



*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

**October 2018–March 2019**

Note: The period of performance covered by this report includes activities that occurred from the first day of October 2018 to the last day of March 2019. 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

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## 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 agency 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 NRC issued the annual assessment letters to licensees in March 2019. The NRC Web site reflects the latest performance assessments as of the end of the first quarter of calendar year (CY) 2019.

## II. Implementing Risk-Informed and Performance-Based Regulations

Forty-six 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, 43 have received license amendments and have transitioned or are in the process of transitioning to the Standard 805 licensing basis. The NRC staff is currently reviewing two amendment requests that cover the remaining three units. The staff anticipates completing its review for one request by the end of the third quarter of fiscal year (FY) 2019 and the other by the end of the third quarter of FY 2020.

The industry communicated its plans to submit applications under 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." In 2014, the NRC approved the pilot application for Vogtle Electric Generating Plant (Vogtle). The industry has subsequently submitted 19 applications to adopt 10 CFR 50.69 since issuance of the pilot. The NRC staff has approved 6 applications and is currently reviewing 10 applications; 3 applications were withdrawn. The NRC anticipates receiving five or more additional applications by the end of CY 2019.

After the March 2011 event at the Fukushima Dai-ichi nuclear power plant in Japan, the NRC 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. 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 potentially be used for other functions (e.g., to support refueling outages, as defense in depth measures). The NRC staff is evaluating whether credit is appropriate for mitigating strategies and equipment (diverse and flexible coping strategies, referred to as FLEX) in risk-informed regulatory areas. Crediting the mitigating strategies poses challenges in the areas of human reliability analysis (HRA) and equipment reliability data. The NRC staff is continuing to work with the industry to overcome these challenges. In the area of HRA, the NRC held an expert elicitation, with industry participation, to inform efforts to develop an HRA tool capable of evaluating these applications. With respect to equipment reliability data, the industry has

recently completed an effort to collect fleet-wide reliability data for FLEX equipment. The NRC plans to audit the results of this effort in CY 2019.

The NRC is also pursuing a risk-informed approach in its rulemaking on the decommissioning of production and utilization facilities, particularly commercial nuclear power reactors. The Commission is currently considering a draft proposed rule that would implement a graded approach to the requirements applicable throughout the transition from operating status to decommissioning. The draft proposed rule would also address other relevant issues such as cybersecurity and drug and alcohol testing and would align regulatory requirements with the reduction in risk that occurs over time as facilities decommission, while continuing to maintain safety and security. Following public comment on the draft regulatory basis, the NRC staff completed and issued the regulatory basis in November 2017 and provided the draft proposed rule to the Commission in May 2018. Similarly, the staff is applying a consequence-oriented approach to emergency preparedness requirements in the draft proposed rule on emergency preparedness for small modular reactors (SMRs) and other new technologies, discussed in Section IX of this report.

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

During this reporting period, the NRC staff continued its evaluation of three open generic issues (GIs) and two proposed GIs. For the first proposed GI, related to the effects of high-energy arcing faults involving aluminum at nuclear power plants, the staff continued its assessment to determine whether the issue should proceed to the regulatory office implementation stage of the GI process. In particular, in September 2018, the Office of Nuclear Regulatory Research conducted several confirmatory tests, following small-scale testing at Sandia National Laboratories, involving aluminum components in high-energy arcing faults. The test results will be used in future pilot plant risk evaluations. For the second proposed GI, related to the adequacy of licensee procedures to address anticipated operational occurrences, the staff determined that the proposed issue did not meet the screening criteria to proceed in the GI program. This issue is now closed.

The open GIs currently in the regulatory office implementation stage are GI-191, GI-199, and GI-204. The sections below summarize the actions associated with these three open GIs and the technical issues involved with each. The NRC provides additional information on the status of open GIs on the GI dashboard on the agency'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 sump screen may result in clogging and the restriction of water flow to the emergency core cooling pumps. In response to GI-191, all PWR licensees increased the size of their containment sump strainers, significantly reducing the risk of debris clogging the strainers. In 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 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML042360586), the NRC 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-A, Revision 2, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," issued July 2013 (ADAMS Accession No. ML13239A114), 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 a topical report describing the approach (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 has suspended its review of this report to pursue an alternative resolution that makes use of the recent improved understanding of the phenomena and applies risk insights in an integrated analysis of the issue. On November 30, 2018, the Director of the Office of Nuclear Reactor Regulation (NRR) signed a letter to the PWR Owners Group Chairman (ADAMS Accession No. ML18311A297) stating that the NRC staff is reevaluating the closure path for GI-191 and GL 2004-02, particularly as related to in-vessel effects.

In SECY-12-0093, "Closure Options for Generic Safety Issue-191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," dated July 9, 2012 (ADAMS Accession No. ML12110648), the staff proposed three options for the closure of GSI-191. In response, the Commission approved these options on December 14, 2012 (ADAMS Accession No. ML12349A378). Licensees have since notified the NRC of their selected options and are developing proposed technical resolutions for staff review.

There are 37 operating reactor sites subject to GSI-191. The nine operating reactor sites that chose the industry's approach to modeling the effects of core cooling with the presence of debris in the reactor vessel have submitted their evaluations. The NRC staff reviewed these evaluations and closed the issue for these nine plants. Twenty-one operating reactor sites chose an approach that involves implementing mitigative measures coupled with a site-specific deterministic analysis. The remaining seven sites chose a risk-informed approach. Plants that elected to use a risk-informed approach are following the South Texas Project, the pilot plant for that method, which closed the issue in the summer of 2017 (ADAMS Accession No. ML121310659).

### **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 assessments used in their original designs and previous evaluations. The NRC staff later expanded the scope to include plants in the western United States. Following collaboration with the Electric Power Research Institute, in September 2010, 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 also 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 in 2011, the NRC incorporated GI-199 into the work being performed in response to the accident, which this report discusses further in Section X. Based

on current schedules, the staff expects to complete activities associated with GI-199 by the end of CY 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, discussed further in Section X of this report. Based on current schedules, the staff expects to complete the activities associated with GI-204 by the end of CY 2020.

#### **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
- other licensee actions that do not require NRC review and approval before licensees can carry them out

The FY 2019 NRC Congressional Budget Justification (CBJ) 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 inventory of other licensing tasks.

Table 1 shows the actual FY 2015 through FY 2019 results to date and the FY 2019 goals for the NRC CBJ performance indicators for operating power reactor licensing actions and other licensing tasks.

The agency continues to communicate with licensees about 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 2019 Goals for the NRC’s Congressional Budget Justification Performance Indicators**

<b>Output Measure</b>	<b>FY 2015 Actual</b>	<b>FY 2016 Actual</b>	<b>FY 2017 Actual</b>	<b>FY 2018 Actual</b>	<b>FY 2019 Current</b>	<b>FY 2019 Goals</b>
Licensing actions completed per year	792	837	967	861	349	700
Age of inventory of licensing actions	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 100% ≤2 years	96% ≤1 year and 100% ≤2 years	95% ≤1 year and 100% ≤2 years
Other licensing tasks completed per year	461	641	644	362	137	226
Age of inventory of other licensing tasks	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	93% ≤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 staff completed its reviews and issued renewed licenses for three operating plants, completed the sufficiency reviews of and accepted for docketing one subsequent license renewal application (SLRA), and continued its review of two SLRAs. During this reporting period, the NRC conducted license renewal activities 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.

*Seabrook Station, Unit 1*

On March 12, 2019, the NRC staff issued the renewed license for Seabrook Station, Unit 1.

In August 2016, NextEra submitted a license amendment request (LAR) to the current license to adopt a methodology for the analysis of seismic Category I structures with concrete affected by the alkali-silica reaction (ASR). This methodology is a basis for aging management programs in the revised LRA. On October 6, 2017, the Atomic Safety and Licensing Board (ASLB) granted a hearing on the ASR LAR. The staff issued its SER for the Seabrook license renewal review and its draft safety evaluation (SE) on the ASR LAR on September 28, 2018, and met with the ACRS License Renewal Subcommittee on October 31, 2018, to present the results of its review of the ASR methodology for the LAR and, for the license renewal review, the aging management programs that are based on the ASR methodology. The staff met with the ACRS License Renewal Subcommittee again on November 15, 2018, to present the results of its safety review of the LRA and the closure of the open items documented in the 2012 evaluation. The ACRS subcommittee provided its recommendations to the full committee on December 6, 2018. The ACRS provided its recommendation letters to the Commission on December 14 and 19, 2018, about closure of the open item on ASR for the license renewal SER and for issuance

of the Seabrook renewed license. The NRC staff has completed its reviews of the ASR LAR and LRA, including the aging management programs related to the ASR issue. The NRC staff held a public meeting in the Seabrook area on February 13, 2019, to discuss its plans for issuing the licensing actions prior to completion of the adjudicatory hearings, as permitted by the Atomic Energy Act of 1954, as amended. Also on February 13, 2019, the C-10 Research and Education Foundation, Inc., filed an emergency petition with the Commission requesting that, among other things, the Commission immediately order the suspension of the NRC staff's licensing decisions on the LAR and LRA. The emergency petition is still pending before the Commission. The NRC staff has confirmed that nothing raised at the public meeting or in C-10's petition would cause it to revisit the SE for the license amendment or the SER for the renewed license. Therefore, the NRC issued the license amendment on March 11, 2019, and the renewed license on March 12, 2019. The ASLB has scheduled the evidentiary hearing on the LAR from September 24–27, 2019.

### *Waterford Steam Electric Station, Unit 3*

On December 27, 2018, the NRC issued the renewed license for Waterford Steam Electric station, Unit 3.

Earlier in this reporting period and prior to this issuance, the ACRS subcommittee provided its recommendations to the full committee on November 1, 2018, and on November 21, 2018, the ACRS letter report recommended to the Commission that it approve the renewed license application. The NRC issued the final SEIS on November 20, 2018.

### *River Bend Station, Unit 1*

On December 20, 2018, the NRC issued the renewed license for River Bend station, Unit 1.

Earlier in this reporting period and prior to this issuance, the ACRS subcommittee provided its recommendations to the full committee on November 1, 2018, and on November 15, 2018, the ACRS recommended to the Commission that it approve the renewed license application.

### *Turkey Point Nuclear Generating, Units 3 and 4*

On January 30, 2018, as later supplemented and revised through April 10, 2018, Florida Power & Light Company (FPL) submitted the first SLRA for renewal of the operating licenses for an additional 20 years for Turkey Point Nuclear Generating, Units 3 and 4 (Turkey Point). The NRC staff began the sufficiency review for acceptance and docketing of the SLRA, and issued a letter accepting the application for docketing and an application review schedule on April 26, 2018. The NRC staff issued a notice of opportunity to request a hearing and petition to intervene, which was published in the *Federal Register* on May 2, 2018. The NRC received three requests for hearing/petition to intervene, submitted by (1) Friends of the Earth, Natural Resources Defense Council, and Miami Waterkeeper (Joint Petitioners), (2) Southern Alliance for Clean Energy (SACE), and (3) Mr. Albert Gomez. The applicant and staff filed answers to the petitions, to which replies were filed. The ASLB held oral arguments on the petitions on December 4, 2018, in Homestead, FL. On March 7, 2019, the ASLB denied Mr. Gomez's petition for failure to file an admissible contention, granted the petitions filed by the Joint Petitioners and Southern Alliance for Clean Energy, admitted four contentions (as revised) for litigation, and referred one portion of its ruling to the Commission; Turkey Point has filed an



appeal from the ASLB's decision. In addition, the Board has issued a tentative hearing schedule, which would culminate in hearings to be held in May 2020. On April 9, 2019, SACE filed a notice of its withdrawal from the proceeding.

Between May 7 and May 18, 2018, the staff audited FPL's operating experience information in connection with the staff's safety review. The staff issued the results of the operating experience audit on July 23, 2018. The staff performed its in-office regulatory audit between June 18 and July 13, 2018, to review the applicant's scoping and screening methodology used to identify structures, systems, and components within the scope of license renewal and subject to aging management review. The audit also (1) examined FPL's aging management programs, aging management review items, and time-limited aging analyses for Turkey Point, (2) verified FPL's claims of consistency with the corresponding aging management program and aging management review items in NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," issued July 2017, and (3) assessed the adequacy of the applicant's time-limited aging analyses. The NRC issued the in-office audit report on October 15, 2018. The NRC staff also performed an issue-specific onsite audit at Turkey Point August 27–31, 2018, to inform its review of the applicant's approach to the aging management of irradiated concrete for subsequent license renewal. This audit was extended to permit the staff to review documents off site during September and October 2018. The audit closed on October 26, 2018, and the NRC issued an audit report on January 25, 2019.

On May 22, 2018, the staff issued a *Federal Register* notice announcing its intent to conduct an environmental scoping process and to prepare an environmental impact statement. On May 31, 2018, the staff held two public environmental scoping meetings in Homestead, FL, near the Turkey Point site, during which members of the public provided comments on the scope of the environmental review to be conducted by the NRC staff for the Turkey Point SLRA. The staff issued its environmental scoping report on January 7, 2019. The staff was on site June 19–22, 2018, to conduct an environmental audit in support of the staff's review of the SLRA. The NRC issued the results of the audit on August 1, 2018.

The staff's schedule for completion of its environmental review has been revised, in large part due to the partial government shutdown, which impacted the interim schedule milestones for the environmental review. Specifically, the shutdown delayed the National Park Service (a cooperating agency on this review) in reviewing those portions of the NRC's preliminary draft SEIS on the areas in and around Biscayne National Park, which is adjacent to the Turkey Point site. As a result, the milestones for the issuance of the draft SEIS were delayed from January to March 2019. The NRC issued the draft SEIS for public comment on March 29, 2019; moved the draft SEIS public meeting to May 1, 2019; and scheduled the end of the draft SEIS public comment period for May 20, 2019. At this time, it is not clear whether the schedule change will impact the issuance of the final SEIS as this depends on the comments received on the draft SEIS. The staff notified the applicant of the schedule change on January 30, 2019 (ADAMS Accession No. ML19028A417).

#### *Peach Bottom Atomic Power Station, Units 2 and 3*

On July 10, 2018, Exelon Generation Company (Exelon) submitted the second SLRA to the NRC for renewal of the operating licenses for an additional 20 years for Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom). On July 16, 2018, the NRC staff began the sufficiency review for acceptance and docketing of the SLRA. The staff determined that the application was acceptable for docketing and issued the acceptance letter and application review schedule on August 27, 2018. The staff issued a notice of opportunity to request a

hearing and petition to intervene, which was published in the *Federal Register* on September 6, 2018. The NRC held a public scoping meeting on September 25, 2018, in Delta, Pennsylvania, during which members of the public provided comments on the scope of the environmental review for consideration by the NRC staff in preparing its draft SEIS.

The staff is conducting its detailed environmental and safety review of the Peach Bottom SLRA. The staff audited Exelon's operating experience information September 17–28, 2018, as part of the staff's safety review and issued its audit report on February 26, 2019. In addition, the staff performed a site tour of Peach Bottom on October 3–4, 2018, completed an environmental audit on November 7–8, 2018, and issued its audit report on January 31, 2019. In addition, the staff performed an in-office audit of the Peach Bottom SLRA and its supporting documentation November 13–December 14, 2018. The staff completed an additional in-office audit for specific technical areas in January 2019.

In November 2018, Beyond Nuclear, Inc., submitted a petition for hearing. The staff and the applicant filed answers to the petition on December 14, 2018. The oral argument on the petition took place on March 27, 2019.

#### *Surry Power Station, Units 1 and 2*

On October 15, 2018, Virginia Electric and Power Company (Dominion) submitted its application for subsequent renewal for Surry Power Station, Units 1 and 2 (Surry). The NRC made the application publicly available on October 24, 2018. The staff informed the applicant in a letter dated December 3, 2018, that it had accepted the application for detailed technical review. The staff performed an operating experience audit for the Surry SLRA December 6–19, 2018, and issued its audit report on March 4, 2019. The NRC held a public meeting to provide an overview of the subsequent license renewal process and the associated environmental scoping on January 8, 2019, in Surry, Virginia. The applicant supplemented its application by letters dated January 29, 2019, and April 2, 2019. On February 28, 2019, the staff completed an in-office audit of the applicant's aging management programs. The staff completed the on-site visit for the environmental review during the week of March 12, 2019.

## **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 both nonescalated and escalated reactor enforcement data, as well as the escalated enforcement data associated with 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 is assessed using the significance determination process under the ROP, which applies risk insights, as appropriate, to assist the NRC staff in determining the safety or security significance of inspection findings identified within the ROP.

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 follow the tables.

**Table 2 Nonescalated Reactor Enforcement Actions\***

<b>NONESCALATED REACTOR ENFORCEMENT ACTIONS</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Cited Severity Level IV or Green	1 <sup>st</sup> Half FY 19	0	0	0	1	1
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	1	1
	FY 18 Total	2	4	0	3	9
	FY 17 Total	2	5	2	2	11
Noncited Severity Level IV or Green	1 <sup>st</sup> Half FY 19	46	31	52	59	188
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	46	31	52	59	188
	FY 18 Total	101	69	108	144	422
	FY 17 Total	116	120	146	179	561
<b>TOTAL Cited and Noncited Severity Level IV or Green</b>	1 <sup>st</sup> Half FY 19	46	31	52	60	189
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	46	31	52	60	189
	FY 18 Total	103	73	108	147	431
	FY 17 Total	118	125	148	181	572

\* 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. These data do not include Green findings that do not have associated violations.

**Table 3 Escalated Reactor Enforcement Actions Associated  
with Traditional Enforcement\***

<b>ESCALATED REACTOR ENFORCEMENT ACTIONS ASSOCIATED WITH TRADITIONAL ENFORCEMENT</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Severity Level I	1 <sup>st</sup> Half FY 19	0	0	0	0	0
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	0	0
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Severity Level II	1 <sup>st</sup> Half FY 19	0	0	0	2	2
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	2	2
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Severity Level III	1 <sup>st</sup> Half FY 19	0	0	0	2	2
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	2	2
	FY 18 Total	0	1	0	0	1
	FY 17 Total	1	3	0	1	5
<b>TOTAL Violations Cited at Severity Level I, II, or III</b>	1 <sup>st</sup> Half FY 19	0	0	0	4	4
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	4	4
	FY 18 Total	0	1	0	0	1
	FY 17 Total	1	3	0	1	5

\* 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\***

<b>ESCALATED REACTOR ENFORCEMENT ACTIONS ASSOCIATED WITH THE ROP</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Violations Related to Red Findings	1 <sup>st</sup> Half FY 19	0	0	0	0	0
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	0	0
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Violations Related to Yellow Findings	1 <sup>st</sup> Half FY 19	0	0	0	0	0
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	0	0	0	0	0
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Violations Related to White Findings	1 <sup>st</sup> Half FY 19	1	0	0	0	1
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	1	0	0	0	1
	FY 18 Total	0	1	3	0	4
	FY 17 Total	2	1	4	3	10
<b>TOTAL Related to Red, Yellow, or White Findings</b>	1 <sup>st</sup> Half FY 19	1	0	0	0	1
	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	FY 19 YTD Total	1	0	0	0	1
	FY 18 Total	0	1	3	0	4
	FY 17 Total	2	1	4	3	10

\* 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**

### *Southern California Edison Company (San Onofre Nuclear Generating Station) EA-18-155*

On March 25, 2019, the NRC issued a notice of violation and proposed imposition of civil penalty in the amount of \$116,000 to Southern California Edison Company for two violations of NRC requirements related to an August 3, 2018, fuel-loading incident at San Onofre Nuclear Generating Station. The first was a Severity Level II violation involving the failure to ensure that important-to-safety equipment was available to provide redundant drop protection features for a spent fuel canister during loading operations. Specifically, the licensee inadvertently disabled the redundant loading slings while lowering a canister into the cask storage vault. For approximately 45-minutes, the canister rested on a shield ring unsupported by the slings, approximately 18 feet above the intended, fully seated position. This failure to maintain redundant drop protection placed the canister in a condition that had not been analyzed in the final safety analysis report.

The second violation was a Severity Level III violation involving the failure to make a timely notification to the NRC Headquarters Operations Center for the August 3, 2018, disabling of important-to-safety equipment described above.

### *Southern Nuclear Operating Company, Inc. (Joseph M. Farley Nuclear Plant) EA-18-032*

On January 29, 2019, the NRC issued a confirmatory order to Southern Nuclear Operating Company, Inc. (SNC or the licensee), to formalize commitments made as a result of an alternative dispute resolution mediation session held on September 21, 2018. The commitments were made as part of a settlement agreement between SNC and the NRC based on evidence gathered during an investigation that identified an apparent violation involving the licensee's failure to store safeguards information (SGI) in accordance with regulatory requirements. The violation involved a now-former Force-on-Force (FOF)/Target Set Coordinator employed at the Joseph M. Farley Nuclear Plant who deliberately failed to store SGI in a locked security storage container while unattended, failed to maintain an inventory of SGI located inside a security storage container, and failed to document the retrieval of SGI when in use. Additionally, the licensee failed to maintain an inventory and document the retrieval of SGI from the security storage container when the Nuclear Security Officer (NSO) reproduced an SGI document, placed the SGI in a binder, and removed it for use from the security storage container. Because licensees are responsible for the actions of their employees and contractors, the NRC concluded that the NSO's actions placed SNC in violation of NRC requirements and licensee procedures. In response to the incident, SNC agreed to complete additional corrective actions and enhancements, as fully discussed in the confirmatory order. In consideration of the corrective actions and commitments outlined in the confirmatory order, the NRC agreed not to pursue any further enforcement action (including issuance of a civil penalty) relating to the notice of apparent violation.

Wolf Creek Nuclear Operating Corporation (Wolf Creek Generating Station) EA-18-037

On December 17, 2018, the NRC issued a notice of violation with proposed imposition of civil penalty in the amount of \$232,000 to Wolf Creek Nuclear Operating Corporation (Wolf Creek) for a Severity Level II violation of 10 CFR 50.7, "Employee Protection." Specifically, between October 31 and November 10, 2016, Wolf Creek discriminated against a contract employee for engaging in protected activities. The contract employee was removed from the site, placed on paid administrative leave, and made the subject of an investigation, at least in part, for (1) submitting a condition report within the licensee's corrective action program related to alleged polar crane contact with equipment while operating within containment, (2) raising the safety concern during a safety stand-down meeting, and (3) raising retaliation concerns directly to Wolf Creek management. The NRC licensee paid the civil penalty in full on January 3, 2019.

Exelon Generation Company (Peach Bottom Atomic Power Station) EA-18-107

On December 11, 2018, the NRC issued a notice of violation to Exelon 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," Criterion XVI, "Corrective Action," at Peach Bottom associated with a White significance determination process finding. Contrary to the requirements, Exelon failed to assure that a condition associated with an emergency diesel generator (EDG) air check valve was promptly identified and corrected. Specifically, after identifying on April 1, 2017, that this air check valve assembly was loose as a result of wear, and after identifying on September 20, 2017, that there was an oil leak on it, Exelon did not take adequate corrective actions to address these adverse conditions. Additionally, the EDG being unavailable resulted in a violation of Technical Specification 3.8.1, "ECCS-Operating," which requires all four EDGs to be operable in Mode 1, and if any EDG is inoperable that it be returned to operable status within 14 days or the unit shall remain down and placed in Mode 3 within 12 hours.

Vistra Operations Company, LLC (Comanche Peak Nuclear Power Plant) EA-18-064

On December 10, 2018, the NRC issued a Severity Level III notice of violation to Comanche Peak Nuclear Power Plant for violations of 10 CFR 50.9, "Completeness and Accuracy of Information," and 10 CFR Part 50, Appendix B, Criterion XVII, "Quality Assurance Records." Specifically, the violation involved a condition report completed by a licensed operator about an unexplained plant water-level transient while shut down. The report documented potential false causes for the transient and the condition adverse to quality. This ultimately led to confusion about the plant system's status. The actual cause of the event was not a plant component failure but an underlying procedure violation not originally reported to plant supervision, although the operator responsible for the condition report knew of the procedure violation.

## **VII. Security and Emergency Preparedness and Incident Response Activities**

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

## Security

The NRC continues to conduct FOF inspections at each nuclear power reactor and Category I fuel cycle facility on a regular 3-year cycle. Each FOF inspection at nuclear power reactors 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 and Category I fuel cycle facility licensees to defend against the design-basis threat (DBT) for radiological sabotage. For Category I fuel cycle facilities, the NRC uses FOF inspections to evaluate the effectiveness of licensees' protective strategy against an additional DBT—theft or diversion of special nuclear material. These oversight activities provide valuable insights that enable the NRC to evaluate the effectiveness of licensee security programs.

Currently, FOF inspections are composed of two exercises for both power reactors and Category I fuel cycle facilities. In October 2018, the Commission approved the staff's recommendation to modify the FOF inspection program for power reactors to consist of one NRC-conducted FOF exercise and an enhanced NRC inspection of a licensee-conducted annual FOF exercise. The Commission also directed the staff to revise the baseline security inspection program framework that implements the revised program. The staff is planning to provide this revised framework to the Commission for review and approval in spring 2019. The staff is also evaluating options to provide credit for operator actions, the use of FLEX equipment, and response by Federal, State, and local law enforcement in the security framework; the staff will provide its resulting recommendations to the Commission in the spring of 2019. In addition, the staff completed a detailed review and update of the power reactor baseline physical security inspection procedures, which resulted in revisions to streamline the inspection process to eliminate redundancies, focus inspection resources on the most risk-significant security areas, and ensure that findings are based on reasonable assurance of adequate protection. The staff also revised the baseline physical security significance determination process for power reactors, which now better aligns with the ROP framework and uses risk information to appropriately characterize the significance of security findings.

In order to evaluate the licensee's protective strategy, mock adversary forces are used to replicate DBT adversary attributes in simulated attacks during FOF inspections. Since 2004, the Nuclear Energy Institute (NEI) has provided an adversary force (Composite Adversary Force (CAF) for use in power reactor FOF inspections and NRC has provided oversight of that adversary force to ensure its capability to replicate the DBT adversary attributes and to provide assurance that any potential conflicts of interest were mitigated. In early 2018, Entergy and NextEra ended their memberships in NEI; as a result, the NEI-managed CAF was not available for use in NRC-conducted FOF inspections at these two utilities' facilities. Following the separation, Entergy and NextEra submitted a joint proposal to provide a mock adversary force (the Joint Composite Adversary Force (JCAF)) to support NRC-conducted FOF inspections.

In April 2018, the Commission approved the use of the proposed JCAF to support NRC-conducted FOF inspections in CY 2018 and CY 2019 only. In CY 2018, the NRC provided increased oversight of the JCAF to verify adequate training for JCAF personnel and mitigate against the potential for conflicts of interest during the JCAF personnel selection process. In CY 2018, the NRC completed seven FOF inspections at Entergy and NextEra facilities using the JCAF. The staff has completed an assessment of the JCAF and determined that it was effective. In response to the Commission's direction, the staff will provide an assessment of options and recommendations for a long-term alternative to the NEI-managed CAF to the Commission in spring 2019.



Separately, the Commission is considering a final rule that would, in part, amend the 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. 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 draft final rule establishes the requirements that licensees must meet when applying for this authority. In developing the rulemaking, the NRC has worked closely with the U.S. Department of Justice's Office of the Attorney General; the Federal Bureau of Investigation (FBI); the Bureau of Alcohol, Tobacco, Firearms and Explosives; and other interested stakeholders.

In addition, to improve consistency and clarity, the draft final rule would revise the mandatory physical security event notification requirements for different classes of facilities and the transportation of radioactive material. The draft final rule would also add mandatory event notification requirements for the theft or loss of enhanced weapons and imminent or actual hostile acts and new reporting requirements for suspicious activities.

Finally, the Commission is considering a draft 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 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 for which to test individuals 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 support the FBI's efforts 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 taken 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 inspection activities for full implementation; as of March 2019, the agency has completed 21 inspections. This initial round of inspections will continue through CY 2020.

The NRC staff proposed several options to the Commission in SECY-14-0147, “Cyber Security for Fuel Cycle Facilities,” dated December 30, 2014 (ADAMS Accession No. ML15083A175), for implementing cybersecurity requirements for fuel cycle facilities. In response, the Commission issued a staff requirements memorandum (SRM) for SECY-14-0147, dated March 24, 2015 (ADAMS Accession No. ML15083A175), which directed the staff to initiate a rulemaking. The Commission is currently considering a draft proposed rule on this subject.

In SECY-17-0034, “Update to the U.S. Nuclear Regulatory Commission Cyber Security Roadmap,” dated February 28, 2017 (ADAMS Accession No. ML16354A258), the NRC staff updated the Commission on the agency’s cybersecurity requirements. SECY-17-0034 shows the current status of the staff’s evaluations of the need for cybersecurity requirements for other NRC license holders, including nonpower reactors, independent spent fuel storage installations, byproduct materials licensees, and decommissioning reactors. The NRC uses the roadmap to help determine the appropriate levels of cybersecurity protections and ensure that NRC-licensed facilities implement them promptly and effectively.

### **Emergency Preparedness and Incident Response**

Following the accident at Fukushima in Japan, the NRC issued information requests on licensee emergency preparedness staffing and communications capabilities during a large-scale natural event. Based on its 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.

In April 2012, the NRC and the Federal Emergency Management Agency (FEMA) began a multiyear initiative to revise NUREG-0654/FEMA-REP-1, Revision 1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” 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 agencies extended the comment period 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 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**

Since the 1970s, licensees have applied for and implemented power uprates as a way to increase the power output of their plants. The NRC staff has reviewed and approved 164 power uprates to date. Existing plants have gained approximately 23,769 megawatts thermal or 7,923 megawatts electric (MWe) in electric generating capacity (the equivalent of about 7 large nuclear power plant units) through power uprates.

Currently, the NRC has no power uprate applications under review. 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 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 enhancing the regulatory framework and infrastructure for advanced reactors (non-LWRs). In addition, the NRC 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, the Tennessee Valley Authority (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 the agency had accepted its application, as supplemented, for docketing and detailed technical review.

The NRC staff began its detailed technical review of the ESP application in January 2017 and issued a full review schedule with public milestones on March 17, 2017. The staff completed Phases A, B, and C of the safety review for all chapters of the application on August 4, 2017; October 17, 2018; and December 6, 2018, respectively. The staff is currently in Phase D of its review, with the final SER scheduled to be issued by August 2019. For the environmental review, the NRC staff completed Phases 1, 2, and 3 of the review on October 30, 2017; April 20, 2018; and December 14, 2018, respectively. The staff recently completed Phase 4 of its review with the public issuance of the final environmental impact statement (EIS) on

April 3, 2019. Both the safety and environmental reviews are currently more than 2 months ahead of schedule.

Three intervenors filed requests for hearing on TVA's application. On October 10, 2017, the ASLB granted two requests and denied the third. On May 21, 2018, the intervenors submitted two new contentions on the draft EIS. On July 31, 2018, the ASLB issued a memorandum and order (LBP-18-04) in which it denied the intervenors' motion for leave to file new contentions, granted the TVA and NRC staff motions to dismiss the remaining admitted contention, and terminated the contested proceeding. The intervenors did not appeal the Board's decision.

On August 23, 2018, the Secretary for the Commission transmitted a memorandum to the ASLB Panel to announce the Commission's decision to conduct the mandatory hearing itself. This will be the first Commission-conducted mandatory hearing on an ESP. The NRC will publish the schedule for the mandatory hearing after the final EIS and final SER are completed.

### *Design Certification Reviews*

#### NuScale Power, LLC, Small Modular Reactor Design Certification Application

On January 17, 2019, the staff issued a letter to NuScale communicating the current status of the design certification application review. The letter stated that, overall, NuScale and the staff have made substantial progress in bringing issues to closure, and the staff anticipates meeting the Phase 2 public milestone date of May 16, 2019, for the majority of the review areas. However, because of delays in the resolution of several challenging issues, some parts of the review may not meet this public milestone. Notwithstanding the likelihood that the Phase 2 milestone may be partially missed, the staff is confident that, if timely resolution of the remaining issues is achieved, the overall 42-month schedule can be met. The final SER is scheduled to be completed in September 2020.

On January 6, 2017, NuScale submitted the first SMR design certification application for NRC review. On March 15, 2017, the NRC completed its acceptance review and docketed the application. The staff issued the acceptance review letter to NuScale on March 23, 2017, and developed a full review schedule with public milestones, which it sent to NuScale on May 22, 2017. On April 11, 2018, the staff completed Phase 1 of the review. The staff's review is currently in Phases 2, 3, and 4. There are 14 significantly challenging issues requiring resolution and that have the potential to adversely affect the review schedule.

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 and other aspects of the design that contribute most to safety. This graded approach applies the appropriate level of review for structures, systems, and components by considering both the safety classification and the risk significance.

#### Advanced Power Reactor 1400

The NRC staff has completed its activities associated with the development of a direct final rule to certify the APR1400 standard plant design and submitted the rule package to the Commission for review and approval in March 2019. The Commission affirmed the direct final rule on April 30, 2019, and it will be published in the *Federal Register*.

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 (APR1400) 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. On September 28, 2018, the staff issued the final SER, completing its review within the 42-month schedule. The NRC also issued a standard design approval for the APR1400 to Korea Hydro & Nuclear Power Company, Ltd., on September 28, 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 PWR 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 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 this design remains suspended.

#### *Design Certification Renewals*

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

In March 2019, the NRC staff closed the remaining open items associated with the advanced boiling-water reactor (ABWR) review. The staff will issue a final schedule letter, as noted below, to General Electric-Hitachi (GEH) following the ACRS subcommittee meeting in April 2019. The ACRS Full Committee meeting is expected to be completed by the fall of 2019.

On December 7, 2010, GEH submitted an application for renewal of the 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. On February 19, 2016, GEH 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 after the staff receives complete responses to its requests for additional information.

## Construction Oversight under 10 CFR Part 52

The NRC is implementing activities to oversee the safe construction and operational readiness of the two Advanced Passive 1000 (AP1000) units under construction at the Vogtle site. 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. 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 finalizing guidance in support of the planning and inspection activities for the licensee's initial test programs. Communications with Vogtle management to assess the scope of construction and operational activities continue to inform NRC inspections.

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, guidance on ITAAC closure, status reports for ITAAC notifications, and other upgrades for faster access to information such as departure reports and license amendments.

The NRC has implemented the Construction ROP (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 the agency then considers 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 affect the schedule for completion of Vogtle Units 3 and 4. The VRG Charter, issued in March 2018, identifies the steps the NRC is taking (including reviewing inspection results, assessing construction activities, reviewing system tests, and completing the transition to operations activities) to ensure that the regulatory requirements in the COLs will be met. The NRC is implementing an integrated project plan that overlays key NRC activities on the licensee's construction and startup schedule. The VRG ensures management attention to the timely implementation of the integrated project plan.

Highlights of the NRC licensing and oversight of construction activities at Vogtle Units 3 and 4 include the following:

- The NRC has provided timely review of all LARs for Vogtle Units 3 and 4 such that the construction schedule was not impacted.
- To date, all construction inspection findings for Vogtle Units 3 and 4 are of low safety significance and the licensee has been addressing these issues appropriately.
- The staff is actively preparing for the transition to operations. The NRC is prepared to effectively and efficiently confirm the operational readiness of these new units.

Additionally, the staff issued LIC-114 (NRR)/REG-106 (Office of New Reactors), “Title 10 of the Code of Federal Regulations (10 CFR) Section 52.103(g) Finding and Communication Process.” This office instruction describes the steps that will be taken and provides templates for memoranda informing the Commission of the status of regulatory activities in the final year of construction for a 10 CFR Part 52 licensed facility and for taking the actions necessary to make the 10 CFR 52.103(g) finding that all ITAAC are met. The staff’s finding is required before operation.

### *Vendor Inspections*

The NRC staff uses the 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 10 CFR Part 21, “Reporting of Defects and Noncompliance,” and verify the effective use 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 2019, the NRC planned to perform approximately 20 vendor inspections in support of a reduction of efforts as the Vogtle project nears its completion. The annual VIP self-assessment showed that the NRC met its goal of completing 25 inspections in FY 2018 in addition to supporting inspections of the initial test program for Vogtle Units 3 and 4. The VIP also completes inspections in support of license renewal reviews for operating plants as well as inspections for other designs currently under review, such as NuScale.

### **Operator Licensing**

The NRR staff supports and provides programmatic oversight for Region II implementation of operator licensing training, procedure inspections, and licensee examinations.

NRR and Region II implemented 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”), The lessons learned from these activities will continue to inform exams to be administered at Vogtle until the transition to operations and will also be used during the NuScale application review.

The staff continued preparations for operator licensing examinations for the NuScale SMR technology. These preparations included an observation of main control room simulator scenarios at a NuScale facility and continued development of the knowledge and abilities catalog, from which the licensing examinations are generated.

### **Non-Light-Water Reactors**

Consistent with Section 103 of the Nuclear Energy Innovation and Modernization Act (NEIMA), which was signed into law on January 14, 2019, the NRC plans to complete a rulemaking by

December 31, 2027, to establish a “technology-inclusive regulatory framework” for optional use by applicants for new commercial advanced nuclear reactor licenses.

Additionally, the staff has a number of ongoing activities to support licensing non-light water reactors, many of which will support the activities required by Section 103 of NEIMA. The staff issued SECY-19-0009, “Advanced Reactor Program Status,” on January 17, 2019 (ADAMS Accession No. ML18346A075). This paper provides the status of the NRC staff’s activities related to advanced reactors, including the progress and path forward on each of the implementation action plans (IAPs) strategies. It also summarizes the various external factors influencing the staff’s preparations for possible licensing and deployment of advanced 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, as described in “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 includes three strategic objectives: (1) enhancing technical readiness, (2) optimizing regulatory readiness, and (3) optimizing communication. The NRC prepared 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.

As part of near-term IAP Strategy 1, the NRC is acquiring and developing sufficient knowledge, technical skills, and capacity to perform non-LWR regulatory activities. The NRC contracted with Argonne National Laboratory to develop sodium-cooled fast reactor training, which took place on March 26–27, 2019, and high-temperature gas-cooled reactor training that will occur in July 2019. The NRC previously contracted with Oak Ridge National Laboratory to develop a training course on molten salt reactors that approximately 90 NRC staff members attended between May and November 2017. All three courses will be available on video for additional NRC staff to take in the future.

As part of near-term IAP Strategy 2, the NRC is acquiring and developing sufficient computer codes and tools to perform non-LWR regulatory reviews. In the near-term, these efforts focus on reactor kinetics and criticality, fuel performance, thermal-fluid phenomena, severe accident phenomena, offsite consequence analysis, materials and component integrity, and probabilistic risk assessment (PRA). An initial screening of analysis codes for design-basis and beyond-design-basis event simulation was completed in 2017, identifying a suite of tools for further examination and consideration. The code suite comprises both NRC-developed codes and codes developed by the U.S. Department of Energy (DOE). On November 16, 2018, the NRC staff briefed the ACRS on the role of confirmatory calculations in regulatory decisionmaking, and non-LWR developers discussed their plans for modeling and simulation tools. In FY 2019, the staff will continue to engage with stakeholders, including the ACRS, and plans to complete reports that will provide a coherent basis and technical rationale for the selection of computer codes, and related development activities, in support of safety reviews of non-LWR designs. The reports will describe the factors used to select the codes, the work necessary to achieve readiness to support the safety reviews, and the approach that will be taken in prioritizing resources for code development activities.



As part of near-term IAP Strategy 3, the NRC is working to optimize the regulatory framework for non-LWR reviews and licensing processes. On December 26, 2017, the NRC issued “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. The staff plans to update the roadmap document in FY 2019 to provide more specific examples of how applicants can use the NRC’s flexible and staged regulatory review processes.

Also as part of IAP Strategy 3, the NRC has engaged with the Licensing Modernization Project (LMP), a cost-shared initiative led by Southern Company, coordinated by NEI, and supported by 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 staff has reviewed four LMP white papers and sent a letter to the LMP on February 21, 2018, concluding its review of the white papers. On March 29, 2018, the industry submitted a working draft of a consolidated guidance document titled, “Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development,” to support discussions during a public meeting on April 5–6, 2018. The NRC also held public meetings on June 5–6, 2018; August 21, 2018; and September 13, 2018, to discuss Southern Company’s updated draft LMP document and to obtain stakeholder feedback on the NRC staff’s draft regulatory guide (DG)-1353, “Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Inform the Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors,” on potential endorsement of the LMP document. The staff and industry also briefed the ACRS Future Plant Subcommittee on June 19 and October 30, 2018. In preparation for the October 30, 2018, ACRS meeting, the industry issued a revision of the LMP document (as NEI 18-04) and the NRC staff released its working draft of DG-1353, both on September 28, 2018. The staff briefed the ACRS Full Committee on February 6, 2019, and plans to issue DG-1353 for public comment in FY 2019. The staff also plans to send a SECY paper to the Commission discussing associated policy issues in FY 2019.

As part of near-term IAP Strategy 4, the NRC is working to facilitate the development of industry codes and standards 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. ASME B&PV Code, Section III, Division 5, provides rules for the design, construction, testing, certification, and quality assurance of high-temperature reactors and covers the use of metallic, graphite, and composite materials. The NRC has identified the 2017 Edition of this standard for potential endorsement to improve the efficiency and effectiveness of the agency’s review process, provide the non-LWR designers a stable set of rules for reactor development, and facilitate the certification of non-LWR component vendors. The NRC staff is also participating in the Task Group on ASME/NRC Liaison for Division 5, which seeks NRC, DOE, and industry input in identifying gaps in ASME B&PV Code, Section III, Division 5, that need to be resolved before the NRC considers endorsing it in 10 CFR 50.55a, “Codes and Standards.” ASME sent a letter to the staff confirming that advanced reactor developers support NRC endorsement of the 2017 Edition of ASME B&PV Code, Section III, Division 5. Therefore, the staff is initiating the endorsement process. ASME also plans to submit a technical basis document for the 2017 Edition. The staff discussed its plans for endorsement of ASME B&PV Code, Section III, Division 5, during the NRC’s annual standards forum on September 11, 2018, and during a periodic advanced reactor stakeholder meeting on September 13, 2018. 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 February 7, 2019, the NRC Standards Executive issued a letter to the ASME

Board Chair and ANS Standards Board Chair (ADAMS Accession No. ML19031C904) communicating the priority of various PRA standard development activities. The NRC identified completion of the non-LWR PRA standard as a high priority consistent with the requirements of NEIMA.

As part of near-term IAP Strategy 5, the NRC is identifying and resolving technology-inclusive (i.e., not specific to a particular non-LWR design or category) policy issues that affect regulatory reviews, siting, permitting, and licensing of non-LWR nuclear power plants. The technology-inclusive policy issues that the NRC staff has discussed 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 in a potential policy issue involving siting considerations for SMRs and non-LWRs related to population distribution and density. SECY-16-0012, “Accident Source Terms and Siting for Small Modular Reactors and Non-Light Water Reactors,” dated February 7, 2016, had previously identified this issue. During a public meeting on May 3, 2018, NEI provided feedback on behalf of its nuclear industry members, stating its position that the NRC should update Regulatory Guide (RG) 4.7, Revision 3, “General Site Suitability Criteria for Nuclear Power Stations,” issued March 2014, to scale the population density guidance based on the smaller source term and lower probability of release anticipated for SMRs and advanced reactors. The staff contracted with Oak Ridge National Laboratory to develop a draft technical report to identify potential alternative siting criteria for SMRs and non-LWRs that recognize the possible reduced offsite releases for advanced reactor designs. The report will provide insights to the staff for informing its plans to develop additional regulatory guidance, as appropriate, for SMR and non-LWR siting. The paper is scheduled to be finalized by mid-2019. The staff will report to the Commission on any proposed actions, as described in SECY-16-0012.
- Offsite Emergency Planning—Consistent with the Commission’s direction in 2015, the NRC staff developed a proposed rule that would provide for alternative emergency preparedness requirements for SMRs and other new technologies. The proposed alternative emergency preparedness requirements would adopt a consequence-oriented, risk-informed, and performance-based approach. In part, this rulemaking would reduce potential requests for exemptions from the current emergency preparedness requirements and promote regulatory stability, predictability, and clarity in the licensing process for these future facilities. The NRC published the regulatory basis on November 15, 2017. On October 12, 2018, the NRC staff provided the proposed rule to the Commission for review and approval.
- 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 facilities with power reactors that produce electrical power equal to or greater than 100 MWe per unit, and multimodule facilities with SMR designs that individually produce less than 100 MWe but that, in combination, produce more than 100 MWe. Specifically, the staff raised the question of whether, under the current Price-Anderson Act and associated regulatory language, insurance and indemnity coverage would be sufficient to pay all public claims in the case of an insurable event at a multimodule facility with an individual module sized at less than 100 MWe. Since then, the NRC has prepared a comparative

analysis of different SMR designs to further explore the potential inequity. The staff is also evaluating the differences in potential consequences for postulated accidents for non-LWR designs in relation to insurance and liability requirements. The staff is using these analyses, and other inputs, to identify whether to recommend any changes to the Price-Anderson Act for SMRs and non-LWRs. In accordance with the latest version of the Price-Anderson Act, by December 31, 2021, the NRC will prepare a report to Congress, and an associated SECY paper for the Commission's consideration, recommending the need for continuation or modification of the provisions of the Price-Anderson Act. This report and SECY paper will address any changes that the staff recommends for non-LWRs and SMRs. The staff engaged stakeholders on this topic during a public 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 asked that “the NRC establish regulatory positions on this approach and the associated policy and technical issues.” The staff considered stakeholder input and prepared SECY-18-0076, “Options and Recommendation for Physical Security for Advanced Reactors,” which it sent to the Commission on August 1, 2018. On November 19, 2018, the Commission directed the staff to initiate a limited-scope revision to regulations and guidance related to physical security for advanced reactors and approved, subject to edits, a related rulemaking plan. At an advanced reactor stakeholder meeting on December 13, 2018, participants discussed the scope of potential changes to physical security requirements. The staff is preparing a draft regulatory basis to issue for public comment in late FY 2019 as described in the rulemaking plan.
- 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 with a policy issue on the use of a functional containment approach for non-LWRs. The staff discussed the draft white paper with stakeholders on December 14, 2017, and February 1, 2018, and with the ACRS Future Plant Designs Subcommittee on February 22 and April 5, 2018. The ACRS provided a letter on May 10, 2018. The staff considered ACRS and stakeholder feedback and provided SECY-18-0096, “Functional Containment Performance Criteria for Non-Light-Water Reactors,” to the Commission on September 28, 2018. In SECY-18-0096, the staff recommended Commission approval of a proposed methodology for establishing functional containment performance criteria for non-LWRs in a manner that is technology inclusive, risk-informed, and performance based. In SRM-SECY-18-0096, dated December 4, 2018, the Commission approved the staff's proposed methodology for establishing functional containment performance criteria for non-LWRs. The Commission also requested that the staff continue to keep it informed as the staff develops the licensing framework for non-LWRs and notify the Commission if future policy issues arise as this work progresses. The staff is incorporating the methodology for functional containment performance criteria in ongoing activities, such as the preparation of DG-1353; future revisions of RG 1.232, “Guidance for Developing Principal Design Criteria for Non-Light-Water Reactors,” issued April 2018; and interactions with specific designers.

As part of near-term IAP Strategy 6, the NRC is optimizing communications. The agency is conducting public meetings with stakeholders every 4 to 6 weeks. The NRC continues to meet with potential applicants upon request and 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 Working 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.

Also in support of IAP Strategy 6, the NRC has frequent interactions with DOE, including the following:

- On November 10, 2016, the NRC and DOE signed a memorandum of understanding (MOU) describing the roles, responsibilities, and processes related to the implementation of the DOE Gateway for Accelerated Innovation in Nuclear (GAIN) initiative. GAIN is intended to provide the nuclear energy community with increased access to the technical and regulatory information and financial support necessary to move new or advanced nuclear reactor designs toward commercialization 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 responsible for then sharing that information with the prospective applicants, as appropriate.
- The NRC and DOE conduct monthly calls to discuss mutual areas of interest related to the GAIN initiative. In addition to the specific activities identified in the GAIN MOU, the NRC actively participates in GAIN-sponsored non-LWR workshops to provide an opportunity for the NRC to gather information, develop technical expertise, and discuss NRC requirements and non-LWR readiness activities.
- The NRC and DOE also conduct quarterly management meetings to share information about advanced reactor readiness activities. For example, the NRC and DOE have discussed areas of future cooperation, such as DOE piloting RG 1.232 and DG-1353 during the DOE authorization process for the proposed versatile test reactor. The NRC and DOE also discussed opportunities for the NRC to observe or participate in the authorization process to gain knowledge about non-LWR technology and to build staff capability for future NRC licensing activities for non-LWR designs. The NRC and DOE are finalizing a MOU to outline these future interactions.
- The NRC and DOE are developing an MOU in order to share technical expertise and knowledge as required by the Nuclear Energy Innovation Capability Act of 2018.
- The NRC is providing technical and regulatory information to support DOE as it prepares a report on microreactors as required by the Nuclear Defense Authorization Act.

### **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 that are largely aimed at non-LWRs. The sections below describe other infrastructure activities conducted during the reporting period.

#### *Revision to Regulatory Guide 1.206*

The NRC has revised RG 1.206, “Combined License Applications for Nuclear Power Plants,” issued June 2007, to include 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. This draft guide captured important lessons learned from recent licensing actions on large LWRs and was informed through discussions in a series of public meetings. The NRC received comments on DG-1325 in September 2017 and issued the revised guide on October 12, 2018.

#### *NUREG-0800*

The NRC staff began an effort to modernize NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports [SRP] for Nuclear Power Plants: LWR Edition.” The SRP is used to support the staff’s reviews of applications for COLs, design certifications, and ESPs; limited work authorization requests; and LARs. The SRP is primarily focused on large LWR design reviews. The NRC staff recognized the need to modernize the SRP to support transformational change in the NRC’s licensing process for current and future light-water applications. The SRP modernization effort will improve efficiency and streamline the SRP by focusing the staff’s review on the regulatory requirements and associated acceptance criteria. In addition, the SRP will leverage the improved use of risk insights to inform the scope of the staff’s review.

#### *Environmental Guidance Updates*

The NRC staff published Revision 3 of RG 4.2, “Preparation of Environmental Reports for Nuclear Power Stations,” in the *Federal Register* on September 24, 2018. The agency had issued the previous revision (Revision 2) of RG 4.2 in July 1976. The staff is currently updating 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 NRC expects to publish a draft of the revised NUREG-1555 for public comment in December 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 LARs.

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

During the reporting period, the NRC's response to the lessons learned from the Fukushima accident in Japan has focused on implementing the highest priority (Tier 1) activities. The agency continued to assign resources to address these activities while maintaining 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 has completed its review of nuclear power plant licensee plans to achieve compliance with the mitigating strategies and spent fuel pool instrumentation orders issued on March 12, 2012. The NRC has issued SEs documenting its assessment of licensee implementation plans. The staff will complete the final three onsite inspections of the licensees' implementation of these important safety improvements by mid-2019.

In June 2013, the NRC issued a revised order requiring boiling-water reactors with Mark I and II containments to install a hardened containment vent capable of withstanding a severe accident. 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. All operating units subject to the order have reported compliance with Phase 1 of the order, with the exception of one site that is scheduled to permanently shut down by June 1, 2019. In November 2017, the first operating reactor site achieved full compliance with both phases of the order. The NRC issued its SE of this site in late April 2018 and completed the subsequent inspection in July. The remaining operating reactor sites subject to this order are scheduled to complete the requirements and achieve full compliance no later than mid-2019, with the exception of the one site that will permanently shut down by June 1, 2019. The NRC will continue to issue SEs documenting its assessment of licensee final implementation plans and will then inspect licensee implementation of these important safety improvements into mid-2020. Since issuance of the order, the NRC has issued SEs for more than one-third of applicable sites.

The NRC issued a 10 CFR 50.54(f) request for information on March 12, 2012, asking 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 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 all but one site. This one site recently submitted a revised FHRR to apply risk insights to its storm surge analysis.

Depending on site-specific considerations, other evaluations may be required. 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 received most of the additional analyses by the end of 2018 and expects the remaining few analyses by mid-2019. (Three sites have requested, and two sites have received, extensions to a date after their expected early shutdown dates.) As of March 20, 2019, the NRC staff completed its assessment and closed out all required actions concerning flooding hazard reevaluations for 47 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 are required to perform an SPRA. Seven of those sites were also required to perform a spent fuel pool evaluation. For the remaining reactors, the NRC staff concluded that sufficient margin exists that a detailed SPRA is not necessary. Licensees for eight sites have submitted their SPRAs, and the NRC is expecting all but two SPRA submittals (eight sites) to be completed by December 2019. (Two sites have received extensions to a date after their expected early shutdown dates.) Of the remaining sites, 31 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 all complete. Eleven sites screened out and did not need to perform any further seismic evaluations.

By January 2016, 34 sites that had seismic exceedances submitted interim actions or evaluations 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 submittals for the expedited seismic evaluation process and found them acceptable. As of March 20, 2019, the NRC staff completed its assessment and closed out all required actions concerning seismic hazard reevaluations for 46 sites.

As of March 20, 2019, 25 operating power reactor sites have completed all post-Fukushima activities in response to the three orders and 10 CFR 50.54(f) request for information issued by the NRC. The NRC staff is engaging with stakeholders on the staff's proposed process for the treatment of the reevaluated flood and seismic hazard information in backfit determinations in light of the recently approved Mitigation of Beyond-Design-Basis Events rule. This process reflects the Commission's direction in the affirmation notice and SRM, dated January 24, 2019 (ADAMS Accession No. ML19023A038), associated with the rule.

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 and activities associated with the reevaluated flooding and seismic hazards. For sites that have approved extensions of required response dates for hazard reevaluations, the NRC expects the licensee to provide the required response by the approved extension date. Should a licensee determine that the remaining responses are no longer necessary (i.e., the plant has been permanently shut down), the NRC expects that the licensee would document such a request in a letter, with the appropriate basis supporting the request, before the approved extension date.

## **XI. Planned Rulemaking Activities**

The attached report lists the status of NRC rulemaking activities as of April 5, 2019, including their priorities and schedules. Of a total of 92 rulemaking activities, 67 rulemakings are planned activities. The NRC is reviewing 25 petitions for rulemaking. The 67 planned rulemaking activities include 9 rulemakings in response to industry requests, 14 rulemakings that could reduce or clarify existing requirements, 25 rulemakings that would comply with congressional statute or conform NRC regulations to other agency requirements or to international treaties or agreements, and 19 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>.

At the time of publication, each proposed and final rule includes a statement that addresses actions taken to adhere to applicable backfitting and issue finality requirements. This includes discussing which backfitting and issue finality requirements apply and how NRC staff evaluated the rule with respect to those requirements. In an effort to improve consistency in applying these requirements, the agency provides training on backfitting and issue finality to staff who engage in activities where these topics arise. The agency's Committee to Review Generic Requirements also reviews all rulemakings that meet defined criteria to provide additional confirmation that backfitting and issue finality requirements are applied to rulemakings appropriately and consistently.