



*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 2016–March 2017**

Note: The period of performance covered by this report includes activities that occurred from the first day of October 2016 to the last day of March 2017. The transmittal letter to Congress accompanying this report provides additional information to keep Congress fully informed on the current licensing and regulatory activities of the U.S. Nuclear Regulatory Commission.

Enclosure

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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 self-assessments and independent evaluations, the NRC continuously assesses the ROP to enhance the effectiveness and efficiency of the program. The NRC staff meets with interested stakeholders periodically to collect feedback on the effectiveness of the process and considers this feedback when making future refinements to the ROP.

The agency's most recent performance assessments show that all plants continue to operate safely. The NRC issued a press release on March 3, 2017, summarizing the 2016 annual assessment of nuclear power plant performance and the associated annual assessment letters sent to each licensee, which are publicly available on the NRC Web site. The NRC has also updated the Web site to reflect the latest performance assessments as of the end of calendar year 2016.

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

Currently, 46 operating nuclear power reactors have committed to transition 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 (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." Of these 46 reactor units, 41 have already transitioned to an NFPA Standard 805 licensing basis, and the NRC staff is currently reviewing 5 others. The NRC anticipates completing its evaluation of all five submitted transition plans by the end of the first quarter of fiscal year (FY) 2018. The agency expects to receive one license amendment application for the remaining two reactor units in the third quarter of FY 2018.

The industry communicated its plans to submit, in the near future, many applications for 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." In 2014, the NRC reviewed and approved the pilot application for Vogtle Electric Generating Plant (Vogtle). Currently, no other 10 CFR 50.69 applications have been submitted to the NRC.

After the March 2011 event at the Fukushima Dai-ichi nuclear power plant in Japan, the NRC developed and issued orders to implement a comprehensive set of recommendations that would enhance the mitigating strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event. As of March 31, 2017, more than 85 percent of all units have fully implemented the mitigating strategies order, and implementation is well underway for the others. The Commission is also reviewing a draft final rule that would make the order requirements generically applicable. Although the equipment and strategies were specifically intended to mitigate the effects of a beyond-design-basis external event, the NRC recognizes that the equipment can also be used for other functions (e.g., refueling outages, defense in depth). The NRC staff is evaluating how mitigating strategies equipment (referred to as FLEX) may be credited in various risk-informed regulatory decisions. In August 2016, the Nuclear Energy Institute (NEI) submitted (for information only) NEI 16-06, "Crediting Mitigating Strategies in Risk-Informed Decision Making." NEI 16-06 is an industry-developed guidance document for use by licensees that outlines a three-tiered approach for evaluating the potential safety benefits of plant mitigation strategies: (1) qualitative assessment, (2) semiquantitative streamlined assessment, and (3) full

probabilistic risk assessment. NEI has not requested endorsement of this guidance document; however, the NRC staff reviewed the document and developed a draft staff position for consideration when licensees use the approach for requesting credit in various risk-informed decisionmaking areas. Although the NRC staff concluded that the current regulatory structure is adequate to evaluate these submittals, it drafted several guidance document changes to promote consistency and efficiency. The staff will continue to monitor these requests and evaluate the need for additional guidance changes in the future.

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

During this reporting period (October 2016–March 2017), the staff continued its evaluation of three open generic issues (GIs) and one proposed GI. Since the prior reporting period, the staff has continued a screening evaluation of a potential GI involving the effects of high-energy arcing faults involving aluminum at nuclear power plants.

The open GIs currently in the regulatory office implementation stage are GI-191, “Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance”; GI-199, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States for Existing Plants”; and GI-204, “Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures.” The sections below summarize the actions associated with these three open GIs. Additional information on the status of open GIs can be found on the GI dashboard on the NRC’s public Web site at <http://www.nrc.gov/about-nrc/regulatory/gen-issues/dashboard.html>.

#### GI-191, “Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance”

GI-191 is concerned with 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 restriction of water flow to the pumps. As a result of GI-191 and the related Generic Letter 2004-02, “Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors,” dated September 13, 2004, all PWR licensees increased the size of their containment sump strainers, significantly reducing the risk of debris clogging the strainers.

A related issue that needs to be resolved to close GI-191 is the potential for debris to bypass 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. In 2012, the industry completed the additional testing and submitted topical report WCAP-16793-NP, “Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid.” In 2013, the NRC staff issued its safety evaluation based on WCAP-16793-NP, Revision 2, as an acceptable model for assessing the effects on core cooling from fibrous particulate and chemical debris that have bypassed the sump strainers. To justify higher fiber limits than those previously approved, the PWR Owners Group submitted a new topical report, WCAP-17788, “Comprehensive Analysis and Test Program for GSI-191 Closure (PA-SEE-1090)—Cold Leg Break (CLB) Evaluation Method for GSI-191 Long-Term Cooling.” The NRC staff discussed this topical report with the Advisory Committee on Reactor Safeguards (ACRS) at a meeting held on October 20, 2015. The staff will hold additional meetings with the ACRS before completing its review of the topical report. The staff anticipates that it will complete its review of WCAP-17788 in early 2018.

Based on its interactions with stakeholders and the results of the industry testing, the NRC staff developed three options that would provide licensees with alternative approaches for resolving GI-191. The staff proposed these options to the Commission 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. In response, the Commission issued a staff requirements memorandum on December 14, 2012, approving these options for use by licensees for closing GI-191. Licensees have since notified the NRC of the option that they have selected and are developing proposed technical resolutions for the staff to review.

There are 36 operating reactor sites subject to GI-191. All of the nine operating reactor sites that chose Option 1, which involves using previously approved models and test methods, have submitted their evaluations. The NRC staff reviewed and approved all of these evaluations; therefore, all activities on Option 1 plants have been closed out.

The 26 operating reactor sites that chose Option 2, which involves implementing additional mitigative measures or selecting a deterministic or risk-informed approach, will follow topical report WCAP-17788. As stated previously, the NRC staff is currently reviewing that report. Plants that elect to use a risk-informed approach can use the industry's proposed risk-informed approach submitted by the pilot plant, South Texas Project (STP). The one site that chose Option 3, which involves separating the regulatory treatment of the sump strainer and in-vessel effects, will submit its report after addressing any issues that the staff identified as part of its review of the STP risk-informed approach. Based on current schedules, the staff expects that activities associated with this GI will be completed by the end of 2018.

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

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

After the nuclear event at Fukushima, the NRC incorporated GI-199 into the work being performed in response to the accident, as further discussed in Section X of this report.

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

GI-204 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. GI-204 is being addressed as part of the efforts associated with the NRC's response to the Fukushima nuclear accident, as discussed in Section X of this report.

#### **IV. Licensing Actions and Other Licensing Tasks**

Licensing actions related to operating power reactors include orders, license amendments, exemptions from regulations, relief from inspection or component testing, topical reports submitted on a plant-specific basis, or other actions requiring NRC review and approval before licensees can carry out certain activities. The FY 2017 NRC Congressional Budget incorporated two output measures related to licensing actions: (1) the number of licensing actions completed per year and (2) the age of the licensing action inventory.

Other licensing tasks for operating power reactors include the following:

- licensees' responses to NRC requests for information through generic letters or bulletins
- NRC review of generic topical reports
- NRC inspections of licensees' analyses under 10 CFR 50.59, "Changes, Tests and Experiments"
- updates to final safety analysis reports
- other licensee actions that do not require NRC review and approval before licensees can carry them out

The FY 2017 NRC Congressional Budget incorporates two output measures related to other licensing tasks: (1) the number of other licensing tasks completed each year and (2) the age of the other licensing task inventory.

Table 1 shows the actual FY 2013, FY 2014, FY 2015, FY 2016, and FY 2017 results to date and the FY 2017 goals for the NRC Congressional Budget performance indicators for operating power reactor licensing actions and other licensing tasks. The NRC continues to work on the Fukushima Tier 1 activities under aggressive schedules that require close monitoring to ensure that the implementation of the activities is successful. The agency prioritizes all licensing action reviews in accordance with their safety significance; however, because of Fukushima-related work competing for the same critical skill sets, the backlog inventory of operating reactor licensing actions increased. In late FY 2014, the staff redistributed resources to support the stabilization and reduction of the licensing action backlog. As a result, the NRC saw the backlog inventory stabilize in FY 2015. The backlog was further reduced in FY 2016 to within performance standards. In addition, the agency has undertaken or planned a number of additional initiatives, including enhancing workload management processes, providing more effective management attention, piloting an issue resolution process, and upgrading workload management tools. The agency continues to communicate with licensees to maintain information on planned licensing submittals as relevant. The NRC's senior management remains heavily engaged in monitoring the licensing action workload towards maintaining target performance goals.

**Table 1 Results and FY 2017 Goals for Congressional Budget Performance Indicators**

<b>CONGRESSIONAL BUDGET PERFORMANCE INDICATORS</b>						
<b>Output Measure</b>	<b>FY 2013 Actual</b>	<b>FY 2014 Actual</b>	<b>FY 2015 Actual</b>	<b>FY 2016 Actual</b>	<b>FY 2017 Year to Date</b>	<b>FY 2017 Goals</b>
Licensing actions completed per year	668	607	792	837	434	754
Age of inventory of licensing actions	95% ≤ 1 year and 100% ≤ 2 years	87% ≤ 1 year and 99% ≤ 2 years	88% ≤ 1 year and 99% ≤ 2 years	95% ≤ 1 year and 100% ≤ 2 years	95% ≤ 1 year and 100% ≤ 2 years	95% ≤ 1 year and 100% ≤ 2 years
Other licensing tasks completed per year	529	765	461	641	352	300
Age of inventory of other licensing tasks	97.6% ≤ 1 year and 100% ≤ 2 years	87% ≤ 1 year and 100% ≤ 2 years	87% ≤ 1 year and 97% ≤ 2 years	90% ≤ 1 year and 99% ≤ 2 years	90% ≤ 1 year and 99% ≤ 2 years	90% ≤ 1 year and 99% ≤ 2 years
2% Improvement in timeliness indicators				≥ 90% for 1-year licensing action indicator ≥ 89% for 1-year other licensing task indicator	95%  90%	This target will not apply if the inventory of licensing actions that is less than 1 year old on September 30, 2017, is 93% or greater.

**V. Status of License Renewal Activities**

The NRC has issued renewed licenses to 87 power reactor units licensed to operate. Two units with a renewed license have since permanently shut down. The NRC is reviewing five license renewal applications (LRAs) for eight reactor units.

**Applications Currently under Review**

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

### *Indian Point Nuclear Generating, Units 2 and 3*

On April 30, 2007, Entergy Nuclear Operations, Inc. (Entergy), submitted an LRA for Indian Point Nuclear Generating, Units 2 and 3, to extend the operating licenses for 20 years beyond the current license periods. In December 2015, the staff issued for public comment a second draft supplement to the December 2010 final supplemental environmental impact statement (SEIS) to address new information and other developments since Supplement 1 to the final SEIS was issued in June 2013. The comment period closed in March 2016; the staff expects to issue the final SEIS supplement in late 2017. On November 6, 2014, the staff issued Supplement 2 to the safety evaluation report (SER). The staff briefed ACRS on SER Supplement 2 on April 23, 2015. Additionally, activities related to the Atomic Safety and Licensing Board (ASLB) hearing process continued. On February 8, 2017, the parties to the legal proceedings agreed to withdraw the remaining contentions pursuant to a settlement agreement wherein Units 2 and 3 will cease operations no later than April 30, 2024, and April 30, 2025, respectively. On March 13, 2017, the ASLB dismissed the remaining contentions and terminated the proceeding. The current schedule is under revision.

The operating license for Indian Point Nuclear Generating, Unit 2, was set to expire on September 28, 2013, and the operating license for Unit 3 was set to expire on December 12, 2015. Given the timely submittal of the LRA for both units, NRC regulations and the Administrative Procedure Act permit continued operation of the units until the NRC determines whether to issue renewed licenses. A final determination will be made once the staff's review is complete. Entergy has implemented aging management programs for both Units 2 and 3, as described in the LRA, and the NRC continues normal reactor oversight to ensure safe operations.

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

On November 24, 2009, Pacific Gas and Electric Company submitted an LRA for Diablo Canyon Power Plant, Units 1 and 2, to extend the operating licenses for 20 years beyond the current license periods. In June 2016, the applicant announced that it had reached an agreement with interested parties not to seek license renewal for Units 1 and 2 and asked the staff to suspend its review of the LRA pending approval of the agreement by the California Public Utilities Commission. The applicant further stated that, if the California Public Utilities Commission approves the agreement, Pacific Gas and Electric Company would withdraw its LRA. In July 2016, the staff informed the applicant that it had suspended its review of the LRA.

### *Seabrook Station, Unit 1*

On June 1, 2010, NextEra Energy Seabrook, LLC, submitted an LRA for Seabrook Station, Unit 1, to extend the operating license for 20 years beyond the current license period. In April 2013, the staff issued a second draft SEIS, which included a revised analysis on severe accident mitigation alternatives and updates to comply with the NRC's revised environmental protection regulations. In July 2015, the staff issued the final SEIS. Additionally, the staff completed activities related to the ASLB hearing process. The safety review remains in progress to resolve a technical issue regarding the alkali-silica reaction (ASR) that affects some concrete structures; all other open items documented in the staff's June 2012 SER are closed. The NRC staff also performed onsite inspections in February and March 2016 related to license renewal. The staff performed an onsite audit in October 2016. The NRC staff continues to work with the applicant to ensure that it properly addresses technical issues for closure of the SER ASR open item. The current schedule for remaining milestones is to be determined.

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

On October 28, 2010, STP Nuclear Operating Company submitted an LRA for STP, Units 1 and 2, to extend the operating licenses for 20 years beyond the current license periods. The staff issued the final SEIS in November 2013 and issued two license renewal SERs with open items in February 2013 and October 2016. One item that remains open involves the selective leaching of aluminum bronze piping and components. The NRC staff continues to work with the applicant to resolve this issue. All other open items documented in the February 2013 SER with open items were resolved and documented in the October 2016 SER with open items. The staff is scheduled to meet with the full ACRS committee in July 2017 and to complete the review by September 30, 2017.

### *Grand Gulf Nuclear Station, Unit 1*

On November 1, 2011, Entergy submitted an LRA for Grand Gulf Nuclear Station (Grand Gulf), Unit 1, to extend the operating license for 20 years beyond the current license period. During the current reporting period, the staff completed its work toward resolution of the open items identified in the staff's January 2013 SER. The staff issued its final SER in April 2016. In May 2016, the ACRS subcommittee conducted its meeting on Grand Gulf. ACRS conducted its full committee meeting on October 6, 2016. The NRC renewed the operating license on December 1, 2016.

### *Fermi Unit 2*

On April 30, 2014, DTE Electric Company submitted an LRA for Fermi, Unit 2, to extend the operating license for 20 years beyond the current license period. The staff published the draft SEIS for comment in October 2015. The comment period on the draft SEIS closed in December 2015. Activities related to the ASLB hearing process are complete. The staff issued the SER with open items in January 2016 and the final SER in July 2016. The NRC renewed the operating license on December 15, 2016.

### *LaSalle County Station, Units 1 and 2*

On December 9, 2014, Exelon Generation Company, LLC (Exelon), submitted an LRA for LaSalle County Station, Units 1 and 2, to extend the operating licenses for an additional 20 years beyond the current license periods. The staff published the draft SEIS for comment in February 2016 and the final SEIS in August 2016. The staff issued the final SER in June 2016. The NRC renewed the operating licenses on October 19, 2016.

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

On March 30, 2016, Entergy submitted an LRA for Waterford Steam Electric Station, Unit 3, to extend the operating license for 20 years beyond the current license period. During the reporting period, the staff continued the LRA review. The Region IV staff completed the inspection in accordance with Inspection Procedure 71002, "License Renewal Inspection." The staff expects to issue the draft SEIS in May 2017 and the SER with open items in June 2017.

## VI. Summary of Reactor Enforcement Action

The reactor enforcement statistics in Tables 2, 3, and 4 are arranged by region, half year, most recent half year, FY to date, and two previous FYs for comparison purposes. These tables provide the nonescalated and escalated reactor enforcement data and the escalated enforcement data associated with traditional enforcement and the ROP. The severity level assigned to the violation (i.e., traditional enforcement) generally reflects the significance of a violation. However, for most violations, the NRC assesses the significance of a violation using the significance determination process under the ROP, which uses risk insights, where appropriate, to assist the NRC in determining the safety or security significance of inspection findings identified within the ROP.

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

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

		Region I	Region II	Region III	Region IV	TOTAL
Cited Severity Level IV or Green	1 <sup>st</sup> Half FY 17	1	3	0	0	4
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 YTD Total	1	3	0	0	4
	FY 16 Total	4	6	2	3	15
	FY 15 Total	4	7	1	10	22
Noncited Severity Level IV or Green	1 <sup>st</sup> Half FY 17	55	65	85	85	290
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 YTD Total	55	65	85	85	290
	FY 16 Total	169	137	171	190	667
	FY 15 Total	137	103	182	224	646
<b>TOTAL Cited and Noncited Severity Level IV or Green</b>	1 <sup>st</sup> Half FY 17	56	68	85	85	294
	2 <sup>nd</sup> Half FY 17	0	0	0	0	0
	FY 17 YTD Total	56	68	85	85	294
	FY 16 Total	173	143	173	193	682
	FY 15 Total	141	110	183	234	668

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

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

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

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

**Table 4 Escalated Reactor Enforcement Actions Associated with the ROP\***

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

\* The escalated enforcement data above reflect the violations or problems cited during the indicated time periods that were associated with either red, yellow, or white findings. These data do not include red, yellow, or white findings that do not have associated violations.

## **Reactor Escalated Enforcement Actions and Other Significant Actions Taken**

The sections below describe security-related actions and confirmatory actions that Tables 2, 3, and 4 do not include. The NRC does not make details of security-related violations publicly available.

### *Energy Northwest (Columbia Generating Station), EA-16-212*

On March 16, 2017, a notice of violation was issued to Energy Northwest for a violation associated with an escalated enforcement finding at the Columbia Generating Station. The details of the finding are Official Use Only—Security-Related Information.

### *Entergy Operations, Inc. (Arkansas Nuclear One), EA-16-247*

On February 27, 2017, the NRC issued a notice of violation to Entergy Operations, Inc., for a violation of Technical Specification 6.4.1.a, which is associated with a White finding under the significance determination process at Arkansas Nuclear One, Unit 2. Technical Specification 6.4.1.a requires, in part, that the licensee establish, implement, and maintain written procedures that cover the applicable procedures recommended in Appendix A, “Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors,” to Regulatory Guide 1.33, “Quality Assurance Program Requirements,” Revision 2, issued February 1978. Specifically, the licensee failed to properly preplan and perform maintenance on a diesel generator inboard bearing because of inadequate work instructions.

### *Exelon Generation Company, LLC (Dresden Nuclear Power Station), EA-16-236*

On February 27, 2017, the NRC issued a notice of violation to Exelon for a violation of Criterion III, “Design Control,” in Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” to 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” associated with a White finding under the significance determination process at Dresden Nuclear Power Station, Unit 3. Criterion III requires, in part, that design control measures shall include provisions for verifying or checking the adequacy of a design (e.g., by the performance of design reviews) by using alternate or simplified calculational methods or by performing a suitable testing program. Specifically, from June 2002 until July 2016, Exelon failed to verify the adequacy of the design of a high-pressure coolant injection (HPCI) auxiliary oil pump required for the successful operation of the HPCI and subject to the requirements of Appendix B to 10 CFR Part 50.

### *NextEra Energy Seabrook, LLC (Seabrook Station), EA-16-170*

On February 15, 2017, a notice of violation was issued to NextEra Energy Seabrook, LLC, for a violation associated with an escalated enforcement finding at the Seabrook Station. The details of the finding are Official Use Only—Security-Related Information.

### *STP Nuclear Operating Company (STP Electric Generating Station), EA-16-250*

On February 9, 2017, a notice of violation was issued to STP Nuclear Operating Company for a violation associated with a Greater-than-Green finding under the significance determination process at the STP Electric Generating Station. The details of the finding are Official Use Only—Security-Related Information.

*PSEG Nuclear, LLC (Hope Creek Generating Station), EA-16-184*

On February 6, 2017, the NRC issued a notice of violation to PSEG Nuclear, LLC (PSEG), for a violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” associated with a White finding under the significance determination process. Criterion V requires, in part, that activities affecting quality shall be prescribed by documented instructions and procedures and shall be accomplished in accordance with these instructions and procedures. During spring 2016, PSEG specifically failed to follow a procedure in place to detect and act upon water intrusion into the lubricating oil reservoir for the high-pressure core injection system. Subsequently, high-pressure core injection, a safety-related system, became inoperable for an extended period of time because of undetected water in the oil. Additionally, the extended period of inoperability exceeded the allowed outage time of 14 days for the high-pressure core injection system as required by Technical Specification 3.5.1.c. The NRC documented both violations in the notice of violation.

*Duke Energy Progress, LLC (H.B. Robinson Steam Electric Plant), EA-16-227*

On February 6, 2017, a notice of violation was issued to Duke Energy Progress, LLC, for a violation associated with an escalated enforcement finding at the H.B. Robinson Steam Electric Plant. The details of the finding are Official Use Only—Security-Related Information.

*Pacific Gas and Electric Company (Diablo Canyon Power Plant), EA-16-168*

On December 28, 2016, the NRC issued a notice of violation associated with a White finding under the significance determination process to Pacific Gas and Electric Company (the licensee) for a violation involving the licensee’s failure to develop adequate instructions for the installation of external limit switches on safety-related, motor-operated valves as required by Technical Specification 5.4.1.a, “Procedures,” at the Diablo Canyon Power Plant. Specifically, Procedure MP E-53.10R, “Augmented Stem Lubrication for Limitorque Operated Valves,” Revision 4, which is used to perform maintenance on safety-related equipment, failed to provide instructions to establish and check that the travel of external switches installed on motor-operated valves is within vendor-established criteria. Consequently, the limit switch for valve RHR-2-8700B was installed such that it was operated repeatedly beyond overtravel tolerances, which resulted in its failure on May 16, 2016. Additionally, the licensee violated Technical Specification 3.5.2 because train B of the emergency core cooling system was determined to be inoperable for greater than the technical specification allowed outage time of 14 days.

*Northern States Power Company (Monticello Nuclear Generating Plant), EA-16-175*

On December 12, 2016, the NRC issued a notice of violation associated with a White finding under the significance determination process to Northern States Power Company (the licensee) for a violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” involving Monticello Nuclear Generating Plant’s failure to correct oil leakage from the safety-related HPCI system, a condition adverse to quality, in accordance with written documents appropriate to the circumstances. Specifically, between March 14, 2006, and March 21, 2016, the licensee initiated a number of work orders and subsequently closed them without performing any further work to correct the conditions adverse to quality, which resulted in gradual degradation and loss of the HPCI system’s safety function.

*Tennessee Valley Authority (Browns Ferry Nuclear Plant), EA-16-064*

On November 28, 2016, the NRC issued a notice of violation and a proposed imposition of civil penalty in the amount of \$140,000 to Tennessee Valley Authority (TVA) for a Severity Level III violation at the Browns Ferry Nuclear Plant. The violation involved TVA's failure to conduct compensatory fire watches as required by its corporate procedures and 10 CFR 50.48, "Fire Protection." Specifically, on multiple occasions in May 2015, TVA did not perform hourly fire watches required as compensatory measures for fire protection equipment that was out of service in the diesel building and the 4-kilovolt shutdown board room of Brown Ferry Nuclear Plant, Unit 3.

*Southern Nuclear Operating Company, Inc. (Edwin I. Hatch Nuclear Plant), EA-16-136*

On October 19, 2016, the NRC issued a notice of violation to Southern Nuclear Operating Company, Inc. (SNC), for a Severity Level III violation of 10 CFR 50.9, "Completeness and Accuracy of Information." This violation involved the licensee's failure to provide information to the Commission that was complete and accurate in all material respects. The issue resulted from the mismanagement of information by Edwin I. Hatch Nuclear Plant (HNP) personnel, which caused HNP to lose track of the type of configuration that it had implemented to deal with intergranular stress corrosion cracking in 1988. The NRC used this inaccurate information to approve HNP's proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code) and deferral of nondestructive examinations required by the ASME Code.

*Florida Power & Light Company (Turkey Point Nuclear Generating Plant), EA-16-099*

On October 10, 2016, the NRC issued a notice of violation to Florida Power & Light Company for a Severity Level III violation involving the failure of Turkey Point Nuclear Generating Plant (Turkey Point) to maintain complete and accurate records as required by 10 CFR 50.9(a). Specifically, on multiple occasions between November 2014 and April 2015, fire watch shift supervisors initialed and signed hourly fire watch logs indicating that hourly fire watches had been completed and all required areas had been checked. However, on multiple occasions, some areas had not been checked nor had hourly fire watches been performed.

*Southern Nuclear Operating Company, Inc. (Edwin I. Hatch Nuclear Plant), EA-16-163*

On October 3, 2016, the NRC issued a confirmatory order to SNC confirming its commitment to submit a license amendment request to transition HNP, Units 1 and 2, to NFPA Standard 805. SNC had originally planned to submit its application on October 4, 2016. However, SNC asked for more time to finish developing its fire probabilistic risk assessment model and to allow appropriate coordination and implementation of design modifications at HNP. The NRC reviewed SNC's request and its justification for the delay and accepted the proposed new submittal date of April 4, 2018.

## **VII. Power Reactor Security and Emergency and Incident Response Activities**

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

### **Security**

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

The NRC is developing a final rule that would amend security requirements in 10 CFR Part 73, "Physical Protection of Plants and Materials," to implement the statutory authority provided to the Commission under Section 161A of the Atomic Energy Act of 1954 (AEA), as amended. AEA Section 161A preemption authority allows the Commission to designate classes of facilities eligible to apply for NRC authorization to use various types of weapons and large-capacity ammunition-feeding devices, notwithstanding State, local, and certain Federal firearms laws and regulations prohibiting such possession and use. The NRC's final rule currently under development establishes the requirements that licensees must meet when applying for this authority. The NRC has worked closely with the U.S. Department of Justice's Office of the Attorney General; the Federal Bureau of Investigation; the Bureau of Alcohol, Tobacco, Firearms, and Explosives; and other interested stakeholders in developing the rulemaking. In advance of the final rulemaking, the NRC has issued orders designating seven power reactor licensees, one Category I strategic special nuclear material licensee, and one "at-reactor" independent spent fuel storage installation licensee eligible for applying for AEA Section 161A preemption authority to address the site-specific needs of these facilities. In addition, the final rule will revise the regulations in 10 CFR Part 73 to include enhancements that were identified through a comprehensive review of the emergency event notification regulations.

The NRC plans to publish a proposed rule in 2017 that would amend the drug testing requirements of 10 CFR Part 26, "Fitness for Duty Programs," to better align NRC drug testing requirements with those of the 2008 version of the U.S. Department of Health and Human Services' report titled, "Mandatory Guidelines for Federal Workplace Drug Testing Programs." Specifically, the proposed changes will broaden the panel of drugs to be tested during required drug testing; lower cutoff levels for certain types of drug testing; improve the testing methods to identify subversion attempts; and improve the clarity, organization, and flexibility of the rule language.

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

## Cybersecurity

Under 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks," the NRC requires nuclear power plant licensees and new license applicants to provide high assurance that digital computer and communication systems and networks are adequately protected against cyberattacks. These licensees must implement a cybersecurity program to ensure that safety, important-to-safety, security, and emergency preparedness functions are protected from cyberattacks. Because of the significant amount of work and lead time required to fully implement the provisions called for in licensees' NRC-approved cybersecurity plans, interim milestones were established to focus efforts on the highest priority activities. Licensees had implemented measures to protect their highest priority digital assets by December 31, 2012.

The NRC has developed an oversight program for cybersecurity that includes an inspection program, inspector training, and a process for evaluating the significance of inspection findings. The agency accomplished this collaboratively with stakeholders, including members of industry and representatives from the U.S. Department of Homeland Security, the Federal Energy Regulatory Commission, and the National Institute of Standards and Technology. The NRC completed inspection activities related to the interim milestones in calendar year 2015. In 2016, the NRC and industry began preparations for full implementation inspection activities that will begin in calendar year 2017.

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

The NRC staff proposed several options to the Commission in SECY-14-0147, "Cyber Security for Fuel Cycle Facilities," for implementing cybersecurity for fuel cycle facilities. In response, the Commission issued a staff requirements memorandum related to SECY-14-0147, dated March 24, 2015, that directed the staff to initiate a high-priority, expedited rulemaking. The NRC staff completed the regulatory basis for the proposed rulemaking in March 2016. The NRC will submit the proposed and draft final rule packages to the Commission in May 2017 and October 2018, respectively.

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

## **Emergency Preparedness and Incident Response**

Based on the review of responses to information requests concerning licensee emergency preparedness staffing and communications capabilities during a large-scale natural event, the NRC is implementing a path forward on these issues, which the agency identified in its assessment of the accident at the Fukushima Dai-ichi nuclear power plant in Japan (Near-Term Task Force Recommendation 9.3). The staff has determined that proposed 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 that is affecting multiple units. The staff has reviewed the staffing assessments submitted by licensees and has verified that the existing emergency response resources, as described in the licensees' emergency plans, are sufficient to support required plant actions and emergency plan functions. The NRC incorporated several emergency preparedness-related enhancements, including those described above, into the proposed rulemaking package on mitigation of beyond-design-basis events (MBDBE). The staff provided the draft final rule to the Commission on December 15, 2016. The Commission is currently reviewing the rulemaking package.

In April 2012, the NRC and the Federal Emergency Management Agency (FEMA) began a multiyear initiative to revise NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, issued November 1980. NUREG-0654/FEMA-REP-1 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 response organizations whose personnel would respond to the plant sites. In FY 2014, the joint NRC/FEMA working group completed initial drafts of the introductory information and the emergency plan evaluation criteria. The NRC and FEMA staff jointly conducted a series of public meetings in FY 2014 to solicit feedback from stakeholders and members of the public on the initial drafts. The NRC and FEMA completed a final draft of this document in FY 2015 and issued it for a 90-day public comment period on May 29, 2015. The comment period was extended to October 13, 2015, in response to requests from stakeholders. As of March 31, 2017, the NRC and FEMA have completed the adjudication of the comments and are 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 Upgrades**

Licensees have applied for and implemented power upgrades since the 1970s as a way to increase the power output of their plants. The NRC staff has reviewed and approved 157 power upgrades to date. Existing plants have gained approximately 22,037 megawatts thermal or 7,346 megawatts electric in electric generating capacity (the equivalent of about seven large nuclear power plant units) through power upgrades. The NRC currently has six power upgrade

applications under review. Discussions with the licensees of seven nuclear power plants indicate that they plan to request power uprates for those plants over the next 5 years.

## **IX. New Reactor Licensing**

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

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

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

#### *Early Site Permit Reviews*

##### Tennessee Valley Authority Clinch River Early Site Permit Application

TVA submitted an early site permit (ESP) application in May 2016 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. Based on feedback, the staff received during its acceptance review, TVA sent a letter dated August 11, 2016, to the NRC proposing to submit supplemental information in support of its application. By December 30, 2016, TVA had submitted all supplemental information to the NRC in support of its application, and by letter dated January 5, 2017, the NRC staff informed TVA that its application, as supplemented, was acceptable for docketing. On March 17, 2017, the NRC sent TVA a schedule letter outlining the major public milestones for the safety and environmental reviews of the Clinch River Nuclear Site ESP application. The NRC will issue the final environmental impact statement (FEIS) and the final SER in June 2019 and August 2019, respectively.

#### *Design Certification Reviews*

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

On January 6, 2017, the NRC received the first application for a design certification of a small modular reactor (SMR) from NuScale Power, LLC (NuScale). The application package indicated that NuScale would supplement the application with one topical report and four technical reports. On January 10, 2017, NuScale submitted all five remaining reports, and on January 12, 2017, NuScale gave the NRC updated files, allowing the agency to successfully complete its electronic processing of the design certification application (DCA) package and upload it to the NRC's Agencywide Documents Access and Management System (ADAMS) on January 13, 2017.

The NRC staff began an acceptance review on January 17, 2017. On March 15, 2017, the NRC completed its acceptance review, concluding that the application was acceptable for review, and docketed the application. The staff issued the acceptance review letter to NuScale on March 23, 2017, and is currently developing a schedule for the review.

To prepare for this first SMR application, the NRC issued eight letters over the past year to provide the staff's technical and regulatory perspectives on significant aspects of the design and to issue a design-specific review standard. In addition, the NRC is implementing a new safety-focused review process based on lessons learned that is designed to improve the effectiveness and efficiency of this review.

#### Advanced Power Reactor 1400

On December 23, 2014, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Company, Ltd., submitted their applications to the NRC for the certification of the Advanced Power Reactor 1400 standard plant design for use in the U.S. domestic energy market. The NRC staff developed a six-phase milestone schedule for completing the application review within a 42-month timeframe and has completed Phase 1 of its technical review (i.e., issuing requests for additional information and developing a preliminary SER) on schedule. ACRS has completed the Phase 2 review (i.e., issuing an SER with open items) and Phase 3 review for DCA Chapters 2, 4, 5, 8, 10, 11, and 12. In addition, ACRS reviewed Chapters 6, 13, and 16 in late March 2017 and Chapter 14 in early April 2017. The ACRS review of the remaining chapters is scheduled for May or June 2017. The NRC remains on track to complete its technical review on the established schedule.

#### U.S. Advanced Pressurized-Water Reactor

Mitsubishi Heavy Industries, Ltd. (MHI), submitted its DCA for the U.S. Advanced Pressurized-Water Reactor (U.S. APWR) on December 31, 2007. On November 5, 2013, MHI issued a letter informing the NRC of its plans to implement a coordinated slowdown of licensing activities related to the application review. The NRC staff has been performing this review at a reduced pace with limited use of resources since March 24, 2014, and will continue at this pace until further notice from the applicant.

#### U.S. Evolutionary Power Reactor

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

#### *Design Certification Renewals*

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

On December 7, 2010, General Electric-Hitachi (GEH) submitted an application for renewal of the Advance Boiling-Water Reactor (ABWR) design certification. By letter dated January 8, 2016, GEH submitted proposed changes to the ABWR design control document (DCD) to redesign the containment overpressure protection system piping and submitted a revised application on February 19, 2016, to incorporate changes to the DCD. The staff issued a milestone schedule letter to GEH on August 30, 2016, projecting the completion of its safety

review in March 2018.

### *Combined License Application Activities*

The NRC staff has received a total of 18 combined license (COL) applications to date. The NRC has issued COLs at 6 sites for 11 units (Vogtle, Units 3 and 4; Virgil C. Summer Nuclear Station (V.C. Summer), Units 2 and 3; Fermi, Unit 3; STP, Units 3 and 4; Levy Nuclear Plant, Units 1 and 2; and William States Lee III Nuclear Station, Units 1 and 2). The NRC has suspended two COL application reviews at the request of the applicants because of changes in the applicants' business plans (Shearon Harris Nuclear Power Plant and Comanche Peak Nuclear Power Plant). Eight COL applications have been withdrawn (Bellefonte Nuclear Station, River Bend Station, Bell Bend Nuclear Power Plant, Victoria County Station, Nine Mile Point Nuclear Station, Callaway Plant, Calvert Cliffs Nuclear Power Plant, and Grand Gulf).

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

### Turkey Point Combined License Application

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

On February 27, 2015, the NRC staff submitted the draft environmental impact statement (DEIS) for the COL application for Turkey Point, Units 6 and 7, to the U.S. Environmental Protection Agency (EPA). The staff developed the DEIS in cooperation with the U.S. Army Corps of Engineers Jacksonville District and the National Park Service. The NRC received approximately 11,000 comments on the DEIS, a majority of which are identical form letters. The NRC received comments from other Federal agencies, including EPA, the National Park Service, the U.S. Department of the Interior, and the U.S. Fish and Wildlife Service. To respond to and resolve some of the issues raised in the comments, the NRC staff performed a further technical analysis and conducted multiple Federal interagency meetings. The NRC met with other Federal agencies in late April 2016 to discuss the resolution of the comments and issued its FEIS on October 28, 2016.

In accordance with a Commission order, the mandatory hearing will be held after the NRC completes all environmental consultations with other government agencies. Activities related to the ASLB (contested) hearing process continues, and the hearing is currently scheduled for early May 2017.

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

On November 27, 2007, Dominion Virginia Power (Dominion) submitted a COL application for an Economic Simplified Boiling-Water Reactor (ESBWR) at its North Anna Power Station (North Anna) site near Richmond, VA, in Louisa County. The NRC issued the FEIS in February 2010.

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

its revised design decision and submitted all remaining application sections to the NRC in December 2013.

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

The mandatory hearing occurred on March 23, 2017. A final licensing decision is pending.

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

The NRC's activities that support the safe construction and operational readiness of the four new AP1000 units under construction at Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3, continue to be the top priority of the New Reactors Business Line. The NRC's Region II office coordinates, plans, schedules, and implements the construction inspections on par with the licensee's construction schedules to verify compliance with the agency's regulations and to ensure that the new plants are constructed in accordance with their COLs. The NRC has focused its recent inspections on concrete placement, welding, module fabrication, civil and structural engineering activities and on the detailed design of piping systems. The NRC is conducting planning and inspection activities under the initial test program. NRC inspection activities will continue to increase as licensees broaden the scope of construction and operational activities.

The NRC staff has been specifically focused on enhancing the quality, predictability, and timeliness of NRC review of inspections, tests, analyses, and acceptance criteria (ITAAC). The NRC staff continues to apply lessons learned from the review of submitted ITAAC closure notifications (ICN) and continues to implement improvements in the processes that support ITAAC closure through numerous public interactions with the licensees. Additionally, an initiative is underway to cross-train additional Office of New Reactors staff to assist in ICN reviews. This initiative will more than double the NRC's available ICN trained staff and will be implemented, if needed, to mitigate the surge of ICN submittals expected late in the construction schedule. Additionally, beginning in fall 2016, the NRC staff undertook a new effort to review "uncompleted" ITAAC notifications. This initiative allows the staff to review a licensee's proposed method for closing an ITAAC, which accomplishes a significant amount of the work in advance. An ICN that verifies a previously accepted method to close an ITAAC will require significantly less effort for the staff to complete its final review. Finally, the staff has put significant effort into establishing and testing a robust ICN process to ensure NRC readiness for the expected ITAAC surge. Specifically, the NRC is undertaking a short-term effort to develop and implement a comprehensive simulation of its ITAAC inspection program and closure verification process. Key expected outcomes of this effort and a tabletop demonstration exercise include (1) recommendations on the NRC's ITAAC process and organizational enhancements, (2) communication tools to ensure a common understanding of the ITAAC closure process, and (3) validation of the resources needed to process the expected ITAAC surge.

The NRC is implementing the Construction Reactor Oversight Process (cROP) at the sites of four new Vogtle and V.C. Summer 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, the NRC continues to meet

periodically with interested stakeholders to collect feedback on the effectiveness of the process and considers this feedback when making enhancements to the cROP. The NRC's most recent performance assessments demonstrate that reactor construction is being conducted safely and that all four units are performing well against the cROP criteria. Plant assessments and the latest cROP-related information are publicly available on the NRC's website.

### *Vendor Inspections*

The NRC staff implements a vendor inspection program to confirm that reactor applicants and licensees are fulfilling their regulatory obligations by providing 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. NRC inspections ensure that vendors maintain an effective system for reporting defects in accordance with 10 CFR Part 21, "Reporting of Defects and Noncompliance," and verify the effective implementation of commercial-grade dedication programs for safety-related materials, equipment, and services. Numerous other activities include the resolution of allegations to ensure the removal of counterfeit items to prevent their use in safety-related applications and participation in the development of industry consensus standards (such as Section III, "General Requirements," of the ASME Code). The vendor inspection program focuses on integrated system validation for control room simulators, digital instrumentation and control systems, modular fabrication, safety-related valves, and reactor coolant pumps. As issues are identified, the staff follows up with the vendors to confirm that corrective actions are being implemented and that the quality of components supplied to the operating plants is consistent with their safe use in accordance with the NRC's regulations. Recently, the NRC's vendor inspection staff has been significantly involved in confirming that potential carbon segregation issues for components manufactured at Creusot Forge (France) are a minimal safety concern for those components supplied to United States nuclear plants.

### *Operator Licensing*

The Headquarters NRC staff support and provide programmatic oversight for Region II implementation of operator licensing training, procedure inspections, and licensee examinations. During the reporting period, the NRC administered operator licensing examinations for South Carolina Electric & Gas Company's V.C. Summer, Units 2 and 3. Of the 25 candidates, 22 passed. The NRC administered similar examinations at Vogtle, Units 3 and 4. Those results are not yet available.

The Office of New Reactors and Region II staff are performing a lessons-learned effort following operator licensing activities (also referred to as "cold licensing activities") for the AP1000 projects at Vogtle and V.C. Summer. This collaborative effort will ultimately result in changes to the agency's cold licensing process and improved guidance for performing technical reviews of new simulators. The effort will include input from both internal and external stakeholders.

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

As the NRC prepares to review and regulate a new generation of non-LWRs, it has developed a vision and strategy to ensure NRC readiness to effectively and efficiently conduct its mission for these technologies. The staff described the vision and strategy in its report titled, "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," issued December 2016 (ADAMS Accession No. [ML16356A670](#)).

The NRC's non-LWR vision and strategy has three strategic objectives: (1) enhancing technical readiness, (2) optimizing regulatory readiness, and (3) optimizing communication. The NRC is preparing implementation action plans (IAPs) to identify the specific activities that the NRC will conduct in the near-term (0–5 years), mid-term (5–10 years), and long-term (beyond 10 years) timeframes to achieve non-LWR readiness. In 2016, the NRC released its draft near-term IAPs to obtain stakeholder feedback. In addition, the NRC staff developed draft mid- and long-term IAPs and released them to the public on February 23, 2017 (ADAMS Accession No. [ML17054D483](#)).

As part of its activities related to the regulatory readiness strategic objective, the NRC will seek to optimize the regulatory framework for non-LWR reviews and licensing processes. In the near term (0–5 years), the staff will examine opportunities for flexibilities within the existing regulatory framework. Potential examples of these flexibilities include the use of a staged review process and the use of conceptual design assessments during the preapplication period. The NRC staff described these approaches in its draft report titled, "A Regulatory Review Roadmap for Non-Light Water Reactors," dated October 25, 2016, to facilitate stakeholder feedback (ADAMS Accession No. [ML16291A248](#)). Over the longer term, the NRC will examine whether a new risk-informed, performance-based regulatory framework for non-LWRs would be beneficial, effective, and efficient.

In July 2013, the U.S. Department of Energy (DOE) and the NRC established a joint initiative to address a key portion of the licensing framework essential to advanced reactor technologies. The initiative addresses the general design criteria in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, which the NRC developed primarily for LWRs, by adapting them to the needs of advanced reactor design and licensing. On April 7, 2016, the NRC issued its draft report titled, "Draft—Advanced Non-LWR Design Criteria—April 2016," for informal public comment. After consideration of stakeholder input, the NRC issued draft regulatory guide (DG) 1330, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors" (ADAMS Accession No. [ML16301A307](#)), for formal public comment on February 3, 2017. The comment period closed on April 3, 2017. The NRC plans on issuing a final regulatory guide at the end of 2017. The NRC expects the issuance of this new regulatory guidance to provide benefits, including reduced regulatory uncertainty for advanced reactor developers, improved guidance for NRC staff who review advanced reactor license applications, and improved timeliness and efficiency of licensing activities for both applicants and the NRC staff.

In a related activity, on March 13, 2017, the NRC published a request for public comment on its "Preliminary Draft Guidance Non-Light Water Reactor Security Design Considerations" (ADAMS Accession No. [ML16305A328](#)). This document sets forth a set of "security design considerations" that a designer should consider while developing the facility design. These considerations, if they are adequately implemented through detailed design, administrative controls, and security programs, are one way to protect a nuclear power reactor against the DBT for radiological sabotage while reducing the reliance on human actions. The comment period closed on April 27, 2017.

As part of its activities to optimize communications, the NRC is conducting public meetings with stakeholders every 4 to 6 weeks. The NRC and DOE also hosted the second in a series of advanced reactors workshop on June 7–8, 2016. The focus of this series of workshops was to open a dialogue between key stakeholders to discuss challenges in the commercialization of non-LWR technologies and to discuss possible solutions. The second workshop included presentations and discussions on strategies for non-LWR development and deployment and

reactor fuel development and qualification. The staff held a third workshop with DOE on April 25–26, 2017. In addition, the NRC continues to meet with potential applicants upon request.

On November 10, 2016, the NRC and DOE signed a memorandum of understanding (MOU) (ADAMS Accession No. [ML16215A382](#)) for the implementation of the Gateway for Accelerated Innovation in Nuclear (GAIN) Initiative. This MOU describes the roles, responsibilities, and processes related to the implementation of DOE’s GAIN initiative. The intent of the GAIN initiative is to give the nuclear energy community increased access to the technical, regulatory, and financial support necessary to commercialize new or advanced nuclear reactor designs while ensuring the continued safe, reliable, and economic operation of the existing nuclear fleet. As described in the MOU, the NRC is responsible for providing DOE and the nuclear energy community with accurate and current information on the NRC’s regulations and licensing processes. DOE is responsible for then sharing that information with the prospective applicants, as appropriate.

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

## **Regulatory Infrastructure**

The NRC continues to enhance its regulatory infrastructure with a goal 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 conducts these regulatory infrastructure enhancements while providing several opportunities for external stakeholder input. In addition, the NRC rigorously assesses licensing and oversight performance and uses the results to inform these regulatory infrastructure activities.

The sections below describe infrastructure activities conducted during the reporting period.

### *Revision to Regulatory Guide 1.206*

The NRC is revising Regulatory Guide (RG) 1.206, “Combined License Applications for Nuclear Power Plants,” issued June 2007, to encompass applicants for all licensing processes under 10 CFR Part 52, including design certifications and ESPs. The revision will also capture important lessons learned from recent licensing actions on large LWRs. The revision is being informed by ongoing interactions with stakeholders and the public. During the period covered by this report, the staff continued to develop the guide by addressing public comments and staff comments.

### *NUREG-0800 Updates*

The NRC staff continues its systematic update of NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” to support its reviews of applications for COLs, design certifications, and ESPs; limited work authorization requests; and license amendment requests. During this reporting period, the staff issued final guidance for site characteristics and site parameters; systems, structures and components; reactor coolant system and connected systems; conduct of operations; and human factors engineering.

### *Environmental Guidance Updates*

The NRC staff is updating RG 4.2, “Preparation of Environmental Reports for Nuclear Power Stations,” Revision 2, issued July 1976, and NUREG-1555, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan,” last revised July 2007. The revisions will incorporate lessons learned from the first set of environmental reviews for new reactors and address reviews of small modular reactors, greenhouse gas emissions, and issues related to climate change. The staff expects to issue a draft of the revised NUREG-1555 for public comment in mid- to late 2017. The revised guidance will improve the effectiveness of the staff’s reviews of applications for ESPs, design certifications, and COLs; limited work authorization requests; and license amendment requests.

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

The NRC’s response to the lessons learned from the Fukushima accident in Japan during the reporting period has focused on implementation of the highest priority (Tier 1) activities and on completing evaluations of the lower priority (Tiers 2 and 3) activities that have not already been addressed. The agency continued to assign resources to address these activities while ensuring a balance between implementing lessons learned from Fukushima and the need to ensure that those efforts do not displace ongoing work of greater safety benefit, work that is necessary to maintain safety, or other higher priority work.

The NRC continues to review nuclear power plant licensee plans to achieve compliance with the mitigation strategies and spent fuel pool instrumentation orders issued in March 2012. The NRC has issued interim staff evaluations and has finished auditing licensees’ implementation of these important safety improvements. As of March 31, 2017, more than 85 percent of all units have fully implemented the mitigating strategies order. The remaining sites have substantially implemented the order, but full compliance depends on, and will be achieved through, the implementation schedule of the order regarding the severe-accident-capable hardened containment vent discussed below. For the spent fuel pool instrumentation order, 99 percent of units have implemented the order, and the one remaining unit will be in compliance with the order in June 2017.

In June 2013, the NRC issued a revised order requiring the installation of a severe-accident-capable hardened containment vent for boiling-water reactors with Mark I and II containments. Licensees are implementing this order in two phases. The NRC received the licensees’ integrated plans for compliance with Phases 1 and 2 of that order by June 2014 and December 2015, respectively. The NRC issued interim staff evaluations for Phases 1 and 2. Licensees will begin coming into compliance with this order in fall 2017 with full implementation of the order for all sites by June 2019.

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

Following Commission direction, the NRC staff is now implementing the closure plan for the flooding hazard reevaluations. As part of this plan, the NRC staff is reviewing flooding hazard reevaluation reports (FHRRs) submitted by licensees and is issuing an interim assessment of those reports. All sites have completed their FHRRs and submitted them to the NRC for review. The NRC staff has issued assessments for 36 of the FHRRs and expects to complete the technical assessment of the remaining FHRRs by the end of 2017. The NRC issued interim hazard letters to all licensees. Licensees are expected to use the information in the interim hazard letters to ensure that their mitigating strategies can be implemented under the reevaluated hazard conditions. As of March 31, 2017, 75 percent of all sites have completed their flooding mitigation strategies assessments (MSAs), and the NRC expects the remaining sites to complete their assessments by the end of 2017. Depending on site-specific considerations, other evaluations may be required beyond those associated with mitigating strategies. The staff will determine the need for any other evaluations using a graded approach to ensure that plants are appropriately protected against the reevaluated flooding hazards. This graded approach focuses on areas with the most potential safety benefit. Those sites that had flood-causing mechanisms that exceeded their current design basis are required to perform an additional analysis (e.g., focused evaluation or integrated assessment) to evaluate the site response to the updated flood hazard. The focused evaluations are due by mid-2017, and the integrated assessments are due by the end of 2018. The NRC staff issued guidance on the graded evaluation approach in July 2016.

In October 2015, the NRC issued a letter establishing the final list of operating reactor sites that will be required to perform a full seismic probabilistic risk assessment (SPRA) and other seismic evaluations. As discussed in that letter and a subsequent letter in December 2016, 18 sites (32 units) will be required to perform an SPRA. For the remaining reactors, the NRC staff concluded that sufficient margin exists such that a detailed SPRA is not necessary. The NRC received the first SPRA in March 2017 and will receive all SPRAs by December 2019. Of the remaining sites, 32 will perform limited-scope evaluations (i.e., a high-frequency evaluation, low-frequency evaluation, or spent fuel pool evaluation). Eleven sites have screened out and will not need to perform any further seismic evaluations. As of March 31, 2017, the NRC staff has completed its assessment and closed out all required actions concerning seismic hazard reevaluations for 28 sites.

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

Licensees are expected to use their reevaluated seismic hazard information to ensure that they can implement mitigating strategies under the reevaluated hazard conditions. As of March 31, 2017, 41 percent of operating reactor sites have completed their seismic MSAs. Except for the 18 sites that will be completing an SPRA, the NRC expects the remaining MSAs

by August 2017. The SPRA sites will submit their MSA by December 2017 or coincident with the SPRA, whichever is later.

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

The NRC moved forward with resolving the lower priority Tier 2 and 3 recommendations that have not already been addressed and submitted a proposed resolution for each recommendation to the Commission in late 2015. The Commission approved the staff's proposals, including closure of a number of the recommendations. The staff provided its evaluations for the final three open Tier 2 and 3 recommendations to the Commission at the end of 2016.

The NRC continues to place a high level of importance on public interaction for all of the activities stemming from the Fukushima lessons learned. The NRC is holding dozens of public meetings as required to discuss Fukushima lessons learned. These opportunities for collaboration with the public, industry, and other stakeholders have improved the effectiveness and efficiency of the NRC's actions. In addition, the NRC continues to actively engage with the international community on the evaluation and response to lessons learned from the accident.

The Fukushima 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 work remaining past 2016 is primarily associated with completing the order for the severe-accident-capable hardened containment vents, activities associated with reevaluating flooding and seismic hazards, postorder compliance inspections, and implementation of long-term NRC oversight.

## **XI. Planned Rulemaking Activities**

The attached report lists the status of NRC rulemaking activities as of April 7, 2017, including priorities and schedules. Of a total of 85 rulemaking activities, 63 rulemakings are planned activities, one rulemaking recently has been completed, and one rulemaking has been approved by the Commission for discontinuation. The NRC is reviewing 19 petitions for rulemaking, and the Commission has recently denied one petition for rulemaking. The 63 planned rulemaking activities include 11 rulemakings in response to industry requests, 7 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 20 rulemakings that could establish new requirements. On March 10, 2017, the NRC deployed a single tracking and reporting system to provide real-time updates on all NRC rulemaking activities. Members of the public can access the system at <https://rulemaking.nrc.gov/>.