

POLICY ISSUE
Information

April 11, 2017

SECY-17-0048

FOR: The Commissioners

FROM: Victor M. McCree
Executive Director for Operations

SUBJECT: CONSTRUCTION REACTOR OVERSIGHT PROCESS
SELF-ASSESSMENT FOR CALENDAR YEAR 2016

PURPOSE:

This paper presents the results of the U.S. Nuclear Regulatory Commission (NRC) staff's calendar year (CY) 2016 self-assessment of the Construction Reactor Oversight Process (cROP). This paper does not address any new commitments.

SUMMARY:

The results of the CY 2016 self-assessment show that the staff effectively applied the NRC's Principles of Good Regulation while implementing the cROP. The cROP met the agency's strategic goals of ensuring safety and security through objective, risk-informed, transparent, and predictable oversight. The staff has completed updates to the cROP in order to maintain consistency with recent changes to the Reactor Oversight Process (ROP). The staff continues to make progress on resolving inspections, tests, analysis, and acceptance criteria (ITAAC)-related issues and on planning for the surge of ITAAC notification submittals expected late in the construction schedule. The staff continues to closely monitor the inspection resources expended at construction sites, and evaluate the potential effects of construction schedule delays. The staff has concluded that no increases should be made to the initial estimate of 35,000 direct inspection hours per unit, but that resources may need to be re-evaluated as construction progresses. The staff will continue to evaluate the efficacy of the program and solicit input from internal and external stakeholders to further improve the cROP.

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BACKGROUND:

The staff conducted the CY 2016 cROP self-assessment in accordance with the NRC's Strategic Plan and Inspection Manual Chapter (IMC) 2522, "Construction Reactor Oversight Process Self-Assessment Program," dated July 28, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14189A211).

The NUREG-1614, Volume 6, "Strategic Plan: Fiscal Years 2014–2018," issued August 31, 2014 (ADAMS Accession No. ML14246A439) describes how the NRC plans to achieve its two strategic goals: (1) to ensure the safe use of radioactive materials, and; (2) to ensure the secure use of radioactive materials. The plan provides an overview of the NRC's responsibilities, describes how stakeholders participated in plan development, summarizes key challenges the agency will face during the planning period, and lays out the objectives, strategies, and key activities that will be used to achieve the agency's goals.

As described in NUREG-1614, Appendix C, "Planned Program Reviews" the agency expects to complete annual reviews of the cROP. The annual cROP self-assessment has three objectives: (1) to determine whether the ongoing program is effective in supporting the achievement of the performance goals and the agency's strategic goals; (2) to provide timely, objective information to inform program planning and to develop recommended improvements to the cROP, and; (3) to inform the Commission, NRC senior management, and the public of the results of the cROP self-assessment program, including any conclusions and resulting improvement actions.

The minimum scope of the evaluation includes: (1) an evaluation of the construction inspection program, the construction significance determination process, the closure-verification program for ITAAC, the construction enforcement program, and the construction assessment program; (2) discussions and assessments of cROP communications and cROP resource expenditures, and; (3) updates on recent issues associated with ITAAC and recent domestic and international construction experience. The cROP self-assessment process, specifically, the program evaluations described below and in the enclosure to this paper, fulfill the intent of NUREG-1614, Appendix C to the Strategic Plan.

As a part of the annual cROP self-assessment, the staff determines the effectiveness of the cROP by evaluating its success in meeting the established goals and metrics described in IMC 2522, Appendix A, "Construction Reactor Oversight Process Self-Assessment Metrics," dated October 19, 2016 (ADAMS Accession No. ML16265A194). The staff presents results of the assessment at the annual Commission briefing on the results of the Agency Action Review Meeting (AARM). Following the 2016 AARM briefing, the Commission, in the associated staff requirements memoranda (SRM),¹ directed that "the staff should provide very consistent attention on the needed inspection resources at the Vogtle [Vogtle Electric Generating Plant (Vogtle)] and Summer [Virgil C. Summer Nuclear Station (V.C. Summer)] construction sites over the next 12 to 24 months." The staff addresses construction inspection resources in the enclosure to this paper.

¹ See "Staff Requirements Memorandum—Briefing on Results of the Agency Action Review Meeting (AARM), 9:00 A.M., Thursday, June 2, 2016, [...]," dated June 24, 2016 (ADAMS Accession No. ML16176A078).

The staff also discussed cROP effectiveness with the Commission during the strategic programmatic overview of the New Reactors Business Line on October 20, 2016. In the SRM² for this briefing, the Commission did not identify any new cROP requirements for staff action.

DISCUSSION:

To ensure that the cROP self-assessment for CY 2016 was comprehensive and robust, the staff conducted numerous activities and obtained data from many sources, including the cROP performance metrics described in IMC 2522, Appendix A; internal and external stakeholder feedback; and direction and insight supplied by the Commission in recent SRMs. The staff analyzed the data to gauge cROP effectiveness and potential areas for improvement. The scope of the staff's self-assessment included cROP program area evaluations (construction inspection program, construction significance determination process (SDP), and construction assessment and enforcement programs); staff progress in resolving issues associated with ITAAC; the construction experience program; independent evaluations; cROP communications; and cROP resources.

cROP Program Evaluations

The staff conducted program evaluations in the three key cROP areas: the construction inspection program, construction SDP, and construction assessment and enforcement programs.

Construction Inspection Program

During CY 2016, the staff continued to effectively implement the construction baseline inspection program and independently verify that the AP1000 licensees are constructing the four new reactors in accordance with the approved design. The staff ensured that inspection guidance for all phases of construction was available to the inspection staff. There are no outstanding procedure change requests that need resolution to support ongoing and planned inspections in CY 2017.

Two of the self-assessment metrics listed in IMC 2522, Appendix A, are associated with the construction inspection program. The staff met the metric related to inspection report timeliness, as all inspection reports were issued within the timeliness goals. The staff did not meet the second metric on the timely response to technical assistance requests (TARs), which has a goal to resolve 90 percent of the TARs by the requested due date. The intent of this metric is to determine whether the NRC staff is providing adequate support in the resolution of technical issues that arise during implementation of the construction inspection program. Four of five TARs closed out in CY 2016 were resolved after the date requested by Region II inspection personnel. However, the staff concluded that, although the metric was missed, there was no adverse impact on ongoing or planned construction inspection activities. To prevent recurrence, the staff will formalize communications with requestors and technical staff who provide input to the TAR response to ensure that the requested due date is reasonable and that either the TAR is resolved by the requested date or, if the due date cannot be met, an acceptable extension of the due date is clearly documented. This change to the TAR process would be consistent with how TARs are handled in other agency programs. In addition, the staff

² See "Staff Requirements Memorandum—Briefing on Strategic Programmatic Overview of the New Reactors Business Line, 9:30 a.m., Thursday, October 20, 2016, [...]" dated October 26, 2016 (ADAMS Accession No. ML16300A383).

plans to conduct an internal review of the TAR program in 2017, to identify further efficiencies and recommendations for program improvement. The review will also consider recommendations identified during the Office of the Inspector General (OIG) audit of the Office of Nuclear Material Safety and Safeguards (NMSS) TAR process, as documented in OIG-16-A-11, "Audit of NRC's Technical Assistance Request Process," dated April 6, 2016 (ADAMS Accession No. ML16097A446), to determine whether the OIG's recommendations on the NMSS TAR process could be translated into improvements in the Office of New Reactors (NRO) process.

On October 1, 2016, Region II reorganized the Division of Construction Inspection and the Division of Construction Projects into a single division. These changes enable a more effective use of resources to plan, schedule, complete, and track program inspections, in accordance with IMC 2504, "Construction Inspection Program: Inspection of Construction and Operational Programs," dated October 12, 2012 (ADAMS Accession No. ML12298A106), and IMC 2503, "Construction Inspection Program: Inspections of Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) Related Work," dated July 5, 2012 (ADAMS Accession No. ML12110A239). In addition, the staff performed an internal assessment of the quality of construction inspections and identified four recommendations for ITAAC inspections and two recommendations for programmatic inspections. These recommendations identified potential efficiencies in the planning and scheduling process to allow better use of inspection resources for ITAAC inspections and resident inspectors' daily activities. The programmatic inspection recommendations focused on staffing inspections based on inspector experience. The staff will continue to evaluate and improve the planning, scheduling, and documenting of construction inspections.

Construction Significance Determination Process

During CY 2016, the staff continued to effectively implement the construction SDP in support of the cROP goals to be objective, predictable, understandable, and open. Two of the self-assessment metrics listed in IMC 2522, Appendix A, are associated with the construction SDP. The staff met one of the two metrics in that there were no appeals to any of the inspection findings' significance determinations. The staff did not meet the second metric in that a review of inspection findings issued during CY 2016 determined that the documentation for two findings did not contain adequate detail to enable an independent reviewer from NRC Headquarters to reach the same significance color characterization as was documented in the inspection report. The staff evaluated the two findings and determined that, although the findings were correctly characterized, the inspection report should have included more detail to support the characterizations. The reviewer discussed this condition with Region II personnel, including the responsible branch chief, the senior project engineer, and resident inspectors. Region II plans to issue an erratum and conduct training in this area by June 2017. The staff will continue to closely monitor implementation of the construction SDP and consider additional improvements, as necessary.

During its review of this year's cROP findings, the staff identified a clarification to the flow diagram in IMC 2519, "Construction Significance Determination Process," Appendix A, "AP1000 Construction Significance Determination Process," dated July 15, 2013 (ADAMS Accession No. ML13150A137). The staff also plans to modify the metric on significance determination findings for small sample sizes. The change to IMC 2522, Appendix A would increase the threshold from 0 to 1, for findings that do not meet the acceptance criteria if there are fewer than 10 findings. The staff will continue to audit 100 percent of findings and will maintain a 90-percent acceptance criterion if there are 10 or more findings. The staff is implementing this

change after concluding that the construction program met its goals despite missing the metric noted above. The staff will implement these improvements for the CY 2017 self-assessment.

Construction Assessment and Enforcement Programs

During CY 2016, the staff continued to effectively implement the construction assessment program and ensured that the NRC and licensees took appropriate actions to address performance issues commensurate with their safety significance. The staff met the four construction assessment program metrics listed in IMC 2522, Appendix A. There were no deviations from the Construction Action Matrix, all assessment program timeliness goals were met, and construction inspections were conducted in a timely manner. All inspection findings were of very low safety significance (Green), and all four units under construction remained in the licensee response column of the Construction Action Matrix.

As a part of Project Aim 2020, SECY-16-0009, "Recommendations Resulting from the Integrated Prioritization and Re-Baselining of Agency Activities," dated January 31, 2016 (ADAMS Accession No. ML16028A189), included a recommendation to stop the ROP midcycle performance assessments while continuing the other performance assessment provisions of the ROP. In the associated SRM,³ the Commission approved the recommendation. To maintain consistency between the cROP and ROP, the staff implemented a similar change to the cROP in CY 2016. The staff revised IMC 2505, "Periodic Assessment of Construction Inspection Program Results," (ADAMS Accession No. ML16253A097), to remove the requirement to conduct a midcycle performance assessment. Starting in CY 2017, the staff will no longer conduct midcycle performance assessments as a part of the cROP.

The ROP Independent Assessment Report for 2013 (ADAMS Accession No. ML14035A571) recommended that the staff review the criteria for transition to Column 3 of the ROP Action Matrix against the original ROP program goals to ensure that the significance of an inspection finding of White is not being overemphasized and to ensure that agency resources used to process White inspection findings are commensurate with findings that, by definition, are of low to moderate safety significance. In SECY-15-0108, "Recommendation to Revise the Definition of Degraded Cornerstone as Used in the Reactor Oversight Process," dated August 28, 2015 (ADAMS Accession No. ML15076A066), the staff recommended changing the definition of a degraded cornerstone from two White inputs to three White inputs in the same cornerstone. The staff also informed the Commissioners in SECY-15-0108 that, if it were approved, the staff planned to incorporate this recommendation into the Construction Action Matrix. The Commission approved the staff recommendation in the associated SRM.⁴ The staff revised the Construction Action Matrix definition of a degraded cornerstone accordingly in a revision to IMC 2505.

The ROP Independent Assessment Report for 2013 also recommended that the staff perform an analysis to determine whether the use of the substantive cross-cutting issue (SCCI) process provided regulatory value in terms of assessing licensee safety performance. The report also suggested that the staff consider replacing the use of SCCIs with a process that uses the nuclear safety culture common language traits and attributes in a graded regulatory response. The staff formed a working group to evaluate the effectiveness of the SCCI process that has

³ See SRM-SECY-16-0009, "Recommendations Resulting from the Integrated Prioritization and Re-Baselining of Agency Activities," dated April 13, 2016 (ADAMS Accession No. ML16104A158).

⁴ See SRM-SECY-15-0108, dated December 2, 2015 (ADAMS Accession No. ML15335A559).

been applied to the ROP and cROP and to develop recommendations to replace or revise the process. The working group made several recommendations to revise the SCCI process (ADAMS Accession No. ML14309A612). The recommendations included (1) changing the threshold for a cross-cutting theme, (2) creating a new cross-cutting theme at the cross-cutting area level, (3) eliminating the subjective questions to determine whether an SCCI existed, and (4) changing the name “substantive cross-cutting issues (SCCIs)” to “cross-cutting issues (CCIs).” As a result, the staff incorporated recommendations from the SCCI working group into the cROP through a revision to IMC 2505.

Enforcement Guidance Memorandum (EGM)-11-006, “Enforcement Actions Related to the Construction Reactor Oversight Process,” dated December 21, 2011 (ADAMS Accession No. ML11354A092), authorizes the staff to disposition construction enforcement actions in a similar manner to its practice for operating reactors. The staff has incorporated EGM-11-006 guidance into a revision to the Enforcement Policy. In SECY-15-0163, “Proposed Revisions to the U.S. Nuclear Regulatory Commission Enforcement Policy,” dated December 13, 2015 (ADAMS Accession No. ML15229A093), the staff requested Commission approval of the proposed Enforcement Policy revisions. The Commission approved the staff recommendations, with edits, in the associated SRM.⁵ The proposed changes were incorporated into the Enforcement Policy effective November 1, 2016.

Staff Progress in Resolving Issues Associated with ITAAC

The staff continues to effectively implement and refine the processes developed for ITAAC closure. The submittals of ITAAC closure notifications (ICNs) increased to 136 ICNs during CY 2016, up from 72 ICNs in CY 2015. As of the end of CY 2016, the staff has received a total of 208 ICNs between both sites. Of the 136 ICNs received in 2016, Southern Nuclear Operating Company submitted 103 ICNs for Vogtle, Units 3 and 4, and South Carolina Electric and Gas Company submitted 33 ICNs for V.C. Summer, Units 2 and 3. The staff expects these numbers to increase as construction progresses in CY 2017. The staff met the ITAAC closure metric listed in IMC 2522, Appendix A, as no ICNs were verified as complete and then reopened by the staff. In addition, the New Reactors Business Line tracks timeliness of ICN reviews, by fiscal year. As of the end of FY 2016 the staff met the timeliness goal, as all ICNs were reviewed within 60 days.

The NRC makes the status of notifications on ITAAC for each unit under construction publicly available on the agency’s public Web site, <http://www.nrc.gov/reactors/new-reactors/oversight/itaac.html>. The NRC also publishes *Federal Register* notices documenting the staff’s determination of the successful completion of ITAAC under Title 10 of the *Code of Federal Regulations* (10 CFR) 52.99(e). During the verification process, the NRC notifies a licensee about insufficient information or potential problems with the content submitted in a notification on ITAAC. To date, the NRC has issued two notifications for insufficient information. The licensees have resubmitted acceptable closure notifications, superseding the previously unacceptable submittals.

During CY 2016, licensees submitted one ITAAC postclosure notification (under 10 CFR 52.99(c)(2)). Licensees use ITAAC postclosure notifications to inform the NRC of new information that materially alters the determination basis for a previously completed ITAAC, including how this new information was resolved, during the ITAAC maintenance phase.

⁵ See SRM-SECY-15-0163, dated September 21, 2016 (ADAMS Accession No. ML16265A543).

In the summer of 2016, the staff and industry completed a pilot exercise that focused on the review of Uncompleted ITAAC Notifications (UINs) that licensees voluntarily submit earlier than required by 10 CFR 52.99(c)(3). The licensees proposed the pilot in order to receive a formal NRC review that is consistent with the staff's verification reviews of ICNs. The pilot proved to be a valuable exercise in resolving issues associated with the methodologies of ITAAC closure described in the UINs. The NRC staff has accepted early submittals of UINs, and it began the reviews in the fall of 2016, after putting the required infrastructure and processes into place. The benefits of having the NRC staff review early UINs include a reduction in the staff's review time during the expected surge of ICNs later in construction and the earlier availability of information to the public on licensee ITAAC closure plans. The review also allows the NRC to identify potential ITAAC closure issues earlier in the construction process. As is the case for ICN status, the NRC makes the UIN review status available on the agency's public Web site. A total of 208 UINs were submitted during CY 2016, all from Southern Nuclear Operating Company.

The staff transmitted draft final ITAAC hearing procedures to the Commission in SECY-15-0010, "Final Procedures for Hearings on Conformance with the Acceptance Criteria in Combined Licenses," dated January 20, 2015 (ADAMS Accession No. ML14343A747). In the associated SRM, dated April 1, 2016 (ADAMS Accession No. ML16092A099), the Commission approved the draft final procedures, subject to changes directed by the Commission. The final procedures were published in Volume 81 of the *Federal Register*, page 43,266 (81 FR 43266), on July 1, 2016. Consistent with Commission direction in the SRM, the staff is developing internal implementation processes and additional templates to further prepare for ITAAC hearings. The staff will complete all related activities by October 2017.

The NRC staff continues to develop an NRO office instruction on the staff's determination process to support 10 CFR 52.103, "Operation Under a Combined License." This instruction will provide guidance on the review of the licensee's ITAAC completion to support the staff in making the finding, in accordance with 10 CFR 52.103(g), that all ITAAC acceptance criteria are met. In addition, the instruction will provide guidance on the staff's implementation of a Commission decision allowing interim operation under 10 CFR 52.103(c). The office instruction will reflect the Commission-approved ITAAC hearing procedures.

The SRM to SECY-15-0010 also stated that the staff should keep the public Web site current and continue to explore ways to make it easier for interested members of the public to identify and access information related to ITAAC. In response, the staff is updating the NRC public Web site for Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3, to provide a convenient place on each page for stakeholders to find information related to ITAAC hearings. To support a potential hearing on ITAAC, the NRC will update the public Web site with an ITAAC status report, ITAAC findings, and the ITAAC hearings procedures. The staff expects to complete the majority of the updates by May 2017.

The staff has started an initiative to cross-train additional NRO staff in preparation for ICN reviews. The additional staff available to assist in closure notification reviews will help mitigate the surge of notification submittals expected late in the construction schedule. Part of the cross-training effort includes the completion of the course, "Introduction to Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)." This comprehensive, Web-based training course is available to all NRC staff and managers. It was developed in response to the recommendations presented in the OIG audit of the staff's ITAAC process (OIG-12-A-16, "Audit of NRC's Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Process," dated July

12, 2012 (ADAMS Accession No. ML12194A434)). The cross-training includes in-house classroom training and on-the-job training under a qualified closure notification reviewer.

In CY 2017, NRO and Region II will exercise a demonstration project of the ITAAC inspection program and closure verification process to identify potential challenges. Key outcomes will include recommendations for process and organizational enhancements, tools to communicate the processes and responsibilities to all stakeholders, and validation of the resources expected to be necessary for the ITAAC surge. The staff will issue a final report documenting the processes evaluated, interactions, lessons learned, and recommendations.

Construction Experience Program

During CY 2016, the Office of Nuclear Reactor Regulation (NRR) Operating Experience (OpE) staff and the NRO Construction Experience (ConE) staff continued to collect, evaluate, and communicate information on construction and operating experience. The two organizations merged under the leadership of the NRR Division of Inspection and Regional Support, Operating Experience Branch, effective December 1, 2016. The ConE staff reviewed and evaluated operational events and construction-related issues for applicability to domestic reactor designs, the new reactor licensing process, and the vendor and construction inspection programs for NRO.

In CY 2016, the ConE staff participated in the issuance of two information notices on topics related to Allen Bradley 700-RTC relays and inadequate contractor oversight activities. The ConE staff also contributed to the issuance of three regulatory issue summaries on topics related to Nuclear Energy Institute guidance for the use of accreditation in lieu of commercial-grade dedication surveys for safety-related calibration and test services, embedded digital devices in safety-related systems, and reverse engineering techniques in the procurement of safety-related components.

The ConE staff provided valuable insights in response to a substantial number of adverse operating experience events identified by the operating fleet relating to methods used by licensees to precondition systems or components, or both, before performing surveillance testing. Such experience is advantageous to new reactor inspectors as they prepare to provide oversight of the new plant's initial test programs. In addition, the ConE staff coordinated with the NRR OpE staff to address operating experience issues related to original construction deficiencies that contributed to safety injection line flaws at McGuire Nuclear Station.

In CY 2016, the ConE staff continued to support the agency's international partnerships by exchanging information and lessons learned within the Nuclear Energy Agency's (NEA) international construction experience exchange database and in associated NEA reports.

In CY 2016, the ConE staff shared the following three specific construction-related issues with the international community that had been identified through NRC inspections and licensee event reporting programs in the United States:

- (1) inadequate seismic qualification testing of active valve assemblies;
- (2) inadvertent damage to the containment vessel at V.C. Summer, Unit 2; and
- (3) potential for a substantial safety hazard caused by pipe support coating deviations at U.S. AP1000 construction sites.

Independent Evaluations

Although OIG did not perform an independent audit of any specific aspect of the cROP in CY 2016, it did perform two audits of the ROP. The staff reviewed both of these OIG audit reports to determine whether they provide any insight into possible enhancements that could be applied to the cROP. One recommendation from OIG-16-A-12, "Audit of NRC's Reactor Oversight Process: Reactor Safety Baseline Inspection Procedures," dated April 6, 2016 (ADAMS Accession No. ML16097A515), resulted in a change to IMC 0040, "Preparing, Revising and Issuing Documents for the NRC Inspection Manual," dated December 19, 2016 (ADAMS Accession No. ML16273A037). The revision focused on clarifying whether statements in inspection procedures are requirements or whether they are optional guidance. The NRC staff will ensure that cROP inspection procedures developed or revised in the future conform to the changes to IMC 0040.

cROP Communications

The staff continued to facilitate means for external stakeholders to access cROP information and to offer feedback. The staff conducted annual public end-of-cycle performance assessment meetings near Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3. During the meetings, the staff responded to several questions from members of the public. In addition, the cROP public Web page includes a link that allows external stakeholders to offer feedback to the staff. Senior managers from Region II and NRO continue to visit the two construction sites on a quarterly basis and discuss topics of mutual interest with senior licensee and other consortium management.

In CY 2016 the staff held one public meeting to discuss the construction inspection program. Topics included construction inspection status, ITAAC inspection and closure, the transition from the cROP to the ROP, and related topics. Members of the public, industry representatives, and other external stakeholders participated in the public meeting. The staff has held fewer public meetings to discuss the construction inspection program over the past 3 years. As the cROP has matured and the staff has resolved many of the outstanding issues, stakeholders have expressed less interest in focused public meetings. However, the staff continues to believe in the value of soliciting stakeholder feedback. To maintain the high level of stakeholder interaction, the staff has participated in additional public meetings not specifically focused on construction inspection. For example, the staff discussed the transition from the cROP to the ROP during NRR's monthly public ROP meetings, and discussed design acceptance criteria inspections during monthly licensing meetings with personnel from Vogtle and V.C. Summer. In CY 2017, the staff plans to hold at least two construction inspection public meetings, with one of the meetings taking place near Vogtle. Public meetings at or near the construction sites will facilitate stakeholder participation, including attendance by members of the public.

cROP Resources

At the end of CY 2016, 42 full-time equivalent (FTE) staff assigned to Region II were qualified construction inspectors. Each site has five construction resident inspectors, supplemented by; inspectors from Region II Division of Construction Oversight (DCO), inspectors from the regional office, and technical experts from the program offices. There are an additional six FTE in the Division of Reactor Safety for operator licensing, security, emergency preparedness, and radiation protection inspections. The NRC has been completing the targeted ITAAC inspection activities commensurate with the licensees' schedules. Operational program inspections are also on pace with the licensees' programs and implementation. The NRC plans and schedules its inspections based on the licensees' established schedules. The NRC has increased

efficiencies by pulling forward inspections or conducting a single inspection that involves two or more units in a given effort. This type of strategic planning and scheduling is maximizing efficiency to help ensure requirements are accomplished within budgeted resources. In FY 2018, DCO is adding four FTE, which it intends to use as test inspectors at each site. Teams of inspectors from NRC Headquarters and the regions continue to conduct vendor inspections, in addition to onsite inspections. These vendor inspections focus on specific type and qualification testing at the facilities of AP1000 suppliers that licensees will ultimately use to support ITAAC closure.

The staff originally estimated that direct inspections would require about 35,000 hours per unit over the course of the construction project. Through CY 2016, actual construction inspection hours expended at Vogtle, Unit 3, and V.C. Summer, Unit 2, slightly exceeded the original estimate of direct inspection effort when prorated over the expected construction duration for these units. This is primarily because of inspections needed to review licensee corrective actions for performance deficiencies in design control and module receipt inspection, and the need to inspect issues with construction that led to license amendment requests. Thus, it is likely that the original estimate of direct inspection effort will be exceeded at Vogtle, Unit 3, and V.C. Summer, Unit 2. However, corrective actions implemented by the licensees have, for the most part, been effective in preventing similar performance deficiencies from occurring at Vogtle, Unit 4, and V.C. Summer, Unit 3. Therefore, the staff anticipates that the direct inspection effort at Vogtle, Unit 4, and V.C. Summer, Unit 3 will be less than that required for Vogtle, Unit 3 and V.C. Summer, Unit 2. No changes to the 35,000 direct inspection hour estimate are planned based on field experience to date, however, the staff will continue to closely monitor direct inspection resource expenditures, and will validate and adjust its estimates as construction progresses. The enclosure to this paper provides a more detailed evaluation of cROP inspection resources.

In CY 2016, as part of the Project Aim 2020 initiative, the staff prioritized and rebaselined work across the agency and identified activities that could be performed with fewer resources. As a result, the fiscal year 2017 budget reduced the number of full-time equivalent staff allocated for the new reactor construction inspection program. The staff will continue to right-size the New Reactor Business Line funding as part of the yearly Planning, Budgeting, and Performance Management process.

CONCLUSION:

The self-assessment results for CY 2016 show that the cROP provided effective oversight by meeting program goals and achieving intended outcomes. The cROP was objective, risk-informed, transparent, and predictable. The cROP also ensured openness and effectiveness in support of the agency's mission and its strategic goals of safety and security. During CY 2016, the staff continued to find opportunities to strengthen program effectiveness and implementation. The staff recognizes the value of continuous improvement and will continue to consider stakeholder feedback in its efforts to apply lessons learned and improve various aspects of the cROP. The staff will continue to monitor and right-size resources allocated to the New Reactor Business Line through the Planning, Budgeting, and Performance Management process.

COORDINATION:

This paper has been coordinated with the Office of the General Counsel, which has no legal objection. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections.

/RA/

Victor M. McCree
Executive Director
for Operations

Enclosure:
Construction Reactor Oversight
Process Resources

SUBJECT: CONSTRUCTION REACTOR OVERSIGHT PROCESS SELF-ASSESSMENT
FOR CALENDAR YEAR 2016 DATE: APRIL 11, 2017.

WITS 201100140

ADAMS Accession No: ML17047A694			*via email	SECY-012
OFFICE	NRO/DCIP/CIPB	NRO/DCIP/CIPB	NRO/DCIP/HOIB	NRO/DCIP
NAME	CWeber	VHall	ARivera-Varona	TMcginty (PKrohn for)
DATE	02/22/2017	02/23/2017	02/22/2017	03/07/2017
OFFICE	RGN II:DRAC*	OE*	OCFO*	QTE*
NAME	LDudes	FPeduzzi	RAllwein	CHsu
DATE	03/14/2017	03/08/2017	03/27/2017	03/15/2017
OFFICE	OGC/NLO*	NRO	EDO	
NAME	AWilson	VOrdaz (MMayfield for)	VMcCree	
DATE	03/28/2017	04/ 07/17	04/11/17	

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Construction Reactor Oversight Process Resources

The U.S. Nuclear Regulatory Commission (NRC) staff estimates that direct inspection will require 35,000 hours per unit over the course of the construction project. This estimate includes 15,000 hours for inspections related to inspections, tests, analyses, and acceptance criteria (ITAAC); 10,000 hours for construction and operational program inspections; 5,000 hours for reactive inspections above the baseline program in response to licensee performance issues, allegations, and nonperformance issues or events; and 5,000 hours for technical support for construction inspections. These have always been stated as average values, with initial units likely to require more inspection than subsequent units.

Table 1 summarizes the NRC staff resources, in hours, expended for the construction inspection program at the four AP1000 units under construction during the past six calendar year (CY) inspection cycles. Tables 2 through 5 reflect direct inspection hours expended by CY for Virgil C. Summer Nuclear Station (V.C. Summer), Unit 2; V.C. Summer, Unit 3; Vogtle Electric Generating Plant (Vogtle), Unit 3; and Vogtle, Unit 4, respectively. The NRC inspection effort increased in CY 2016 compared with CY 2015. Through CY 2016, 28 percent to 31 percent of the estimated direct inspection hours were expended at V.C. Summer, Unit 2, and Vogtle, Unit 3, and 10 percent to 12 percent of the estimated direct inspection hours were expended at V.C. Summer, Unit 3, and Vogtle, Unit 4. As expected, the majority of the ITAAC direct inspection hours to date were for ITAAC that the licensees have not yet completed.

Through CY 2016, actual direct inspection hours at the lead units have been slightly above the estimated direct inspection effort of 35,000 hours per unit over the course of the construction project, when prorated over the expected construction duration. This is primarily because of inspections needed to review licensee corrective actions for performance deficiencies in design control and module receipt inspection and the need to inspect constructability issues that led to license amendment requests. Therefore, it is likely that the original estimate of direct inspection effort will be exceeded at Vogtle, Unit 3, and V.C. Summer, Unit 2. However, corrective actions implemented by the licensees have, for the most part, been effective in preventing similar performance deficiencies from occurring at Vogtle, Unit 4, and V.C. Summer, Unit 3. Therefore, the staff anticipates that the direct inspection effort at Vogtle, Unit 4, and V.C. Summer, Unit 3 will be less than that required for Vogtle, Unit 3 and V.C. Summer, Unit 2. No changes to the 35,000 direct inspection hour estimate are planned based on field experience to date, however, the staff will continue to closely monitor direct inspection resource expenditures, and will validate and adjust its estimates as construction progresses.

Each combined license issued for the AP1000 design contains ITAAC that licensees are required to complete during construction, before authorization to operate. The completion of the associated ITAAC-related inspections closely mirrors the completion status of the licensees' work activities associated with the ITAAC. The NRC Region II staff tracks the percentage of completed NRC inspections associated with safety-related ITAAC with respect to the total number of inspections that must be completed for the Vogtle and V.C. Summer facilities that are used to confirm compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 52.103(g). Through CY 2016, approximately 24 percent of ITAAC inspections were complete at both sites⁶. The staff has expended approximately 29 percent of the total number of direct inspection hours estimated (see Table 1). The percentage of ITAAC inspections that

⁶ See "Status Report on the Licensing Activities and Regulatory duties of the U.S. Nuclear Regulatory Commission," dated March 2017 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML17053B989).

have been completed is not directly comparable to the number of direct inspection hours expended because the percentage does not account for the level-of-effort for each inspection (e.g., one inspection may require 8 hours to complete, while another might require 40). In addition, the percentage complete number does not take into account the inspection program efficiencies expected to be realized when inspecting the second units at each site

The staff also tracks the percentage of completed program inspections, which are separate from the ITAAC-related inspections and include both construction and operational programs. Program inspection status also closely mirrors the licensees' completion status of program development and implementation. There are five construction programs, including quality assurance, fitness for duty, and ITAAC management, and there are 20 operational programs, including fire protection, emergency preparedness, reactor operator training, and security. Through CY 2016, approximately 14 percent of the program inspections were completed at both sites.⁷ The staff has expended approximately 39 percent of the direct inspection hours estimated (see Table 1). As with ITAAC inspections, the percentage of completed program inspections is not directly comparable to the number of direct inspection hours expended because the percentage: 1) does not account for the level-of-effort required for each inspection, 2) does not take into account the inspection program efficiencies expected to be realized when inspecting the second units at each site, and 3) does not consider that some of the construction program inspections that are considered complete (e.g., quality assurance) require routine inspection and evaluation throughout the life of the construction project. The staff's overall direct inspection level of effort for operational programs will likely increase from the current level as the units proceed through construction and into the preoperational testing phase.

Direct inspection charges for allegation follow-up at the two sites are very low in proportion to the number of allegations received. The majority of concerns received are related to (1) a chilled work environment, (2) retaliation or discrimination (getting laid off for raising concerns), and (3) Employee Concern Program issues. These issues are typically handled in-office and account for the majority of hours charged to allegations. The number of actual technical concerns received is significantly lower, and qualified inspectors typically inspect these on site.

In CY 2015, the NRC implemented a change to the human resources management system that made it difficult to directly track direct inspection hours related to allegation support. For CY 2016, the staff provided a best estimate of allegation-related inspection hours by performing an hour-by-hour analysis of allegation inspections for each site. The staff has a high level of confidence in the estimate of allegation inspection hours provided in Tables 1–5. The staff initiated a change to the human resources management system to allow for a return to direct time accounting for allegation-related inspections. The revised time accounting system should be implemented in early CY 2017 and will allow for improved efficiency in reporting allegation-related inspection hours in future self-assessments. The staff will continue to ensure that allegation follow-up time is appropriately charged.

⁷ See "Status Report on the Licensing Activities and Regulatory duties of the U.S. Nuclear regulatory Commission," dated March 2017 (ADAMS Accession No. ML17053B989).

**Table 1 Actual Total Construction Inspection Program Resource Expenditures
CYs 2011–2016 (Hours)**

Inspection Activity	Hour Estimate Per Unit	V.C. Summer Unit 2	V.C. Summer Unit 3	Vogtle Unit 3	Vogtle Unit 4	All Units Percent of Effort Expended
ITAAC direct inspections	15,000	5,956	2,556	6,122	2,753	29%*
Program direct inspections	10,000	4,999	2,684	5,327	2,701	39%*
Reactive and allegation inspections	5,000	274	21	346	148	4%
Headquarters technical staff inspection support**	5,000	1,232	539	1,328	590	18%
TOTAL	35,000	12,461	5,800	13,123	6,192	27%

* Approximately 24 percent of ITAAC inspections and 14 percent of program inspections were complete at both Vogtle and V.C. Summer sites. The percentage of direct inspection hours expended is not directly comparable to the percentage of completed inspections. Among other factors, the numbers reported for completed inspections do not factor in the level-of-effort required for inspections.

** To date, NRC Headquarters technical staff inspection support has not been linked to a specific docket and has not been fee-billable. Therefore, it is not possible to distinguish the technical support hours expended by the Office of New Reactors on each unit. In this table, the total hours expended on technical support have been prorated between the four units under construction based on total inspection hours.

**Table 2 Actual Construction Inspection Program Resource Expenditures
V.C. Summer, Unit 2, CYs 2011–2016 (Hours)**

Inspection Activity	Hour Estimate Per Plant	2011	2012	2013	2014	2015	2016	Total
ITAAC direct inspections	15,000	0	636	1,269	1,388	1,180	1,483	5,956
Program direct inspections	10,000	98	1,169	1,035	787	874	1,036	4,999
Reactive and allegation inspections	5,000	0	0	0	0	157	117	274
Headquarters technical staff inspection support	5,000	13	292	228	214	302	183	1,232
TOTAL*	35,000	111	2,097	2,532	2,389	2,513	2,819	12,461

* Total hours expended at V.C. Summer, Unit 2, were slightly higher in CY 2016 compared with CY 2015. Approximately 36 percent of the total estimated hours have been expended at V.C. Summer, Unit 2, through the end of CY 2016.

**Table 3 Actual Construction Inspection Program Resource Expenditures
V.C. Summer, Unit 3, CYs 2011–2016 (Hours)**

Inspection Activity	Hour Estimate Per Unit	2011	2012	2013	2014	2015	2016	Total
ITAAC direct inspections	15,000	0	18	313	359	493	1,373	2,556
Program direct inspections	10,000	105	550	597	289	513	630	2,684
Reactive and allegation inspections	5,000	0	0	0	0	19	2	21
Headquarters technical staff inspection support	5,000	14	92	90	64	140	139	539
TOTAL*	35,000	119	660	1,000	712	1,165	2,144	5,800

* Total hours expended at V.C. Summer, Unit 3, were higher in CY 2016 compared with CY 2015. Approximately 16 percent of the total estimated hours have been expended at V.C. Summer, Unit 3, through the end of CY 2016.

**Table 4 Actual Construction Inspection Program Resource Expenditures
Vogtle, Unit 3, CYs 2011–2016 (Hours)**

Inspection Activity	Hour Estimate Per Unit	2011	2012	2013	2014	2015	2016	Total
ITAAC direct inspections	15,000	7	739	1,049	1,552	1,632	1,143	6,122
Program direct inspections	10,000	135	1,187	1,324	1,031	906	744	5,327
Reactive and allegation inspections	5,000	0	0	39	12	59	236	346
Headquarters technical staff inspection support	5,000	19	311	239	256	355	148	1,328
TOTAL*	35,000	161	2,237	2,651	2,851	2,952	2,271	13,123

* Total hours expended at Vogtle, Unit 3, were slightly lower in CY 2016 compared with CY 2015. Approximately 37 percent of the total estimated hours have been expended at Vogtle, Unit 3, through the end of CY 2016. All planned inspection activities were completed in CY 2016. The NRC plans and schedules its inspection effort based on the licensees' established schedules, and due to schedule changes from the licensee, some inspections shifted from CY 2016 to CY 2017. Inspection hours at Vogtle, Unit 3 are expected to increase in 2017. Approximately 37 percent of the total estimated hours have been expended at Vogtle, Unit 3, through the end of CY 2016.

**Table 5 Actual Construction Inspection Program Resource Expenditures
Vogle, Unit 4, CYs 2011–2016 (Hours)**

Inspection Activity	Hour Estimate Per Unit	2011	2012	2013	2014	2015	2016	Total
ITAAC direct Inspections	15,000	0	229	301	391	664	1,168	2,753
Program direct inspections	10,000	26	391	572	401	693	618	2,701
Reactive and allegation inspections	5,000	0	0	0	0	53	95	148
Headquarters technical staff inspection support	5,000	3	100	86	78	192	131	590
TOTAL*	35,000	29	720	959	870	1,602	2,012	6,192

* Total hours expended at Vogle, Unit 4, were higher in CY 2016 compared with CY 2015. Approximately 18 percent of the total estimated hours have been expended at Vogle, Unit 4, through the end of CY 2016.