



*Protecting People and the  
Environment*

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

**April–September 2017**

Note: The period of performance covered by this report includes activities that occurred from the first day of April 2017 to the last day of September 2017. 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 .....	1
II.	Implementing Risk-Informed and Performance-Based Regulations .....	1
III.	Status of Issues Tracked in the Reactor Generic Issues Program.....	2
IV.	Licensing Actions and Other Licensing Tasks .....	4
V.	Status of License Renewal Activities .....	5
VI.	Summary of Reactor Enforcement Actions .....	7
VII.	Security and Emergency Preparedness and Incident Response Activities.....	13
VIII.	Power Uprates .....	16
IX.	New Reactor Licensing .....	16
X.	Response to Lessons Learned from the Fukushima Accident in Japan .....	24
XI.	Planned Rulemaking Activities .....	26

## **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 and communicate changes in the assessment of licensee performance quarterly and issue end-of-cycle assessment letters. The next annual assessment letters will be issued in early 2018. The staff has updated the Web site to reflect the latest performance assessments as of the end of the second quarter of calendar year 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 NRC staff is currently reviewing 3 other transition plans. The NRC anticipates completing its evaluation of the 3 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 for 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. 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. The NRC anticipates completing its evaluation of the eight applications in the fourth quarter of FY 2018.

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) (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. The NEI has not requested endorsement of this guidance document; however, 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. Although NRC staff concluded that the current regulatory structure is adequate to evaluate these submittals, it drafted several changes in the guidance document to promote consistency and efficiency. The staff will continue to monitor these requests and evaluate the need for additional guidance changes in the future.

### **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 one proposed GI. Since the previous reporting period, the staff has completed its screening evaluation of a potential GI concerning the effects of high-energy arcing faults involving aluminum at nuclear power plants and determined that the issue should proceed into the assessment stage. On August 21, 2017, the staff issued an Information Notice on this topic (IN 2017-04, “High Energy Arcing Faults in Electrical Equipment Containing Aluminum Components”).

There are three open GIs currently in regulatory office implementation. The subsections below summarize the actions associated with these three open GIs. Additional status information is available 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”**

This GI is concerned with the possibility that, after a loss-of-coolant accident in a pressurized-water reactor, debris accumulating on the emergency core cooling system sump screen may result in clogging and restricting water flow to the pumps. As a result of GI-191, all pressurized-water reactor licensees increased the size of their containment sump strainers, significantly reducing the risk of debris clogging the strainers. Generic Letter 2004-02, “Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors,” dated September 13, 2004, considered a related issue on the potential for debris to pass through the sump strainers and enter the reactor core. In 2008, 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,” dated May 8, 2012, as an acceptable model for assessing the effects on core cooling from fibrous, particulate, and chemical debris reaching the reactor vessel. This work included a conservative generic limit on the amount of fiber reaching the core.

The Pressurized-Water Reactor Owners Group developed a methodology to justify higher in-vessel limits using plant-specific analyses and submitted this method as 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 is reviewing this topical report and expects to complete its review in early 2018.

In a July 9, 2012, paper to the Commission, “Closure Options for Generic Safety Issue 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance,” the staff proposed three options for closure of GSI-191. In response, the Commission approved

these options on December 14, 2012. Licensees have notified the NRC of their selected option and are now developing proposed technical resolutions for the staff to review.

There are 37 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 the issue is closed 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.

Based on 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 may be higher than the values used in their original designs and previous evaluations. The scope was expanded later to include plants in the Western United States. In collaboration with the Electric Power Research Institute, NRC staff issued a safety/risk assessment report in August 2010, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants”. On September 2, 2010, the NRC staff then issued Information Notice 2010-18, “Generic Issue 199, ‘Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants.’”

After the nuclear event at Fukushima, the NRC incorporated GI-199 into the work being performed in response to the accident, which is discussed further in Section X, “Response to Lessons Learned from the Fukushima Accident in Japan,” of this report. As of September 29, 2017, NRC staff had completed its assessment and closed out actions concerning seismic hazard reevaluations for 38 of the 59 operating reactor sites. Based on current schedules, the staff expects that activities associated with this GI will be completed 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 its response to the Fukushima nuclear accident, which is discussed further in Section X of this report. As of September 29, 2017, NRC staff had completed its assessment and closed out all required actions concerning flooding hazard reevaluations for 13 of the 59 operating reactor sites. Based on current schedules, the staff expects that activities associated with this GI will be completed 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. The FY 2017 NRC Congressional Budget incorporated two output measures related to licensing actions: (1) the number of licensing actions completed per year and (2) the age of the licensing action inventory.

Other licensing tasks for operating power reactors include the following:

- licensees' responses to NRC requests for information through generic letters or bulletins;
- NRC review of generic topical reports;
- NRC inspections of licensees' analyses under 10 CFR 50.59, "Changes, Tests and Experiments";
- 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 2017 NRC Congressional Budget 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 2013 through FY 2017 results to date and the FY 2017 goals for the NRC Congressional Budget performance indicators for operating power reactor licensing actions and other licensing tasks. The NRC continues to work on the highest priority post-Fukushima activities under close monitoring to ensure successful implementation of the activities. The agency prioritizes all licensing action reviews in accordance with their safety significance; however, because of Fukushima-related work competing for the same critical skill sets, the backlog inventory of operating reactor licensing actions increased. In late FY 2014, the staff redistributed resources to support the stabilization and reduction of the licensing action backlog. As a result, the NRC saw the backlog inventory stabilize in FY 2015. The agency further reduced the backlog in FY 2016 to within performance standards. As of September 2017, the current inventory of open licensing actions is 14. 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 2017 Goals for Congressional Budget Performance Indicators**

<b>CONGRESSIONAL BUDGET PERFORMANCE INDICATORS</b>						
<b>Output Measure</b>	<b>FY 2013 Actual</b>	<b>FY 2014 Actual</b>	<b>FY 2015 Actual</b>	<b>FY 2016 Actual</b>	<b>FY 2017 Actual</b>	<b>FY 2017 Goals</b>
Licensing actions completed per year	668	607	792	837	967	754
Age of inventory of licensing actions	95% ≤ 1 year and 100% ≤ 2 years	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	95% ≤ 1 year and 100% ≤ 2 years
Other licensing tasks completed per year	529	765	461	641	644	300
Age of inventory of other licensing tasks	97.6% ≤ 1 year and 100% ≤ 2 years	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	90% ≤ 1 year and 99% ≤ 2 years
2% Improvement in timeliness indicators					NA	This target will not apply if the inventory of licensing actions that is less than 1 year old on September 30, 2016, is 93% or greater.

**V. Status of License Renewal Activities**

During this reporting period, the NRC was reviewing six license renewal applications (LRAs) for a total of nine power reactors. On September 28, 2017, the NRC issued renewed operating licenses for South Texas Project, Units 1 and 2. The issuance of the South Texas Project renewed licenses brings the total number of renewals to 89 reactor units. Three units with a renewed license have since permanently shut down.

**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 Supplement 1 to the final SEIS was issued in June 2013. The comment period closed in March 2016; the staff expects to issue the final SEIS supplement in late 2017. 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. Additionally, activities related to the Atomic Safety and Licensing Board (ASLB) hearing process continued. On February 8, 2017, the parties to the legal proceedings filed an unopposed motion to the ASLB 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 renewed operating licenses for both units are expected to be made in the fourth quarter of FY 2018.

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. The agency will make a final determination once the staff's review is complete. 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.

### *Diablo Canyon Power Plant, Units 1 and 2*

On November 24, 2009, Pacific Gas and Electric Company 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. The applicant further stated that, if the California Public Utilities Commission approves the agreement, Pacific Gas and Electric Company would withdraw its LRA. In July 2016, the staff informed the applicant that it had suspended its review of the LRA.

### *Seabrook Station, Unit 1*

On June 1, 2010, NextEra Energy Seabrook, LLC, 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 regarding 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 ongoing review of this amendment has a direct impact on the schedule for the license renewal review. The 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 the cornerstone for the aging management program being evaluated under the LRA review. The staff needs to complete its review of this methodology before it can reach a decision on the license renewal application. In addition, on October 6, 2017, the ASLB granted a hearing request admitting one contention on NextEra's license amendment request. This issue remains pending before the ASLB. Therefore, the current schedule for remaining license renewal milestones is to be determined.

#### *South Texas Project, Units 1 and 2*

On October 28, 2010, South Texas Project (STP) Nuclear Operating Company submitted an LRA for STP, Units 1 and 2, to extend the operating licenses for 20 years beyond the current license periods. The staff issued the final SEIS in November 2013 and issued two license renewal SERs with open items in February 2013 and October 2016. The open item involving the selective leaching of aluminum bronze piping and components has been resolved. The STP full committee meeting with the ACRS was held on July 12, 2017. The ACRS issued the "Report on the Safety Aspects of the License Renewal Application for South Texas Project, Units 1 and 2," on July 26, 2017. The NRC renewed the South Texas Project operating licenses on September 28, 2017.

#### *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 NRC staff continues to work with the applicant to resolve this issue.

#### *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 the acceptance review on August 14, 2017, and started the review of the LRA. The application review schedule has been established, and the review is expected to take about 18 months. A public meeting was held on September 19, 2017, in St. Francisville, LA. A petition to intervene on the River Bend license renewal application has been filed.

## **VI. Summary of Reactor Enforcement Actions**

The reactor enforcement statistics in Tables 2, 3, and 4 are arranged by region, half-FY, FY total, and two previous FYs for comparison purposes. These tables provide the nonescalated and escalated reactor 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 the violation. However, for most violations, the NRC assesses the significance of a violation using the significance determination process under the ROP, which relies on risk insights, where appropriate, to assist the NRC in determining the safety or security significance of inspection findings identified within the ROP.

Following these tables are 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\***

		<b>Region I</b>	<b>Region II</b>	<b>Region III</b>	<b>Region IV</b>	<b>TOTAL</b>
<b>Cited Severity Level IV or Green</b>	1 <sup>st</sup> Half FY 17	1	3	0	0	4
	2 <sup>nd</sup> Half FY 17	1	2	2	2	7
	FY 17 Total	2	5	2	2	11
	FY 16 Total	4	6	2	3	15
	FY 15 Total	4	7	1	10	22
<b>Noncited Severity Level IV or Green</b>	1 <sup>st</sup> Half FY 17	55	65	85	85	290
	2 <sup>nd</sup> Half FY 17	61	55	61	94	271
	FY 17 Total	116	120	146	179	561
	FY 16 Total	169	137	171	190	667
	FY 15 Total	137	103	182	224	646
<b>TOTAL Cited and Noncited Severity Level IV or Green</b>	1 <sup>st</sup> Half FY 17	56	68	85	85	294
	2 <sup>nd</sup> Half FY 17	62	57	63	96	278
	FY 17 Total	118	125	148	181	572
	FY 16 Total	173	143	173	193	682
	FY 15 Total	141	110	183	234	668

\* 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 data from the Reactor Process System, which may change slightly following verification. The monthly totals generally lag by 30 days because of the time needed for development of 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\***

		<b>Region I</b>	<b>Region II</b>	<b>Region III</b>	<b>Region IV</b>	<b>TOTAL</b>
<b>Severity Level I</b>	1 <sup>st</sup> Half FY 17	0	0	0	0	0
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
	FY 15 Total	0	0	0	0	0
<b>Severity Level II</b>	1 <sup>st</sup> Half FY 17	0	0	0	0	0
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
	FY 15 Total	0	0	0	0	0
<b>Severity Level III</b>	1 <sup>st</sup> Half FY 17	0	3	0	0	3
	2 <sup>nd</sup> Half FY 17	1	0	0	1	2
	FY 17 Total	1	3	0	1	5
	FY 16 Total	1	0	1	1	3
	FY 15 Total	3	2	0	1	6
<b>TOTAL Violations Cited at Severity Level I, II, or III</b>	1 <sup>st</sup> Half FY 17	0	3	0	0	3
	2 <sup>nd</sup> Half FY 17	1	0	0	1	2
	FY 17 Total	1	3	0	1	5
	FY 16 Total	1	0	1	1	3
	FY 15 Total	3	2	0	1	6

\* 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\***

		Region I	Region II	Region III	Region IV	TOTAL
Violations Related to Red Findings	1 <sup>st</sup> Half FY 17	0	0	0	0	0
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
	FY 15 Total	0	0	0	0	0
Violations Related to Yellow Findings	1 <sup>st</sup> Half FY 17	0	0	0	0	0
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
	FY 16 Total	0	0	0	0	0
	FY 15 Total	1	0	0	2	3
Violations Related to White Findings	1 <sup>st</sup> Half FY 17	1	0	2	2	5
	2 <sup>nd</sup> Half FY 17	1	1	2	1	5
	FY 17 Total	2	1	4	3	10
	FY 16 Total	2	0	0	0	2
	FY 15 Total	4	1	5	0	10
<b>TOTAL Related to Red, Yellow, or White Findings</b>	1 <sup>st</sup> Half FY 17	1	0	2	2	5
	2 <sup>nd</sup> Half FY 17	1	1	2	1	5
	FY 17 Total	2	1	4	3	10
	FY 16 Total	2	0	0	0	2
	FY 15 Total	5	1	5	2	13

\* 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 section below describes 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.

### *FirstEnergy Nuclear Operating Company (Perry Nuclear Power Plant), EA-17-043*

On August 24, 2017, the NRC issued a notice of violation to FirstEnergy Nuclear Operating Company (FirstEnergy) for a violation of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," at Perry Nuclear Power Plant. The violation was associated with a White significance determination process finding. Contrary to the requirements, FirstEnergy failed to conduct adequate design control of a modification to the electrical circuitry for emergency start of the site's standby diesel generators. Specifically, FirstEnergy failed to evaluate the effect of a shorted diode on the emergency start circuitry. Additionally, there is an associated violation of Technical Specification 3.8.1, "AC Sources Operating," for one standby diesel generator being inoperable for greater than the allowed outage time of 14 days.

### *STP Nuclear Operating Company (South Texas Project), EA-16-216*

On August 18, 2017, the NRC issued a Severity Level III notice of violation to STP Nuclear Operating Company for violations of 10 CFR 50.9, "Completeness and Accuracy of Information," and 10 CFR 50.48, "Fire Protection." These violations involved two examples of failing to implement fire protection program written procedures for fire watches and three examples of failing to ensure that fire protection documents were complete and accurate in all material respects.

### *Tennessee Valley Authority (Watts Bar Nuclear Plant), EA-17-022*

On July 27, 2017, the NRC issued a confirmatory order to Tennessee Valley Authority (TVA) for a violation identified during the staff's performance of a Problem Identification and Resolution Inspection at Watts Bar Nuclear Plant. The confirmatory order is the result of a violation for failure to implement an Adverse Employee Action Process Confirmatory Order issued in December 2009. The staff conducted the Problem Identification and Resolution Inspection as followup to a chilled work environment letter issued to the Watts Bar Nuclear Plant on March 23, 2016.

The new order requires TVA to confirm proper implementation of all past orders, implement independent oversight for the Adverse Employee Action Process, and take additional actions to understand and improve safety culture.

### *Energy Northwest (Columbia Generating Station), EA-17-028*

On July 6, 2017, the NRC issued a notice of violation to Energy Northwest, for a violation associated with a White significance determination process finding identified during an inspection at Columbia Generating Station. The White finding, an issue of low to moderate safety significance, involved Energy Northwest's failure to ship a Type B quantity of radioactive material in a container that was approved or tested for that purpose. The significance of this

event stems from the increased risk to the public and accident hazard posed under these circumstances. The violation involves the failure to transport low specific activity material in accordance with the condition that the external dose rate may not exceed an external radiation level of 10 millisieverts/hour (1 rem/hour) at 3 meters (10 feet) from the unshielded material. The licensee transported a package as low specific activity material with an external radiation level of 2.1 rem/hour at a distance of 3 meters from the unshielded material.

*Tennessee Valley Authority (TVA) (Browns Ferry Nuclear Plant), EA-17-069*

On July 11, 2017, the NRC issued a notice of violation to TVA for a violation associated with a Greater-than-Green significance determination process finding at the Browns Ferry Nuclear Plant. The details of the finding are official use only–security-related information.

*DTE Energy Company (Fermi, Unit 2), EA-17-012*

On May 11, 2017, the NRC issued a notice of violation to DTE Energy Company for a violation of 10 CFR 50.54(q)(2) at Fermi Power Plant, Unit 2, associated with a White significance determination process finding. Contrary to the requirements, DTE Energy failed to maintain the effectiveness of its emergency plan and to use adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency. Specifically, the licensee failed to maintain the ability to accurately declare an Emergency Action Level Classification RG-1.1 and to develop and issue accurate protective action recommendations during the implementation of the site's emergency plan in response to a rapidly progressing accident.

*PSEG Nuclear, LLC (Hope Creek Generating Station), EA-16-251*

On May 3, 2017, the NRC issued a notice of violation to PSEG Nuclear, LLC, for a Severity Level III violation associated with the failure to follow site procedures, resulting in a reactor scram at the Hope Creek Generating Station. An investigation by the NRC Office of Investigations determined that the technician deliberately failed to implement a procedure for a surveillance activity of safety-related equipment when the technician made an error while performing a surveillance test and deliberately attempted to correct the error rather than comply with the procedural guidance to stop and inform management. Specifically, the technician, who was performing a surveillance test on the redundant reactivity control system, inadvertently selected the wrong system channel to test. Rather than immediately stopping and informing the job supervisor, as required by the procedure, the technician deliberately attempted to correct the error by selecting the proper channel, thereby causing the reactor to scram.

*Southern Nuclear Operating Co., Inc. (Vogtle Electric Generating Plant), EA-17-014*

On April 25, 2017, the NRC issued a notice of violation to Southern Nuclear Operating Co., Inc., for its failure to maintain the effectiveness of an emergency plan and have a standardized emergency action level scheme in use based on facility system and effluent parameters at Vogtle Electric Generating Plant, Units 1 and 2. This is a violation of 10 CFR 50.47(b)(4) and Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50 and is associated with a White significance determination process finding. The emergency classifications for a General Emergency and Site Area Emergency contained effluent radiation monitor threshold values that were 42 times different than the correct values. These radiation monitors were being relied on to determine the magnitude and to continuously

assess the impact of the release of radioactive materials. The monitors also provided the criteria for determining the need for notification and participation of local and State agencies.

*Exelon Nuclear (Oyster Creek Nuclear Generating Station), EA-16-241*

On April 13, 2017, the NRC issued a notice of violation to Exelon Nuclear for a violation of Technical Specification 6.8.1, “Procedures and Programs,” at Oyster Creek. The violation was associated with a White significance determination process finding. Exelon failed to properly implement a procedure for rebuilding and reassembly of an electromagnetic relief valve. The maintenance instruction directed reinstallation of a lever plate with previously removed lock washers. By failing to reinstall the lock washers, the licensee caused excessive friction between the solenoid frame and the cut-out switch lever plate, causing the cut-out switch lever to become bound in the energized position and rendering the valve unable to perform its safety-related function. Additionally, this incorrect reassembly resulted in the relief valve being inoperable for greater than the outage time allowed by the technical specification for the automatic depressurization system.

## **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 inspections at each nuclear power reactor and Category I fuel cycle facility on a regular 3-year cycle. Each force-on-force 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. Force-on-force exercises also provide valuable insights that enable the NRC to evaluate the effectiveness of licensee security programs.

The NRC is developing a final rule that would 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 161.a of the Atomic Energy Act (AEA). Preemption authority under this section allows the Commission to designate classes of facilities eligible to apply for NRC authorization to use various types of weapons and large-capacity ammunition-feeding devices, notwithstanding local, State, 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, the NRC has issued orders designating seven power reactor licensees, one Category I strategic special nuclear material licensee, and one “at-reactor” independent spent

fuel storage installation licensee as eligible to apply for AEA Section 161.a preemption authority to address the site-specific needs of their facilities. 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.

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 titled "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 actively 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 calendar year 2015. In July 2017, the NRC began the full implementation inspection activities. The initial round of inspections is expected to continue until 2020.

In 2015, the agency amended 10 CFR Part 73 by adding timely notification requirements for certain operating reactor cybersecurity events. The regulations in 10 CFR 73.77, "Cyber Security Event Notifications," require licensees to notify the NRC of cybersecurity events. Such notifications will contribute to the NRC's analysis of the reliability and effectiveness of licensees' cybersecurity programs and, therefore, will play an important role in the continuing effort to ensure that digital computer and communication systems and networks are adequately protected against cyberattacks up to and including the DBT. This regulation also increases the NRC's ability to respond to emergencies, monitor ongoing events, assess trends and patterns, and identify precursors of more significant events. In addition, it enhances the NRC's ability to



inform licensees, the U.S. Department of Homeland Security, and Federal intelligence and law enforcement agencies of cybersecurity-related events.

The NRC staff proposed several options to the Commission in SECY-14-0147, “Cyber Security for Fuel Cycle Facilities,” for implementing cybersecurity for fuel cycle facilities. In response, the Commission issued a staff requirements memorandum 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, 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 efficiently.

### **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 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. The Commission is currently reviewing the rulemaking package.

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. The document is currently in the NRC and FEMA concurrence process.

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 Upgrades**

Licensees have applied for and implemented power upgrades since the 1970s as a way to increase the power output of their plants. The NRC staff has reviewed and approved 161 power upgrades to date. Existing plants have gained approximately 23,577 megawatts thermal or 7,859 megawatts electric in electric generating capacity (the equivalent of about seven large nuclear power plant units) through power upgrades. The NRC is currently reviewing three power upgrade applications. Licensees of six nuclear power plants have indicated that they plan to request power upgrades for those plants 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 Light-Water Reactors and Small Modular 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, 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 the first week of 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 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 review (issuing the advanced SER with no open items). The NRC schedule projects that the agency will issue the final environmental impact statement and the final SER in June 2019 and August 2019, respectively.

On June 12, 2017, the Southern Alliance for Clean Energy, Tennessee Environmental Coalition, 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.

### *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, concluding that the application was acceptable for review, and docketed the application. The staff issued 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 is implementing 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 17 critical issues that require resolution. The final SER is 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 is currently in Phase 4 of its review (issuing the advanced SER with no open items). The 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 (U.S. APWR) 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 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 will not be able to complete its review on the original schedule. The letter also stated that the NRC will issue a revised schedule letter to GEH after additional discussions with the applicant to resolve these issues.

### *Combined License Application Activities*

The NRC staff has received a total of 18 combined license (COL) applications to date. The NRC has issued COLs at 7 sites for 12 units (Vogtle, Units 3 and 4; Virgil C. Summer Nuclear Station (V.C. Summer), Units 2 and 3; Fermi, Unit 3; STP, Units 3 and 4; Levy Nuclear Plant, Units 1 and 2; William States Lee III Nuclear Station, Units 1 and 2; and North Anna Power Station, Unit 3). 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). Recently, the licensees for the COLs for V.C. Summer Nuclear Station, Units 2 and 3, and the Levy Nuclear Plant, Units 1 and 2, informed the NRC of pending plans to terminate the COLs. To date, the NRC has not received formal documentation to terminate those licenses.

During the reporting period, NRC staff was actively reviewing two COL applications for a total of three 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.

On February 27, 2015, NRC staff submitted the draft environmental impact statement (DEIS) for the COL application for Turkey Point, Units 6 and 7, to the U.S. Environmental Protection Agency. The staff developed the DEIS in cooperation with the U.S. Army Corps of Engineers Jacksonville District and the National Park Service. The NRC received approximately 11,000 comments on the DEIS, a majority of which are identical form letters. The NRC received comments from other Federal agencies, including the U.S. Environmental Protection Agency, the National Park Service, the U.S. Department of the Interior, and the U.S. Fish and Wildlife Service. To respond to and resolve some of the issues raised in the comments, NRC staff performed further technical analysis and conducted multiple Federal interagency meetings. The NRC met with other Federal agencies in late April 2016 to discuss the resolution of the comments and issued its final environmental impact statement 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 that is pending before the Commission. The mandatory hearing was scheduled for October 5, 2017. However, because a severe weather event (Hurricane Irma) impacted the entire State of Florida, Florida Power and Light requested a delay in the mandatory hearing schedule to allow the company to focus on preparing for and responding to the hurricane and its aftermath. The Commission granted the delay on September 12, 2017. The mandatory hearing is currently rescheduled for December 12, 2017.

#### North Anna Power Station, Unit 3, Combined License Application

On November 27, 2007, Dominion Virginia Power submitted a COL application for an economic simplified boiling-water reactor (ESBWR) at its North Anna Power Station site near Richmond, VA, in Louisa County. The NRC issued the final environmental impact statement in February 2010.

On June 28, 2010, Dominion submitted a revised application to cite a different design, the U.S. APWR. However, on April 25, 2013, Dominion notified the NRC of its intent to revert to the ESBWR design. Dominion submitted its partially revised COL application in July 2013 to reflect its revised design decision and submitted all remaining application sections to the NRC in December 2013.

On October 22, 2014, Dominion submitted a seismic closure plan that described a modified approach to certain aspects of its seismic analysis to address exceedances of the ESBWR seismic design limitations. On December 16, 2015, Dominion provided its third and final submittal to the NRC. On January 12, 2017, NRC staff completed the safety review for the North Anna, Unit 3, COL application, 3 months ahead of the public milestone.

The mandatory hearing occurred on March 23, 2017. On May 31, 2017, the Commission authorized the staff to issue the North Anna 3 COL to Virginia Electric and Power Company, which the staff did on June 2, 2017. (This narrative will be removed from future reports).

### **Construction Oversight under 10 CFR Part 52**

The top priority for the NRC's New Reactor Business Line continues to be the activities that support the safe construction and operational readiness of the two AP1000 units under construction at the Vogtle site. On July 31, 2017, Southern Carolina Electric and Gas and Santee Cooper, the licensee for V.C. Summer, announced the decision to discontinue construction on Units 2 and 3. In response to the licensee's request, the NRC has ceased work on the V.C. Summer project.

The NRC's Region II Office 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. Recent NRC inspections have focused on concrete placement, welding, module fabrication, and civil and structural engineering activities, as well as the detailed design of the piping system. The NRC is performing planning and inspection activities for the licensee's initial test programs. NRC planned inspection activities will continue to increase as Vogtle broadens 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 inspection, test, analysis, and acceptance criteria (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 recommendations identified in this demonstration project will improve the NRC processes that support the agency's determination that licensees have met the criteria to allow fuel load. The NRC has begun to address these recommendations and make other refinements to the ITAAC closure verification process as discussed below.

The NRC has enhanced the 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, and other upgrades for faster access to information such as departure reports and license amendments.

In anticipation of the surge in ITAAC closure notifications (ICNs) near the end of construction, additional staff members from the Office of New Reactors have successfully completed cross-qualifying as ICN reviewers. The additional review staff will be assigned as needed to meet the required surge capacity.

In October 2016, NRC staff began to review "uncompleted" ITAAC notifications. 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 uncompleted ITAAC notifications 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 verifies a method previously accepted by the NRC for closing an ITAAC.

On August 24, 2017, the NRC approved a Southern Nuclear Company license amendment to consolidate the 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 plant, while maintaining the technically robust nature of the criteria.

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.

### ***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, the VIP met the metric of 35 vendor inspections, the highest number of vendor inspections performed to date. For FY 2018, approximately 25 percent fewer vendor inspections are planned 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.

### ***Operator Licensing***

NRC staff in the Office of New Reactors support and provide programmatic oversight for Region II implementation of operator licensing training, procedure inspections, and licensee examinations. Staff from the Office of New Reactors and Region II continue to examine 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 encompasses potential changes to the agency's cold licensing process 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, NRC staff began 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 the NRC will conduct in the near-term (0–5 years), mid-term (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 mid- and long-term IAPs in February 2017. The staff updated and finalized its IAPs to reflect stakeholder feedback in July 2017.

As part of its activities related to the regulatory readiness strategic objective, the NRC will seek to optimize the regulatory framework for non-LWR reviews and licensing processes. In the near term (0–5 years), the staff will examine opportunities for flexibility within the existing regulatory framework. Potential examples of flexibility include the use of a staged review process and conceptual design assessments during the preapplication period. The NRC staff described these approaches in its draft report titled "A Regulatory Review Roadmap for Non-Light Water Reactors," dated October 25, 2016, to facilitate stakeholder feedback. The NRC plans to finalize the regulatory review roadmap in the fall of 2017. 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 describes the relevant regulations governing the testing requirements for advanced reactors, describes 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, and the NRC plans to address stakeholder feedback and incorporate this document into the "Regulatory Review Roadmap" to be issued in the fall of 2017.

In July 2013, the U.S. Department of Energy (DOE) and the NRC established a joint initiative 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. On April 7, 2016, the NRC issued its draft report titled "Draft—Advanced Non-LWR Design Criteria—April 2016" for informal public comment. After consideration of stakeholder input, the NRC issued draft regulatory guide (DG) - 1330, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors," for formal public comment on February 3, 2017. The comment period closed on April 3, 2017. The NRC plans to issue a final regulatory guide in 2018. The agency expects this new regulatory guidance to provide benefits, including reduced regulatory uncertainty for advanced reactor developers, improved guidance for NRC staff members who review advanced



reactor license applications, and improved timeliness and efficiency of licensing activities for both applicants and NRC staff.

The NRC is also engaged with the Licensing Modernization Project (LMP) being led by Southern Company and coordinated by the NEI, with costs shared with DOE. The LMP's objective is to inform the NRC as the agency develops technology-inclusive, risk-informed, and performance-based regulatory guidance for licensing non-LWRs. The NRC is currently reviewing two LMP white papers: "Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors—Selection of Licensing Basis Events," Draft Report, Revision 0, and "Modernization of Technical Requirements for Licensing of Advanced Non-Light Water Reactors—Probabilistic Risk Assessment Approach." Additional LMP white papers regarding safety system classification and defense in depth are expected to be submitted in the fall of 2017.

As part of its activities to optimize communications, the NRC is conducting public meetings with stakeholders every 4 to 6 weeks. The NRC and DOE also hosted the last of a series of three advanced reactors workshops on April 25 and 26, 2017. This series of 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) for the implementation of the Gateway for Accelerated Innovation in Nuclear (GAIN) Initiative. This MOU describes the roles, responsibilities, and processes related to the implementation of the 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 the DOE and the nuclear energy community with accurate and current information on the NRC's regulations and licensing processes. The 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 Organization 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 sections below describe infrastructure activities conducted during the reporting period.

#### *Revision to Regulatory Guide 1.206*

The NRC is revising Regulatory Guide (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. The revision captures important lessons learned from recent licensing actions on large LWRs. Ongoing interactions with stakeholders and the public are also informing the revision. In June 2017, the staff issued a draft of the proposed revision, DG-1325, “Applications for Nuclear Power Plants,” for formal public comment. The comment period closed on September 18, 2017.

#### *NUREG-0800 Updates*

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 final guidance for physical security hardware regarding inspections, tests, analyses and acceptance criteria; draft guidance for piping systems and components inspections, tests, analyses, and acceptance criteria, and draft guidance for physical security for combined license and operating reactors.

#### *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 that were received. The final RG is expected to be issued in September 2018. The staff expects to 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 mitigation strategies and spent fuel pool instrumentation orders issued in March 2012. The NRC has been issuing staff evaluations documenting its assessment of licensees’ implementation plans and inspecting licensees’ implementation of these important safety improvements. As of September 29, 2017, more than 90 percent of all units have fully implemented the mitigating strategies order. The remaining sites have substantially

implemented the order, but full compliance depends on, and will be achieved through, the implementation schedule of the order regarding the severe-accident-capable hardened containment vent discussed below. Regarding the spent fuel pool instrumentation, all licensees have implemented the 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. The NRC received the licensees' integrated plans for compliance with Phases 1 and 2 of that order by June 2014 and December 2015, respectively. The NRC issued interim staff evaluations for Phases 1 and 2. Full implementation of the order for all sites is expected by June 2019.

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, has issued interim evaluations, also called interim hazard letters, to all licensees. The NRC staff also has issued staff assessments fully documenting its review of the FHRRs for 44 sites and expects to complete the remaining staff assessment in early 2018. Licensees are expected to use the information in these letters to ensure that their mitigating strategies can be implemented under the reevaluated hazard conditions. As of September 29, 2017, 97 percent of all sites had completed their flooding mitigation strategies assessments (MSAs), and the NRC expects the remaining sites to complete their assessments by the end of March 2018.

Depending on site-specific considerations, other evaluations may be required beyond those associated with mitigating strategies. The staff will determine 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 focused evaluations were due by mid-2017, and the integrated assessments are due by the end of 2018. The NRC has received 70 percent of the focused evaluations and integrated assessments. Most of these are currently under review, and NRC staff has begun to issue its assessments of these evaluations. In all, 20 percent of sites have completed the flooding reevaluation process.

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, NRC staff concluded that sufficient margin exists that a detailed SPRA is not necessary. The NRC received the first SPRA in March 2017 and is expecting all SPRAs, except for one, by December 2019. (One site has received an extension to August 2021, which is after its expected shutdown date.) Of the remaining sites, 32 will perform limited-scope evaluations (i.e., a high-frequency evaluation, low-frequency evaluation, or spent fuel pool evaluation). Eleven sites have screened out and will not need to perform any further seismic evaluations. As

of September 29, 2017, NRC staff had completed its assessment and closed out all required actions concerning seismic hazard reevaluations for 38 sites.

Sites that are required to conduct an SPRA 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 September 29, 2017, 41 operating reactor sites have completed their seismic MSAs, with an additional three MSAs expected by the end of 2017. The SPRA sites will submit their MSAs by December 2017 or coincident with the SPRA, whichever is later.

The Commission previously approved consolidating the rulemaking on station blackout mitigation strategies with the rulemaking on onsite emergency response capabilities and including 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.

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 October 13, 2017, including priorities and schedules. Of a total of 80 rulemaking activities, 59 rulemakings are planned activities. The NRC is reviewing 21 petitions for rulemaking. The 59 planned rulemaking activities include 7 rulemakings in response to industry requests, 7 rulemakings that could reduce or clarify existing requirements, 24 rulemakings that would comply with congressional statute or conform NRC regulations to other agency requirements or to international treaties or agreements, and 21 rulemakings that could establish new requirements. On March 10, 2017, the NRC deployed a single tracking and reporting system to provide real-time updates on all NRC rulemaking activities. Members of the public can access the system at <https://rulemaking.nrc.gov/>.