees must implement a cybersecurity program to ensure that safety, important-to-safety, security, and emergency preparedness functions are protected from cyberattacks. Because of the extensive work and lead time required to fully implement the provisions called for in licensees' NRC-approved cybersecurity plans, the agency established interim milestones to focus efforts on the highest priority

activities. Licensees had implemented measures to protect their highest priority digital assets by December 31, 2012.

The NRC has developed an oversight program for cybersecurity that includes an inspection program, inspector training, and a process for evaluating the significance of inspection findings. The agency accomplished this in collaboration with stakeholders, including members of industry and representatives from the U.S. Department of Homeland Security, the Federal Energy Regulatory Commission, and the National Institute of Standards and Technology. The NRC completed inspection activities related to the interim milestones in CY 2015. In July 2017, the NRC began the full implementation inspection activities; as of April 30, 2018, four inspections have been completed. This initial round of inspections will continue through 2020.

The NRC staff proposed several options to the Commission in SECY-14-0147, "Cyber Security for Fuel Cycle Facilities," for implementing cybersecurity requirements for fuel cycle facilities. In response, the Commission issued an SRM related to SECY-14-0147, dated March 24, 2015, which directed the staff to initiate a high-priority, expedited rulemaking. The NRC staff completed the regulatory basis for the proposed rulemaking in March 2016. The NRC staff submitted the proposed rule package to the Commission on October 4, 2017.

In SECY-17-0034, "Update to the U.S. Nuclear Regulatory Commission Cyber Security Roadmap," dated February 28, 2017, the NRC staff updated the Commission on the agency's cybersecurity requirements. SECY-17-0034 shows the current status of the staff's evaluations on the need for cybersecurity requirements for other NRC license holders, including nonpower reactors, independent spent fuel storage installations, byproduct materials licensees, and decommissioning reactors. Implementation of the roadmap helps the NRC determine the appropriate levels of cybersecurity protections and ensures that NRC-licensed facilities implement them promptly and effectively.

Emergency Preparedness and Incident Response

Following the accident at the Fukushima Dai-ichi nuclear power plant in Japan, the NRC issued information requests concerning licensee emergency preparedness staffing and communications capabilities during a large-scale natural event. Based on the review of the industry responses, the NRC concluded that additional regulatory action was prudent. The staff determined that the industry's interim actions (e.g., portable satellite phones) combined with long-term enhancements (e.g., new radio systems, sound-powered telephones, battery-powered radio repeaters, and satellite phone systems) will help to ensure that licensees can communicate effectively during a station blackout event affecting multiple units. The staff has reviewed the staffing assessments submitted by licensees and has verified that the existing emergency response resources, as described in the licensees' emergency plans, are sufficient to support required plant actions and emergency plan functions. The NRC incorporated several enhancements of emergency preparedness, including those described above, into the rulemaking package on mitigation of beyond-design-basis events. The staff provided the draft final rule to the Commission on December 15, 2016, for its review and approval.

In April 2012, the NRC and the Federal Emergency Management Agency (FEMA) began a multiyear initiative to revise NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, issued November 1980. This is one of the key guidance documents for developing and evaluating onsite and offsite emergency plans for nuclear power plants and for the State and local government emergency response organizations that would respond to

the plant sites. In FY 2014, the joint NRC/FEMA working group completed initial drafts of the introductory information and the emergency plan evaluation criteria. The NRC and FEMA staff jointly conducted a series of public meetings in FY 2014 to solicit feedback from stakeholders and members of the public on the initial drafts. The NRC and FEMA completed a final draft of this document in FY 2015 and issued it for a 90-day public comment period on May 29, 2015. The comment period was extended to October 13, 2015, in response to requests from stakeholders. On March 31, 2017, the NRC and FEMA completed the review of the comments and started processing the document for final review and approval. As of April 2, 2018, both agencies have completed their internal review and have reached consensus that the document will need to be provided to the Office of Management and Budget (OMB) to determine whether the document is a major rule. The NRC expects to send it to OMB by April 30, 2018.

The NRC continues to work with States to replenish potassium iodide supplies for use as a supplement to public protective actions within the 10-mile emergency planning zones around nuclear power plants.

All licensing reviews for new power reactor applications under the physical security and emergency preparedness program remain on schedule. The NRC staff is using its established licensing process to ensure that the safety and environmental reviews meet all milestones and provide appropriate opportunities for stakeholder input.

VIII. Power Uprates

Licensees have applied for and implemented power uprates since the 1970s as a way to increase the power output of their plants. The NRC staff has reviewed and approved 163 power uprates to date. Existing plants have gained approximately 23,707 megawatts thermal or 7,902 megawatts electric (MWe) in electric generating capacity (the equivalent of about seven large nuclear power plant units) through power uprates. The NRC is currently reviewing one power uprate application. No licensees of nuclear power plants have indicated that they plan to request power uprates over the next 5 years.

IX. New Reactor Licensing

The NRC's new reactor program serves the public interest by enabling the safe and secure use of nuclear power in meeting the Nation's future energy needs. The NRC is focusing on licensing and construction oversight activities that support applicants and licensees of large light-water reactors (LWRs) and small modular LWRs and is pursuing activities to enhance the regulatory framework and infrastructure for advanced reactors (non-LWRs). In addition, the NRC's new reactor program is actively engaged in several international cooperative initiatives focused on addressing safety reviews of new reactor designs and improving the effectiveness and efficiency of inspections and the collection and sharing of construction experience.

Reviews of Applications for Large and Small Modular Light-Water Reactors

The NRC is currently reviewing applications for new large LWRs and small modular LWRs that have been submitted under the provisions of 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

Early Site Permit Reviews

Tennessee Valley Authority Clinch River Early Site Permit Application

On May 12, 2016, TVA submitted an early site permit (ESP) application for the Clinch River Nuclear Site near Oak Ridge, TN. This application is based on a plant parameter envelope characterizing several small modular LWR designs. By December 30, 2016, TVA had submitted all supplemental information to the NRC in support of its application, and by letter dated January 5, 2017, the NRC staff informed TVA that its application, as supplemented, was accepted for docketing and detailed technical review.

The NRC staff began its detailed technical review of the ESP application in January 2017 and developed a full review schedule with public milestones that was transmitted to TVA on March 17, 2017. On August 4, 2017, the staff completed the Phase A safety review (preparing the preliminary SER and issuing requests for additional information) for all chapters of the application. The staff is currently in Phase B of the safety review (issuing the advanced SER with no open items), which is scheduled to conclude on October 29, 2018. For the environmental review, the NRC staff completed Phase 1 of the review (issuing the Scoping Summary Report) on October 30, 2017, ahead of schedule, and remains positioned to complete Phase 2 (issuing the draft EIS) before June 1, 2018, which would be ahead of schedule, as well. The NRC schedule projects that the agency will issue the final EIS and the final SER in June 2019 and August 2019, respectively.

On June 12, 2017, the Southern Alliance for Clean Energy (SACE), Tennessee Environmental Coalition (TEC), and Blue Ridge Environmental Defense League filed petitions seeking a hearing. On September 12, 2017, the ASLB conducted oral argument on these petitions and subsequently granted the hearing request. On October 10, 2017, the Board issued a decision that denied the Blue Ridge Environmental Defense League's petition to intervene and granted SACE and TEC's joint petition to intervene and admitted two contentions. SACE/TEC filed a motion for reconsideration of the Board's dismissal of the third contention, and the motion was dismissed. Separately, TVA appealed the admission of the two contentions to the Commission and that appeal is currently pending before the Commission. The Board is working to schedule the contested hearing for the two admitted contentions.

Design Certification Reviews

NuScale Power, LLC, Small Modular Reactor Design Certification Application

In January 2017, the NRC received the first application for a design certification of a small modular reactor (SMR) from NuScale Power, LLC. On March 15, 2017, the NRC completed its acceptance review, concluded that the application was acceptable for review, and docketed the application. The staff provided the acceptance review letter to NuScale on March 23, 2017, and issued a full review schedule with public milestones that was transmitted to NuScale on May 22, 2017.

The NRC has implemented a new safety-focused review process based on lessons learned from previous design reviews, to improve the effectiveness and efficiency of reviews. This process uses a graded review approach, in which the review focus and resources are aligned with risk-significant structures, systems, and components (SSCs) and other aspects of the design that contribute most to safety. This graded approach applies the appropriate level of review for an SSC by considering both the safety classification and the risk significance. The

staff's review is currently in the first phase (preparing the preliminary SER and issuing requests for additional information) and the second phase (issuing an SER with open items). The staff has identified 26 significantly challenging issues that require resolution and that have the potential to adversely affect the review schedule. The final SER remains scheduled to be completed in September 2020.

Advanced Power Reactor 1400

On December 23, 2014, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Company, Ltd., submitted an application to the NRC for certification of the Advanced Power Reactor 1400 standard plant design for use in the U.S. domestic energy market. The NRC staff developed a six-phase milestone schedule for completing the application review within 42 months. The staff completed the Phase 2 review (issuing an SER with open items) for all chapters of the application in May 2017 and the Phase 3 review (review of the SER with open items by the ACRS) in June 2017. The staff's review is currently in Phase 4 (issuing the advanced SER with no open items) and Phase 5 (issuing a response to the ACRS about its review of the SER with no open items).

On February 2, 2018, the staff issued an updated schedule letter to the applicant explaining that, although the NRC staff has made substantial progress toward completing both the remaining Phase 4 and Phase 5 reviews, issues related to the technical quality, completeness, or timeliness of the applicant's submittals have resulted in delays that affected the milestone dates for completion of Phase 4 and Phase 5. Therefore, the staff revised the Phase 4 public milestone date from March 2018 to May 2018 and moved the Phase 5 public milestone date from June 2018 to July 2018. Although the Phase 6 milestone date did not change, this delay may also affect the completion of the review schedule within the 42-month schedule. The current NRC schedule projects that the staff will issue the final SER in September 2018.

U.S. Advanced Pressurized-Water Reactor

On December 31, 2007, Mitsubishi Heavy Industries, Ltd., submitted its application to the NRC for certification of the U.S. Advanced Pressurized-Water Reactor design. On November 5, 2013, the company issued a letter informing the NRC of its plans to slow down licensing activities related to the application review. Given this request, the NRC staff has been performing this review at a reduced pace with limited use of resources since March 24, 2014, and will continue in this manner until further notice from the applicant or until the review is completed.

U.S. Evolutionary Power Reactor

On December 11, 2007, AREVA, Inc., submitted its application to the NRC for certification of the U.S. Evolutionary Power Reactor (EPR) design. On February 25, 2015, AREVA asked the NRC to suspend the application review until further notice. The NRC staff's review of the application for the U.S. EPR remains in suspension.

Design Certification Renewals

Advanced Boiling-Water Reactor Renewal (General Electric-Hitachi)

On December 7, 2010, General Electric-Hitachi (GEH) submitted an application for renewal of the advanced boiling-water reactor (ABWR) design certification. By letter dated January 8,

2016, GEH submitted proposed changes to the ABWR design control document to redesign the containment overpressure protection system piping and, on February 19, 2016, submitted a revised application to incorporate changes in the design control document. The staff issued a milestone schedule letter to GEH on August 30, 2016, which was based on resolving all open items by January 2017. However, some open items associated with the review of the application remain unresolved. As a result, on August 3, 2017, the staff issued a letter to GEH indicating that the NRC would not be able to complete its review on the original schedule. The letter also stated that the NRC would issue a revised schedule letter to GEH after additional discussions with the applicant to resolve these issues and the staff receives complete responses to its requests for additional information.

Combined License Activities

The NRC staff has received a total of 18 combined license (COL) applications to date. The NRC has issued COLs at 8 sites for 14 units (Vogtle, Units 3 and 4; Virgil C. Summer Nuclear Station (V.C. Summer), Units 2 and 3; Fermi, Unit 3; South Texas Project, Units 3 and 4; Levy Nuclear Plant, Units 1 and 2; William States Lee III Nuclear Station, Units 1 and 2; North Anna Power Station, Unit 3; and Turkey Point, Units 6 and 7). The NRC has suspended two COL application reviews at the request of the applicants because of changes in the applicants' business plans (Shearon Harris Nuclear Power Plant and Comanche Peak Nuclear Power Plant). Eight COL applications have been withdrawn (Bellefonte Nuclear Station, River Bend Station, Bell Bend Nuclear Power Plant, Victoria County Station, Nine Mile Point Nuclear Station, Callaway Plant, Calvert Cliffs Nuclear Power Plant, and Grand Gulf Nuclear Station).

The licensees for the COLs for V.C. Summer, Units 2 and 3, and the Levy Nuclear Plant, Units 1 and 2, have informed the NRC of plans to terminate the COLs. By letter dated December 27, 2017, South Carolina Electric & Gas Company (SCE&G) requested withdrawal of the COLs for V.C. Summer, Units 2 and 3. On January 8, 2018, Santee Cooper submitted a letter to the NRC in response to SCE&G's letter requesting withdrawal of the COLs for V.C. Summer, Units 2 and 3. In its letter, Santee Cooper stated that South Carolina Public Service Authority (the co-owner and co-licensee of V.C. Summer, Units 2 and 3, with SCE&G) requested that the NRC hold in abeyance any action on SCE&G's request to terminate the COLs for V.C. Summer, Units 2 and 3, for 180 days or until such time that South Carolina Public Service Authority can complete its evaluation on what to do with the licenses. On January 25, 2018, SCE&G and SCANA Corporation requested written consent approving the indirect transfer of control of Operating License No. NPF-12 and COL Nos. NPF-93 and NPF-94 for V.C. Summer, Units 1, 2, and 3, and its independent spent fuel storage installation to Dominion Energy. The indirect transfer arises from an "Agreement and Plan of Merger," dated January 2, 2018. The NRC staff is currently evaluating the request to transfer the licenses indirectly.

On January 25, 2018, Duke Energy submitted a letter to the NRC requesting approval to terminate the COLs for Levy Nuclear Plant, Units 1 and 2, after Duke Energy announced it will no longer move forward with building the plant. The NRC staff is currently evaluating Duke Energy's request to terminate the COLs for Levy Nuclear Plant, Units 1 and 2.

As of March 2018, the NRC was reviewing one COL application for a total of two units, as discussed below.

Turkey Point Combined License Application

On June 30, 2009, Florida Power & Light Company submitted a COL application for two Advanced Passive 1000 (AP1000) units at the existing Turkey Point site in Miami-Dade County, FL. The NRC staff completed its safety review of the AP1000 units and presented the final SER to the ACRS on August 19, 2016. The NRC issued the final SER for Turkey Point on November 10, 2016. The NRC issued its final EIS on October 28, 2016.

On May 2–3, 2017, the ASLB conducted an evidentiary hearing in Homestead, FL, in the contested proceeding involving the Southern Alliance for Clean Energy, the National Parks Conservation Association, and other joint intervenors. On July 10, 2017, the ASLB ruled in favor of the NRC staff and terminated the contested proceeding. On April 18, 2017, the City of Miami, City of South Miami, and Village of Pinecrest (petitioners) filed a new petition seeking a hearing. On July 31, 2017, the ASLB rejected the pending contention and terminated the contested proceeding involving those petitioners. The petitioners filed an appeal to the Commission. The Commission denied the petitioners' appeal from that decision on December 11, 2017 (CLI-17-12). The mandatory hearing took place on December 12, 2017, and the Commission approved issuance of the COLs on April 5, 2018 (CLI-18-01). The NRC issued the COLs to Florida Power & Light Company for Turkey Point Units 6 and 7 on April 12, 2018.

Construction Oversight under 10 CFR Part 52

The NRC is implementing activities to oversee the safe construction and operational readiness of the two AP1000 units under construction at the Vogtle site. The NRC's Region II coordinates, plans, schedules, and implements the construction inspections in coordination with the licensee's construction schedules to verify compliance with the agency's regulations and to ensure that the new plants are built in accordance with their COLs. NRC inspections continue to focus on all inspection activities in support of inspections, tests, analyses, and acceptance criteria (ITAAC), including but not limited to welding, module installation, and civil and structural engineering activities, as well as any associated system tests. The NRC is developing an office instruction in support of the planning and inspection activities for the licensee's initial test programs. NRC inspection activities continue to be informed by communications with Vogtle management to assess the scope of construction and operational activities.

In the spring of 2017, the NRC completed a demonstration project to evaluate the readiness and reliability of the ITAAC inspection and verification processes. The purpose of the project was to enhance the NRC's ITAAC processes and to identify gaps in preparation for the surge in ITAAC notifications expected towards the end of construction. The NRC developed a series of recommendations and refinements to the ITAAC closure verification process, which were shared with stakeholders at a December 2017 public meeting. Through the first quarter of 2018, the NRC continued to engage with Vogtle and other stakeholders to refine the ITAAC closure notification (ICN) process through public meetings and visits to the construction site.

The NRC has enhanced its public Web sites for the new units under construction to provide a convenient portal for stakeholders to find information related to ITAAC closure. The Web sites include links to the ITAAC hearing procedures, links to guidance on ITAAC closure, status reports for ITAAC notifications, and other upgrades for faster access to information such as departure reports and license amendments.

In anticipation of the surge in ICNs near the end of construction, additional staff members from the Office of New Reactors have successfully completed training to cross-qualify as ICN reviewers. The additional review staff will be assigned as needed to meet the anticipated surge capacity.

In October 2016, the NRC staff began to review "uncompleted" ITAAC notifications (UINs). This initiative allows staff to review the licensee's proposed method for closing an ITAAC, which accomplishes much of the work in advance. The staff found that the early review process for UINs allows earlier communication with public stakeholders and earlier identification of issues related to ITAAC completion. The staff expects to expend fewer resources and take less time to complete its final review of an ICN that uses a method previously accepted by the NRC for closing an ITAAC. As of March 2018, Vogtle has submitted a number of UINs that have successfully provided the necessary background paperwork beforehand to facilitate NRC's ICN reviews. The NRC will continue to engage its stakeholders to incorporate any lessons learned from the UIN reviews throughout the rest of the year.

On August 24, 2017, the NRC approved a Southern Nuclear Company license amendment to consolidate a number of ITAAC to improve the efficiency of the ITAAC completion and closure process. This amendment reduces the number of individual ITAAC by about 230 per unit, while maintaining the technically robust nature of the ITAAC.

The NRC has implemented the Construction Reactor Oversight Process (cROP) at the site of the two new Vogtle reactor units. The cROP ensures safety and security through objective, risk-informed, transparent, and predictable NRC oversight during new reactor construction. Using practices similar to those of the ROP for operating reactors, the NRC continues to meet periodically with interested stakeholders to collect feedback on the effectiveness of the process, which is then considered in enhancing the cROP. The agency's most recent performance assessments demonstrate that the reactors are being constructed safely and both units are performing well against the cROP criteria. Plant assessments and the latest cROP-related information are publicly available on the NRC Web site. Also, in anticipation of the final phase of construction, the NRC created the Vogtle Readiness Group (VRG), whose primary objective is to identify and resolve any licensing, inspection, or regulatory challenges or gaps that could impact the schedule for completion of Vogtle Units 3 and 4. The VRG Charter was issued in March 2018 and identifies the different steps the NRC is taking: reviewing inspection results, assessing construction activities, reviewing system tests, and completing the transition to operations activities to ensure Vogtle will meet all the regulatory requirements of its COL. The intent of the VRG is to ensure that the Commission is effectively and efficiently assuring that safety requirements are met before Vogtle is allowed to start operations.

Vendor Inspections

The NRC staff implements a Vendor Inspection Program (VIP) to confirm that reactor applicants and licensees are fulfilling their regulatory obligations to provide effective oversight of the supply chain. The NRC staff conducts inspections to verify the effective implementation of vendor quality assurance programs to ensure the quality of materials, equipment, and services supplied to the commercial nuclear industry. These inspections ensure that vendors maintain an effective system for reporting defects under the requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance," and verify the effective implementation of commercial-grade dedication programs for safety-related materials, equipment, and services. Other activities of the vendor inspection staff include resolving allegations, ensuring that counterfeit items are removed and prevented from use in safety-related applications, participating in international

cooperation efforts, and developing industry consensus standards. VIP focus areas for new reactors include integrated system validation for the control room simulators, digital instrumentation and control systems, modular fabrication, safety-related valves, and reactor coolant pumps. For FY 2017, VIP met the metric of 35 vendor inspections, the highest number performed to date. For FY 2018, the NRC plans approximately 25 percent fewer vendor inspections because of the completion of many of the structural modules for the Vogtle site and the cancellation of construction at the V.C. Summer site. VIP is on schedule to complete 25 inspections in FY 2018, in addition to supporting inspections of the initial test program for Vogtle, Units 3 and 4, and review of the quality assurance program for NuScale.

Operator Licensing

The NRC staff in the Office of New Reactors (NRO) supports and provides programmatic oversight for Region II implementation of operator licensing training, procedure inspections, and licensee examinations. During this reporting period, the staff successfully completed an examination of Vogtle operators and is planning additional operator licensing examinations before the end of CY 2018.

NRO and Region II continue to review the lessons learned from operator licensing activities for the plants under construction at Vogtle and previously under construction at V.C. Summer (also referred to as cold licensing activities). Cold license examinations are administered before completion of preoperational and initial startup testing at new reactors. The lessons-learned effort may encompass potential changes to the agency's cold licensing process through a proposed Part 55 rulemaking and will result in improved guidance for performing technical reviews of new simulators. The effort will include input from both internal and external stakeholders.

During this reporting period, the NRC staff continued preparations for operator licensing examinations for the NuScale SMR technology. This included initial development of the knowledge and abilities catalog, from which the licensing examinations are generated, and assessment and evaluation of program changes that will be necessary to administer the examinations.

Non-Light-Water Reactors

As the NRC prepares to review and regulate a new generation of non-LWRs, it has developed a vision and strategy to ensure the agency's readiness to effectively and efficiently conduct its mission for these technologies. The staff described the vision and strategy in its report, "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," issued December 2016.

The NRC's non-LWR vision and strategy have three strategic objectives: (1) enhancing technical readiness, (2) optimizing regulatory readiness, and (3) optimizing communication. The NRC prepared implementation action plans (IAPs) to identify the specific activities that it will conduct in the near-term (0–5 years), midterm (5–10 years), and long-term (beyond 10 years) timeframes to achieve non-LWR readiness. To obtain stakeholder feedback, the NRC released the draft near-term IAPs in 2016 and the draft midterm and long-term IAPs in February 2017. The NRC updated and finalized its IAPs to reflect stakeholder feedback in July 2017.

The NRC issued SECY-18-0011, "Advanced Reactor Program Status," on January 25, 2018, which informed the Commission of the progress and path forward on each of the near-term IAP

strategies. This paper also provided an overview of the various external factors influencing the staff's activities to prepare for possible licensing and deployment of advanced reactors.

As part of near-term IAP Strategy 1, the NRC is implementing activities to acquire and develop sufficient knowledge, technical skills, and capacity to perform non-LWR regulatory activities. The NRC contracted with the Oak Ridge National Laboratory to develop a 12-module training course on molten salt reactors (MSR). Approximately 90 NRC staff attended the training between May and November 2017.

As part of near-term IAP Strategy 2, the NRC is implementing activities to acquire and develop sufficient computer codes and tools to perform non-LWR regulatory reviews. The NRC has begun to identify and evaluate computer codes and tools and has documented the status of efforts in these areas in a report, "Strategy 2 Near-Term Implementation Action Plan Progress Report for Fiscal Year 2017," on November 24, 2017.

As part of near-term IAP Strategy 3, the NRC is implementing activities to optimize the regulatory framework for non-LWR reviews and licensing processes. Activities where the NRC staff continues to examine opportunities for flexibility within the existing regulatory framework include the following:

- On December 26, 2017, the NRC issued the final report "A Regulatory Review Roadmap for Non-Light Water Reactors," which describes potential examples of flexibility, including the use of a staged review process and conceptual design assessments during the preapplication period. Over the longer term, the NRC will examine whether a new risk-informed, performance-based regulatory framework for non-LWRs would be beneficial, effective, and efficient.

- In June 2017, the NRC issued a preliminary draft document, "Nuclear Power Reactor Testing Needs and Prototype Plants for Advanced Reactor Designs," to solicit stakeholder feedback. This document discusses the relevant regulations governing the testing requirements for advanced reactors, explains the process for determining testing needs to meet the NRC's regulatory requirements, clarifies when a prototype plant might be needed and how it might differ from the proposed standard plant design, and describes licensing strategies and options that include the use of a prototype plant to meet the NRC's testing requirements. The document was discussed during a public meeting on August 3, 2017. The NRC addressed stakeholder feedback and issued the final prototype document as part of the Regulatory Review Roadmap on December 26, 2017.

- The staff released the draft final regulatory guide (RG) 1.232,"Guidance for Developing Principal Design Criteria for Non Light Water Reactors," to support meetings with the ACRS subcommittee on February 7, 2018 and the full committee on March 8, 2018. This activity is part of a joint initiative with DOE to address a key portion of the licensing framework essential to advanced reactor technologies. The initiative addresses the general design criteria in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, which the NRC developed primarily for LWRs, by adapting them to the needs of advanced reactor design and licensing. The NRC issued the final RG on April 10, 2018.

- The NRC is also engaged with the Licensing Modernization Project (LMP) being led by Southern Company and coordinated by NEI, with costs shared with DOE. The LMP's objective is to develop technology-inclusive, risk-informed, and performance-based regulatory guidance for licensing non-LWRs for the NRC's consideration and possible endorsement. The NRC has reviewed and provided feedback to industry on four LMP white papers: "Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors—Selection of Licensing Basis Events," "Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors—Probabilistic Risk Assessment Approach," "Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors: Safety Classification and Performance Criteria for Structures, Systems, and Components," and "Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors: Risk-Informed and Performance-Based Evaluation of Defense-in-Depth Adequacy." The NRC sent a letter to the LMP on February 21, 2018, concluding its review of the four white papers. Southern Company issued a response letter to the NRC on March 9, 2018, acknowledging the important work completed to date and encouraging the expedited completion of this overall effort. The staff is expecting NEI to submit a consolidated guidance document for NRC review and possible endorsement in 2018.

As part of near-term IAP Strategy 4, the NRC is implementing activities to facilitate the development of industry codes and standards needed to support the non-LWR life cycle. The NRC staff is actively participating in subgroups and working groups associated with the development of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section III, Division 5. The NRC staff is also participating in the "Task Group on ASME/NRC Liaison for Division 5," that seeks NRC, DOE, and industry input in identifying gaps in ASME B&PV Code Section III, Division 5, which need to be resolved before considering endorsement in 10 CFR 50.55a, "Codes and Standards." The staff discussed this topic during a public meeting on December 14, 2017.

The staff is also actively participating on several American Nuclear Society (ANS) standards working groups and consensus committees related to non-LWR safety standards and the joint ASME/ANS non-LWR PRA standard.

On September 26, 2017, the NRC held the second annual NRC Standards Forum, which was attended by representatives from many standards development organizations, representatives from industry (NEI, EPRI, and Technology Working Groups for non-LWRs), and representatives from DOE and DOE national laboratories. A portion of this year's standards forum was devoted to non-LWRs with the intent of working with stakeholders to identify new codes and standards needed for non-LWR development and to facilitate the codes and standards development and eventual endorsement by the NRC, as appropriate. A followup workshop on advanced reactor standards development is planned for May 2, 2018.

As part of near-term IAP Strategy 5, the NRC is implementing activities to identify and resolve technology-inclusive (not specific to a particular non-LWR design or category) policy issues that affect regulatory reviews, siting, permitting, and/or licensing of non-LWR nuclear power plants. The technology-inclusive policy issues that the NRC staff has been discussing with stakeholders include the following:

- Siting—In November 2017, the NRC issued the draft white paper "Siting Considerations Related to Population for Small Modular and Non-Light Water Reactors." The purpose of the paper was to facilitate stakeholder engagement for a potential policy issue

regarding siting considerations for SMRs and non-LWRs, with regard to population distribution and density, identified in SECY-16-0012, "Accident Source Terms and Siting for Small Modular Reactors and Non-Light Water Reactors," dated February 2, 2016. The draft white paper summarized the NRC staff's assessment of current siting regulations, guidance, and Commission policy. The NRC staff discussed it in a public meeting on December 14, 2017. The staff will consider insights obtained from stakeholder discussions and determine whether clarifications to siting guidance or other actions would be beneficial to address siting criteria for SMRs and non-LWRs. The staff will report to the Commission on any proposed actions, as described in SECY-16-0012.

- Offsite Emergency Planning—In 2015, the Commission directed the initiation of rulemaking to revise the emergency preparedness regulations to be commensurate with the reduced radiological consequences of SMRs, non-LWRs, and other new design technologies such as isotope producing facilities. The Commission also directed the staff to adapt an approach to emergency planning zones for SMRs under existing exemption processes in the interim until completion of the emergency preparedness rulemaking. The NRC published the draft regulatory basis for public comment in the *Federal Register* on April 13, 2017, and the staff issued the final regulatory basis on October 16, 2017. The proposed rule is scheduled to be provided to the Commission for its consideration in October 2018.

- Insurance and Liability—In SECY-11-0178, "Insurance and Liability Regulatory Requirements for Small Modular Reactor Facilities," dated December 22, 2011, the NRC identified a potential inequity between the insurance requirements for power reactors producing electrical power equal or greater than 100 MWe per unit and those SMR designs with individual modules producing less than 100 MWe. Specifically, the NRC raised the question of whether there would be insurance and indemnity coverage sufficient to pay all public claims under the current Price-Anderson Act and associated regulatory language in the case of an insurable event for a multi-modal facility where each SMR module was sized at less than 100 MWe, but the power level for the maximum number of reactor modules featured in the design would exceed 500 MWe. Since completing that paper, the NRC prepared a comparative analysis of different SMR designs to further explore the potential inequity. The NRC is using this analysis, and other inputs, to develop a SECY paper for this topic. In the paper, the NRC will discuss whether rulemaking or a change to the current interpretation of the definitions given in the Price-Anderson Act is recommended. In accordance with the latest version of the Price-Anderson Act, the NRC will prepare a report to Congress and an associated SECY paper, recommending the need for continuation or modification of the provisions of the Price-Anderson Act by December 31, 2021. The staff will address any changes that may be needed for non-LWRs and SMRs in that report and SECY paper. The staff engaged stakeholders on this topic during a meeting on November 2, 2017, and the staff will continue to keep stakeholders informed as it prepares the report to Congress.

- Security and Safeguards Requirements—On December 14, 2016, NEI submitted a white paper, "Proposed Consequence-Based Physical Security Framework for Small Modular Reactors and Other New Technologies." This paper "proposes an approach to security that considers the enhanced safety and security incorporated into these designs and provides a more effective and efficient means to protect the public health and safety." In the transmittal letter, NEI requested that "the NRC establish regulatory positions on this approach and the associated policy and technical issues." The NRC provided feedback on NEI's white paper in July 2017 and met with NEI on October 12, 2017. The staff

prepared a draft white paper to facilitate stakeholder interactions and discussed this white paper with NEI and other stakeholders on December 13, 2017. The staff will consider stakeholder feedback and plans to prepare a SECY paper in 2018 to address this issue.

- Functional Containment Performance—On November 30, 2017, the NRC issued the draft white paper "'Functional Containment' Performance Criteria." The purpose of the paper was to facilitate stakeholder engagement for a policy issue on the use of a functional containment approach for non-LWRs. In SRM-SECY-03-0047, "Staff Requirements—SECY-03-0047—Policy Issues Related to Licensing Non-Light-Water Reactor Designs," dated June 26, 2003, the Commission directed the staff to develop performance requirements and criteria working closely with industry experts (e.g., designers, EPRI) and other stakeholders regarding options in this area, taking into account such features as core, fuel, and cooling systems design. The Commission also directed the staff to pursue the development of functional performance standards and then submit options and recommendations to the Commission. The staff discussed the draft white paper with stakeholders on December 14, 2017, and February 1, 2018, and with the ACRS subcommittee on February 22, 2018. The staff will brief the ACRS full committee in April 2018. The staff will then consider ACRS and stakeholder feedback and plans to prepare a SECY paper in 2018 to address this issue.

As part of near-term IAP Strategy 6, the NRC is implementing activities to optimize communications. The NRC is conducting public meetings with stakeholders every 4 to 6 weeks. The NRC and DOE also held a series of three advanced reactors workshops focused on opening a dialogue between key stakeholders to discuss challenges in the commercialization of non-LWR technologies and to discuss possible solutions. In addition, the NRC continues to meet with potential applicants upon request.

On November 10, 2016, the NRC and DOE signed a memorandum of understanding (MOU) to implement the Gateway for Accelerated Innovation in Nuclear (GAIN) Initiative. This MOU describes the roles, responsibilities, and processes related to implementing DOE's GAIN Initiative. The intent of the GAIN Initiative is to give the nuclear energy community increased access to the technical, regulatory, and financial support necessary to commercialize new or advanced nuclear reactor designs, while ensuring the continued safe, reliable, and economic operation of the existing nuclear fleet. As described in the MOU, the NRC is responsible for providing DOE and the nuclear energy community with accurate and current information on the NRC's regulations and licensing processes. DOE is then responsible for sharing that information with the prospective applicants, as appropriate.

The NRC continues to share information with various international groups, including the Organisation for Economic Co-operation and Development's Nuclear Energy Agency, the International Atomic Energy Agency, the Generation IV International Forum, and the NRC's international regulatory counterparts. The NRC chairs the Nuclear Energy Agency's ad hoc group (known as the Group on the Safety of Advanced Reactors) for international regulators of non-LWRs. The purpose of the group is to bring interested regulators together to discuss common interests, practices, and problems and to address both the regulatory interests and research needs in support of nuclear safety and security.

Regulatory Infrastructure

The NRC continues to enhance its regulatory infrastructure with the goals of improving the planning, licensing, and oversight of future new reactor applications; making timely and effective policy decisions; and enhancing and updating regulatory guidance for large LWRs, SMRs, and non-LWRs. In addition to updating regulatory guidance, the NRC continues to review its internal processes to enhance the effectiveness and efficiency of its application review process. The NRC provides several opportunities for external stakeholder input as part of these enhancements. In addition, the NRC rigorously assesses licensing and oversight performance and uses the results to inform these regulatory infrastructure activities.

The previous section discussed infrastructure activities which are largely aimed at non-LWRs. The sections below describe infrastructure activities conducted during the reporting period.

Revision to Regulatory Guide 1.206

The NRC is revising RG 1.206, "Combined License Applications for Nuclear Power Plants," issued June 2007, to encompass applicants for all licensing processes under 10 CFR Part 52, including design certifications and ESPs. In June 2017, the staff issued a draft of the proposed revision, DG-1325, "Applications for Nuclear Power Plants," for formal public comment. The draft guide captured important lessons learned from recent licensing actions on large LWRs and was informed by a series of public meetings. The NRC received comments on DG-1325 in September 2017 and plans to issue the revised guide during FY 2018.

NUREG-0800

The NRC staff continues its systematic update of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," to support its reviews of applications for COLs, design certifications, and ESPs; limited work authorization requests; and license amendment requests. During this reporting period, the staff issued draft guidance for the environmental qualification of mechanical and electrical equipment.

Environmental Guidance Updates

The NRC staff is updating RG 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," Revision 2, issued July 1976, and NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan," last revised in July 2007. The revisions will incorporate lessons learned from the first set of environmental reviews for new reactors and address reviews of SMRs, greenhouse gas emissions, and issues related to climate change. The staff issued a draft revision of RG 4.2 for comment in February 2017 and is addressing numerous comments it received. The NRC expects to publish the final RG in September 2018 and issue a draft of the revised NUREG-1555 for public comment in June 2019. The revised guidance will improve the effectiveness of the staff's reviews of applications for ESPs, design certifications, and COLs; limited work authorization requests; and license amendment requests.

X. Response to Lessons Learned from the Fukushima Accident in Japan

The NRC's response to the lessons learned from the Fukushima accident in Japan during the reporting period has focused on implementing the highest priority (Tier 1) activities. The agency continued to assign resources to address these activities while ensuring a balance between

implementing lessons learned from Fukushima and ensuring that those efforts do not displace ongoing work of greater safety benefit, work that is necessary to maintain safety, or other higher priority work.

The NRC continues to review nuclear power plant licensee plans to achieve compliance with the mitigating strategies and spent fuel pool instrumentation orders issued in March 2012. The NRC has been issuing safety evaluations documenting its assessment of licensees' implementation plans and inspecting licensees' implementation of these important safety improvements. As of April 2, 2018, more than 95 percent of all units have fully implemented the mitigating strategies order, and inspections have been completed at over 80 percent of operating power reactor sites. The remaining sites have substantially implemented the order, but full compliance depends on, and will be achieved through, the implementation schedule of the order on the severe-accident-capable hardened containment vent discussed below. The five remaining units will be in full compliance with the mitigating strategies order following refueling outages to be completed in the first half of CY 2018. All licensees have implemented the spent fuel pool instrumentation order.

In June 2013, the NRC issued a revised order requiring the installation of a severe-accident-capable hardened containment vent for boiling-water reactors with Mark I and II containments. Licensees are implementing this order in two phases, with the first phase addressing venting of the wetwell and the second addressing either venting of the drywell or management of water addition to prevent the need to vent the drywell. The NRC received the licensees' integrated plans for compliance with Phases 1 and 2 and issued interim staff evaluations of the integrated plans for both phases. In November 2017, the first operating reactor site achieved full compliance with both phases of the order. The 18 remaining operating reactor sites subject to this order are scheduled to complete the requirements and achieve compliance no later than mid-2019, with the exception of 2 sites that are scheduled to permanently shut down in 2018 and 2019. The NRC will issue safety evaluations documenting its assessment of licensees' final implementation plans and will inspect licensees' implementation of these important safety improvements, with the first inspection planned for this summer.

The NRC also asked nuclear power plant licensees to reevaluate flooding and seismic hazards that could affect their sites. If these newly reevaluated hazards are not bound by the current design basis, licensees must determine whether interim protective measures are necessary while they complete a longer term evaluation of the hazard's impact on the plant.

Following Commission direction, the NRC staff is now implementing the closure plan for the flooding hazard reevaluations. As part of this plan, all sites have completed flooding hazard reevaluation reports (FHRRs) and submitted them to the NRC for review. The NRC staff has reviewed the FHRRs and has issued interim evaluations, also called interim hazard letters, to all licensees. The NRC staff has also issued staff assessments fully documenting its review of the FHRRs for 54 sites and expects to complete the remaining staff assessments in 2018. Licensees were expected to use the information in these letters to ensure that their mitigating strategies can be implemented under the reevaluated hazard conditions. As of April 2, 2018, all sites had completed flooding mitigating strategies assessments (MSA) to address the impact of the reevaluated flooding hazards on the strategies they developed under the mitigating strategies order.

Depending on site-specific considerations, other evaluations may be required beyond those associated with mitigating strategies. The staff determined the need for any other evaluations

using a graded approach to ensure that plants are appropriately protected against the reevaluated flooding hazards. This graded approach focuses on areas with the greatest potential safety benefit. Those sites that had flood-causing mechanisms that exceeded their current design basis are required to perform an additional analysis (e.g., focused evaluation or integrated assessment) to evaluate the site response to the updated flood hazard. The NRC expects to receive the additional analyses by the end of 2018. The NRC has received 41 of the expected 54 additional analyses. As of April 2, 2018, the NRC staff has completed its assessment and closed out all required actions concerning flooding hazard reevaluations for 36 sites.

In October 2015, the NRC issued a letter establishing the final list of operating reactor sites that will be required to perform a full seismic probabilistic risk assessment (SPRA) and other seismic evaluations. As discussed in that letter and a subsequent letter in December 2016, 18 sites (32 units) will be required to perform an SPRA. For the remaining reactors, the NRC staff concluded that sufficient margin exists that a detailed SPRA is not necessary. Licensees for four sites have submitted their SPRAs, and the NRC is expecting all SPRAs submittals, except for one, to be completed by December 2019. (One site has received an extension to August 2021, which is after its expected shutdown date.) Of the remaining sites, 38 were expected to perform limited-scope evaluations (i.e., a high-frequency evaluation, low-frequency evaluation, or spent fuel pool evaluation). These limited-scope evaluations are complete. Eleven sites screened out and did not need to perform any further seismic evaluations.

Thirty-four sites that are required to conduct an SPRA or limited scope evaluation submitted interim actions or evaluations in December 2014 or January 2016 as part of the expedited seismic evaluation process. These evaluations assessed systems and components used to shut down a plant safely under certain accident conditions to (1) confirm that a plant has sufficient margin to continue with a longer term evaluation without any plant modifications, or (2) identify the need to enhance the seismic capacity of the plant. The NRC staff completed its review of the expedited seismic evaluation process submittals and found them acceptable.

Licensees are expected to use their reevaluated seismic hazard information to ensure that they can implement mitigating strategies under the reevaluated hazard conditions. As of April 2, 2018, 47 operating reactor sites have completed their seismic MSAs. The remaining sites will submit their MSAs coincident with their SPRA. As of April 2, 2018, the NRC staff had completed its assessment and closed out all required actions concerning seismic hazard reevaluations for 42 sites.

The Commission previously approved consolidating the rulemaking on station blackout mitigation strategies with the rulemaking on onsite emergency response capabilities and included portions of the emergency planning recommendations in the consolidation. The consolidation enables the NRC to use resources more efficiently to produce an integrated and coherent set of requirements for addressing beyond-design-basis events. In August 2015, the Commission approved the draft proposed rule, which was made available for public comment in November 2015. The public comment period closed in February 2016. The NRC received 20 public comment letters, and the staff reviewed these comments and revised the rulemaking package accordingly. The staff delivered the final rule package to the Commission at the end of 2016.

As of April 2, 2018, 16 operating power reactor sites have completed all post-Fukushima activities in response to the 3 orders and the March 12, 2012, request for additional information

issued under 10 CFR 50.54(f). The NRC staff will conduct oversight of compliance with the NRC's post-Fukushima requirements through the ROP.

The Fukushima-related activities described above demonstrate consistent progress in completing safety enhancements at U.S. facilities in response to lessons learned from the accident. As expected, most of the safety benefits from the post-Fukushima enhancements were in place by December 31, 2016. The ongoing work is primarily associated with completing implementation of the order for the severe-accident-capable hardened containment vents, activities associated with reevaluating flooding and seismic hazards, postorder compliance inspections, and implementation of long-term NRC oversight.

XI. Planned Rulemaking Activities

The attached report lists the status of NRC rulemaking activities as of March 23, 2018, including their priorities and schedules. Out of a total of 80 rulemaking activities, 58 rulemakings are planned activities. The NRC is reviewing 22 petitions for rulemaking. The 58 planned rulemaking activities include 6 rulemakings in response to industry requests, 7 rulemakings that could reduce or clarify existing requirements, 22 rulemakings that would comply with congressional statute or conform NRC regulations to other agency requirements or to international treaties or agreements, and 23 rulemakings that could establish new requirements. The NRC uses a single tracking and reporting system to provide real-time updates on all NRC rulemaking activities. Members of the public can access the NRC's rulemaking activity information at https://www.nrc.gov/about-nrc/regulatory/rulemaking/rules-petitions.html.