

December 9, 2013

The Honorable Ed Whitfield
Chairman, Subcommittee on Energy and Power
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On behalf of the U.S. Nuclear Regulatory Commission, I am responding to your letter of November 21, 2013, posing a number of questions and seeking information regarding various agency activities and expenditures. The Commission's responses and the data requested are enclosed.¹

The NRC strives to be an effective and efficient regulator; and we recognize that the regulatory activities we pursue to ensure safety and security must be well understood and clearly communicated. My fellow Commissioners and I look forward to appearing before you this week, at which time we would be happy to discuss with you the issues raised in your letter.

Sincerely,

/RA/

Allison M. Macfarlane

Enclosure:
[As stated](#)

cc: Representative Fred Upton
Representative Henry A. Waxman
Representative Bobby L. Rush
Representative Paul Tonko

¹ Commissioner George Apostolakis did not participate in the development of the responses to Questions 4, 5, and 6.

Identical letters sent to:

The Honorable Ed Whitfield
Chairman, Subcommittee on Energy and Power
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

cc: Representative Fred Upton
Representative Henry A. Waxman
Representative Bobby L. Rush
Representative Paul Tonko

The Honorable John Shimkus
Chairman, Subcommittee on Environment
and the Economy
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

cc: Representative Fred Upton
Representative Henry A. Waxman
Representative Bobby L. Rush
Representative Paul Tonko

Question 1. What steps is the agency taking to identify declining workloads and numbers of licensees and propose corresponding resource reductions?

ANSWER.

During the annual budget formulation process, the agency develops a two year projected workload in the Nuclear Reactor Safety and Nuclear Materials and Waste Safety programs, including the anticipated number of licensees and the number and complexity of anticipated license applications. On an annual basis, the NRC reviews the baseline budget and adjusts resource allocations based on several factors, including letters of intent from current and prospective licensees, changes in regulatory requirements, and prior year expenditures. The year prior to executing the budget, the agency reviews the resources and associated workload that was previously requested and adjusts them based on the most current information. Lastly, in the year of budget execution, the agency adjusts resources commensurate with the level of work actually received. The most recent budget that was formulated (FY2015) is based on current assumptions regarding the projected workload for fiscal year 2015. The agency will begin to develop the FY2016 budget in the coming months using updated assumptions about operating plants, COL applications, and other indicators of the projected workload.

As of November 16, 2013, the NRC has 3871 staff, including the Office of the Inspector General, which is down 368 employees from FY2010. The NRC has actively engaged in efforts to streamline the organization. For example, the NRC initiated efforts to reduce its overhead by centralizing and consolidating corporate support functions through its Transforming Assets into Business Solutions (TABS) initiative. This effort has resulted in a reduction of Office support FTE of 273 (25%) from FY2011 to FY2015.

Question 2. What Role does the Chairman’s office play in the identification of declining trends in agency workloads?

ANSWER.

The Chairman works collegially with the Commission to respond to changes in agency workload by revising budget estimates and determining the distribution of appropriated funds according to major programs and purposes, consistent with the Energy Reorganization Act of 1974, Section 201(a)(5). The initial step in this process is for the Chairman to provide high-level planning objectives for budget development and prioritization of planned activities to the Commission for review and approval and to provide any other documents used to inform the high-level planning objectives to the Commission for review. This is done prior to the start of the annual budget formulation process. The Chairman is also responsible for initiating the update of the agency Strategic Plan and the Commission’s annual review of the Performance Budget, presenting the Strategic Plan, Performance Budget, and Congressional Budget Justification to the Commission for its review and approval. During budget execution, the Chairman, along with all other Commissioners, approves any reprogramming requests, significant resource changes due to “fact-of-life” workload adjustments and reductions due to sequestration or rescissions.

Question 3. How is the NRC redistributing its resources in light of the reduction in workload in some areas?

ANSWER.

The NRC has an established add/shed/defer process whereby the agency identifies and reprioritizes existing or planned work when emergent items of higher priority are assigned, when there is a shift in workload priorities, when licensees or applicants change their plans, or when the realized impact of work is greater than what was budgeted. “Fact-of-life” changes frequently occur and result in the need to re-evaluate plans and resources. When there is a reduction of workload, the agency uses this established process to evaluate how resources should be reallocated to support emergent work.

This process was used to address the decision made by the Commission to respond to the Court decision on Waste Confidence. In addition, staff in the Office of New Reactors with expertise in seismology and hydrology were redirected to support the Office of Nuclear Reactor Regulation's efforts to address the post-Fukushima actions. This process will also be used if additional reductions are necessary due to sequestration and to make adjustments for unplanned shutdown of plants.

Question 4. Please provide a schedule with the dates estimated for the release of each outstanding volume of the Yucca Mountain Safety Evaluation Report.

ANSWER¹.

In response to the Commission's August 30, 2013 Order seeking comment from the participants in the Yucca Mountain adjudication as to how the agency should continue with the licensing process, the staff estimated that absent any unforeseen issues and with sufficient staff resources, it could complete and issue the remaining volumes of the Yucca Mountain Safety Evaluation Report (SER) concurrently approximately 12 months after initiating work. This estimate was based on inclusion of a start-up period to replace key technical reviewers who no longer work for the agency, to reassemble technical staff assigned to other tasks, and to enable reviewers to regain familiarity with licensing issues and docketed correspondence due to the break in the application review and the shift in staff focus to other agency activities. It was assumed the project would be given a high priority so that appropriate technical staff and resources are available.

In its November 18, 2013, Memorandum and Order, the Commission directed the staff to complete all remaining SER volumes concurrently, but issue each SER volume upon its completion. The Commission requested that the staff, through monthly progress reports, keep the Commission fully informed of the status of the activities the Order and Staff Requirements Memorandum directed the staff to take. The Commission anticipates receiving the staff's plan for implementing the Commission's decision on the path forward by the end of this month. The Commission will keep the Committee fully and currently informed.

¹ Commissioner George Apostolakis did not participate in the development of this response.

Question 5.

Please provide an estimate of the resources necessary to fully comply with the DC Circuit's mandamus decision, complete the review of the Yucca Mountain license application, and issue a decision regarding construction authorization as mandated in the Nuclear Waste Policy Act.

ANSWER².

The writ of mandamus issued by the D.C. Circuit Court directed NRC to continue with the Yucca Mountain licensing process unless and until Congress authoritatively says otherwise or there are no appropriated funds remaining. When the decision granting the writ of mandamus was issued, the agency had approximately \$11 million in unobligated carryover funding appropriated from the Nuclear Waste Fund. The NRC staff has estimated that, absent any unforeseen issues, these resources are sufficient to complete the Safety Evaluation Report (estimated cost of completion: \$8.3 million) and an adoption determination review of a supplemental Environmental Impact Statement to be prepared by the Department of Energy. Further, the Licensing Support Network document collection currently in the Secretary of the Commission's possession can be loaded into the non-public portion of the NRC's Agencywide Documents Access and Management System for approximately \$700,000. We seek to maintain an adequate margin so as not to jeopardize our ability to complete these tasks and we will re-evaluate our path forward not to resume the adjudication in the event that circumstances materially change.

Following issuance of the Safety Evaluation Report and an adoption determination of the supplemental Environmental Impact Statement, a number of licensing steps remain to reach a

² Commissioner George Apostolakis did not participate in the development of this response.

decision regarding construction authorization for a repository at Yucca Mountain. This includes completion of the adjudicatory hearings, which currently include 15 parties and nearly 300 admitted contentions. At this time, the NRC has not prepared an estimate of resources required to complete this multi-year licensing process.

Question 6. **Has the NRC submitted a supplemental budget request to the Office of Management and Budget? If not, when do you expect to do so?**

ANSWER³.

NRC has not submitted a supplemental budget request to the Office of Management and Budget for additional Nuclear Waste Funds. Nothing in the D.C. Circuit Court of Appeals' mandamus order requires the Commission to do so.

The Commission's focus has been on how to spend the available funds as ordered by the court. Any future decision to seek additional funding would be made by the Commission as a collegial body.

³ Commissioner George Apostolakis did not participate in the development of this response.

Question 7. Please provide a list of the costs billed each year to each applicant for the review of license renewal applications for the past 10 years including ongoing reviews.

ANSWER.

The requested data are attached. The NRC's level of effort, and corresponding costs to applicants, may vary depending on site specific technical issues that arise during the review.

Question 8. Please provide a list of the costs billed each year to each licensee for the review of new plant COL applications for the past 10 years including previously issued and ongoing reviews.

ANSWER.

[The requested data are attached.](#) The following information has been provided as background.

The timeliness of the safety reviews of the combined licenses referencing designs that are undergoing certification review have been affected by the delayed schedules of the respective design certification reviews (see response to Information Request #9 regarding design certification activities), and by project- and site-specific delays in addressing regulatory requirements (Bell Bend, Calvert Cliffs, Fermi, North Anna, Comanche Peak). The remaining combined license applications (Lee, Levy, Turkey Point, South Texas) are encountering delays stemming from both safety and environmental issues unique to each project that do not have an underlying common theme, and such causes of delay are based on applicant-specific limitations in providing information needed by the NRC to complete the reviews. There were some project specific impacts on the pace of environmental reviews as a result of budget sequestration in FY2013, however, these delays did not affect critical path.

Question 9. Please provide a list of the costs billed each year to each applicant for the review of new design certification applications, amendments, and renewals for the past 10 years including previously issued and ongoing reviews.

ANSWER.

The requested data are attached. The following information has been provided as background. Design certification applications address the various safety issues associated with the proposed nuclear power plant design independent of a specific site. The NRC is making progress on its ongoing reviews of design certifications and design certification renewals.

Schedules for the review of the pending design certifications and renewals (ESBWR, EPR, U.S. APWR, and renewals of the ABWR) have been delayed based on either (1) the applicant's inability to resolve safety issues identified by the NRC staff during its review in a timely manner, or (2) notifications received from the applicants of limitations on their ability to support the schedules that had previously been established for completion of these reviews, or (3) both. These reviews have not been suspended and the applications have not been withdrawn. However, the pace of the reviews, and the resultant schedules, are being reevaluated in direct response to the applicant's circumstances, but not as the result of limitations on the NRC's ability to complete the required review activities in a timely manner.

Question 10. Please provide a copy of any “lessons learned” reports examining the NRC’s performance in reviewing the first new plant licenses in over 30 years.

ANSWER.

Copies of a lessons learned review (April 2013) and a self-assessment review (July 2013) are [attached](#). We also have included a copy of the Bipartisan Policy Center review conducted in 2010 at the request of the NRC.

Question 11.

Please explain what actions the Commission is taking to address shortcomings in meeting performance metrics for reviewing power uprate requests [Part 1]. Please provide a list of the costs billed to each licensee for the review of power uprate requests for the past 10 years including ongoing reviews [Part 2]. Please provide a list of power uprate requests that have been withdrawn, including how long those requests were under consideration and the costs billed to each licensee [Part 3].

ANSWER.

Part 1

The NRC's operating reactor power uprate program has been effective, as demonstrated through the approval of approximately 150 applications for power uprates that added over 6,800 megawatts of electric power capacity to the U.S. electrical grid. This is roughly the equivalent of nearly seven new large electrical generating facilities. The NRC is on schedule to approve an additional power uprate application by the end of 2013, and four more power uprates in the spring of 2014.

Timeliness goals for reviewing power uprate applications depend on licensees providing all of the information the NRC staff needs to determine whether the application meets all regulatory requirements, thus ensuring public health and safety through the completion of the appropriate safety reviews. In some cases, the NRC has been challenged in meeting the timeliness goals for power uprate applications while focusing on the completion of the necessary safety reviews. The timeliness goals have been missed primarily due to the NRC's identification of safety and technical issues, review of operating experience, and the licensees required time to address these issues. Key examples of the issues requiring additional safety review time include complex technical issues related to crediting containment backpressure for equipment needed

for reactor core cooling, structural integrity of steam dryers, and the potential impact of high-energy line breaks on safety-related equipment. Delays have also occurred as a result of licensee revisions to engineering and safety analysis in response to NRC staff questions or errors identified in calculations, inaccuracies in the ability of ultrasonic flow measurement devices to predict feedwater flow, and licensee engineering changes beyond the scope of a typical uprate application. The power uprate applications currently under review have been impacted by the agency's post Fukushima activities, particularly as staff resources in some specialized technical disciplines have been redirected.

While these activities have exceeded the anticipated schedule goals, they have been required to assure the safety of the uprates. As a result, in 2012, as part of a lessons-learned review of the power uprate program, the NRC changed the timeliness goals for uprates based on measurement uncertainty recaptures from 6 to 9 months, stretch power uprates from 9 to 12 months, and extended power uprates from 12 to 18 months. These changes were necessary to reflect NRC safety review requirements and to incorporate experience gained from reviews conducted to date. The revised timeliness goals enable the staff to complete the appropriate safety review, support management oversight of the review activities, and meet industry expectations for timely reviews.

The power uprate applications currently under review have been impacted by the agency's post-Fukushima activities, particularly as staff resources in some specialized technical disciplines have been reduced. The NRC staff has largely overcome these challenges by prioritizing power uprate reviews based on licensees' implementation schedules.

Over the years, the NRC has taken numerous actions to improve the power uprate program. Examples of these actions include: issuing guidance on the content of measurement

uncertainty recapture power uprate applications; issuing a review standard for extended power uprates; issuing generic guidelines for extended power uprate testing programs; revising guidance on dynamic testing and analysis of systems, components, and equipment, reactor pressure vessel internals, and the comprehensive vibration assessment program for reactor internals during preoperational and initial startup testing; and approving generic models and analytical approaches developed by the nuclear industry, such as the applicability of General Electric thermal hydraulic analysis.

More recently, the NRC staff addressed recommendations provided by the NRC's Office of the Inspector General on areas for enhancement, including inspection procedures, safety evaluations, and program coordination. As a result, the NRC revised guidance to support the early identification of information gaps in licensee applications, revised the power uprate inspection procedure, and revised guidance to strengthen coordination of power uprate activities and clarify roles and responsibilities. In 2011, the Commission approved an approach to credit containment backpressure for equipment needed for reactor core cooling. This is important, as credit for containment backpressure impacted several power uprate applications.

The NRC's power uprate program is a high priority, and the staff continues to participate in discussions with stakeholders, including the nuclear industry, on enhancements to the program. As an example, the staff participates in activities such as the Nuclear Energy Institute Licensing Action Task Force. As part of that effort, the NRC staff piloted a pre-application meeting process to improve the quality of discussions and the documenting of decisions regarding power uprate applications. Additionally, the NRC staff is reviewing topical reports supporting resolution of long-standing technical issues associated with steam dryer analysis and a methodology for containment backpressure. Recently, NRC staff has been notified by several licensees that their plans to submit power uprate applications have changed due to evolving economics in the

electrical sector as a result of lower natural gas prices. Therefore, NRC staff does not anticipate receiving many more power uprate applications over the next year or so.

Part 2

Over the past 10-years, the NRC staff has approved 49 power uprate applications as fully meeting all NRC requirements, which ensure public health and safety. These power uprates added approximately 2730 megawatts of electrical power capacity to the U.S. electrical grid. Additionally, NRC is reviewing 14 power uprate applications, which, if approved, would add an additional 1000 megawatts of electric power capacity. The NRC staff review costs for these activities is provided in the following tables:

Approved Power Uprate Applications

| Plant Name (type of uprate) | NRC staff costs billed to licensee (Note 1) |
|---|--|
| Fort Calhoun (measurement uncertainty recapture) – (Note 2) | \$147,763.20 |
| Kewaunee (stretch power uprate) | \$295,744.80 |
| Palisades (measurement uncertainty recapture) | \$129,698.40 |
| Indian Point 2 (stretch power uprate) | \$439,127.60 |
| Seabrook (stretch power uprate) | \$644,694.60 |
| Indian Point 3 (stretch power uprate) | \$251,185.50 |
| Waterford (extended power uprate) | \$1,197,677.70 |
| Palo Verde 1 (stretch power uprate) | \$105,907.30 |
| Palo Verde 2 (administrative change) – (Note 3) | \$12,367.00 |
| Palo Verde 3 (stretch power uprate) | \$99,619.80 |
| Vermont Yankee (extended power uprate) | \$2,230,859.50 |
| Ginna (extended power uprate) | \$1,100,204.50 |
| Beaver Valley 1 (extended power uprate) | \$739,270.80 |
| Beaver Valley 2 (extended power uprate) | \$717,074.50 |
| Browns Ferry 1 (stretch power uprate) | \$558,623.10 |

| | |
|--|----------------|
| Crystal River 3 (measurement uncertainty recapture) | \$279,772.00 |
| Susquehanna 1 (extended power uprate) | \$878,581.90 |
| Susquehanna 2 (extended power uprate) | \$831,911.40 |
| Vogle 1 (measurement uncertainty recapture) | \$207,535.20 |
| Vogle 2 (measurement uncertainty recapture) | \$182,947.80 |
| Hope Creek (extended power uprate) | \$2,100,963.40 |
| Comanche Peak 1 (stretch power uprate) | \$360,967.80 |
| Comanche Peak 2 (stretch power uprate) | \$353,073.00 |
| Cooper (measurement uncertainty recapture) | \$226,627.20 |
| Davis-Besse (measurement uncertainty recapture) | \$315,787.40 |
| Millstone 3 (stretch power uprate) | \$1,120,969.40 |
| Calvert Cliffs 2 (measurement uncertainty recapture) | \$107,980.60 |
| Calvert Cliffs 1 (measurement uncertainty recapture) | \$213,129.00 |
| North Anna 1 (measurement uncertainty recapture) | \$155,298.00 |
| North Anna 2 (measurement uncertainty recapture) | \$106,575.30 |
| Prairie Island 1 (measurement uncertainty recapture) | \$195,474.20 |
| Prairie Island 2 (measurement uncertainty recapture) | \$103,211.20 |
| LaSalle 1 (measurement uncertainty recapture) | \$138,239.50 |
| LaSalle 2 (measurement uncertainty recapture) | \$122,641.60 |
| Surry 1 (measurement uncertainty recapture) | \$154,078.20 |
| Surry 2 (measurement uncertainty recapture) | \$132,235.60 |
| Limerick 1 (measurement uncertainty recapture) | \$285,556.40 |
| Limerick 2 (measurement uncertainty recapture) | \$225,888.00 |
| Point Beach 1 (extended power uprate) | \$1,128,732.20 |
| Point Beach 2 (extended power uprate) | \$941,838.50 |
| Nine Mile Point 2 (extended power uprate) | \$1,765,952.33 |
| Harris 1 (measurement uncertainty recapture) | \$608,788.25 |
| Turkey Point 3 (extended power uprate) | \$1,415,799.00 |
| Turkey Point 4 (extended power uprate) | \$859,096.00 |

| | |
|---|----------------|
| St. Lucie 1 (extended power uprate) | \$2,140,512.50 |
| Grand Gulf 1 (extended power uprate) | \$2,162,050.55 |
| St. Lucie 2 (extended power uprate) | \$1,913,824.71 |
| McGuire 1 (measurement uncertainty recapture) | \$345,692.00 |
| McGuire 2 (measurement uncertainty recapture) | \$215,045.50 |

Ongoing Power Uprate Reviews

| Plant Name (type of uprate) | NRC staff costs billed to licensee (Note 1) |
|---|--|
| Browns Ferry 1 (extended power uprate) | \$2,172,241.07 |
| Browns Ferry 2 (extended power uprate) | \$1,350,742.97 |
| Browns Ferry 3 (extended power uprate) | \$1,273,650.32 |
| Monticello (extended power uprate) | \$2,286,671.79 |
| Braidwood 1 (measurement uncertainty recapture) | \$289,588.50 |
| Braidwood 2 (measurement uncertainty recapture) | \$253,082.75 |
| Byron 1 (measurement uncertainty recapture) | \$324,247.00 |
| Byron 2 (measurement uncertainty recapture) | \$241,736.00 |
| Oconee 1 (measurement uncertainty recapture) | \$194,581.25 |
| Oconee 2 (measurement uncertainty recapture) | \$139,913.00 |
| Oconee 3 (measurement uncertainty recapture) | \$116,983.00 |
| Peach Bottom 2 (extended power uprate) | \$1,059,105.62 |
| Peach Bottom 3 (extended power uprate) | \$918,021.27 |
| Fermi 2 (measurement uncertainty recapture) | \$485,975.50 |

Notes on NRC estimated costs

1. Cost estimates are based on NRC staff review of the hours billed to licensees and do not include inspection activities associated with implementation of the power uprate approval.
2. NRC staff approved a measurement uncertainty power uprate for Fort Calhoun on January 16, 2004. Subsequently, the licensee, Omaha Public Power District, was informed by Westinghouse that the potential instrument inaccuracies in the Advanced Measurement and Analysis Group ultrasonic flow meter would not allow

implementation of the power uprate. The NRC amended the license to withdrawal approval of the power uprate.

3. The NRC approved a three percent power uprate for Palo Verde 2 by amendment dated September 29, 2003. Subsequently, by letter dated November 16, 2006, NRC approved a three percent power uprate amendment for Palo Verde 1 & 3. This required an administrative change to the Unit 2 technical specifications to clarify that the uprate applied to all three Palo Verde Units.

Part 3

The staff has identified, from the actual applications submitted by licensees to the NRC, eight power uprate applications that have been withdrawn and one denied application within the past ten years. These applications include Hope Creek (date of application November 7, 2005, and date of withdrawal February 10, 2006), Susquehanna 1 & 2 (date of application March 31, 2006, and date of withdrawal May 18, 2006), Calvert Cliffs 1 & 2 (date of application January 31, 2005, and date of withdrawal September 27, 2007), Fort Calhoun (date of application March 31, 2005, and date of denial September 27, 2007), Monticello (date of application March 31, 2008, and date of withdrawal June 25, 2008), St. Lucie 1 (date of application April 16, 2010, and date of withdrawal August 13, 2010), and Crystal River 3 (date of application June 15, 2011, and date of withdrawal February 7, 2013). The Hope Creek, Susquehanna 1 & 2, Monticello, and St. Lucie 1 applications were withdrawn due to issues identified during the NRC staff's acceptance review of the application. The Calvert Cliffs 1 & 2 applications were withdrawn and the Fort Calhoun application was denied following the NRC staff decision to suspend its approval of the Westinghouse Crossflow ultrasonic flow meter topical report. The Crystal River 3, application was withdrawn due to the business decision to retire the unit. These applications and the associated NRC staff review costs are provided in the following table:

Withdrawn or Denied Power Uprate Applications

| Plant Name (type of uprate) | NRC staff costs billed to licensee |
|--|---|
| Hope Creek (extended power uprate) | \$181,240.50 |
| Susquehanna 1 (extended power uprate) | \$43,706.00 |
| Susquehanna 2 (extended power uprate) | \$36,572.00 |
| Calvert Cliffs 1 (measurement uncertainty recapture) | \$121,493.50 |
| Calvert Cliffs 2 (measurement uncertainty recapture) | \$122,782.60 |
| Fort Calhoun 1 (denial of measurement uncertainty recapture) | \$106,709.50 |
| Monticello (extended power uprate) | \$254,348.60 |
| St. Lucie 1 (extended power uprate) | \$422,164.96 |
| Crystal River 3 (extended power uprate) | \$2,231,280.99 |

Question 12. **Please provide a statement on what principles and factors will guide the Commission's FY '15 budget deliberations.**

ANSWER.

The NRC's FY 2015 budget request to the Office of Management and Budget provides resources necessary to allow the agency to accomplish its mission of protecting public health and safety, promoting the common defense and security, and protecting the environment for existing and future NRC licensees in the Nuclear Reactor Safety program and Nuclear Material and Waste Safety program. These include the resources necessary to accomplish activities related to ensuring the safety of operating reactors and nuclear facilities (new and current) and the oversight of the construction of new nuclear power reactors and other nuclear facilities. In developing the FY 2015 budget, the Commission first established the high-level planning guidance to guide the development of the FY 2015 budget proposal. Upon receipt of the FY 2015 budget proposal, the Commission then ensured that it provided adequate funding for high-priority activities that are required to meet the agency's mission and goals while identifying efficiencies to offset growing costs and limited funding.

The NRC has formulated its Fiscal Year FY2015 Performance Budget to support the agency's Safety and Security strategic goals and objectives. The NRC's FY 2015 Performance Budget provides the necessary resources for the Nuclear Reactor Safety and Nuclear Materials and Waste Safety Programs to carry out the agency's mission and achieve the stated goals and desired outcomes for the American public.

Question 13. In what ways does the Commission seek to ensure that the budget appropriately adheres to the NRC's *Principles of Good Regulation*?

ANSWER.

The NRC strives to conduct all of its activities in accordance with its Principles of Good Regulation. The Commission recognizes the importance of being an effective and efficient regulator. In making budgetary decisions, the Commissioners take into account the NRC's commitment to independence, openness, efficiency, clarity, and reliability. These principles are embedded in the budget development process and are reinforced by the Commission in reviewing and approving a budget request.

| COSTS BILLED FOR REVIEW OF LICENSING RENEWAL APPLICATIONS | | | | | | | | | | | |
|---|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------|
| Applicant | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
| OYSTER CREEK | -- | \$58,827.90 | \$2,236,509.51 | \$1,573,171.46 | \$603,417.34 | \$129,529.60 | -- | -- | -- | -- | -- |
| NINE MILE POINT 1 | \$36,613.20 | \$984,463.01 | \$725,867.64 | \$319,592.09 | -- | -- | -- | -- | -- | -- | -- |
| DRESDEN 2 | \$563,950.50 | \$56,076.30 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| GINNA | \$794,583.22 | \$10.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| INDIAN POINT 2 | -- | -- | -- | \$88,297.30 | \$1,256,419.14 | \$679,013.64 | \$343,722.98 | \$274,329.40 | \$240,901.50 | \$367,560.00 | \$40,732.00 |
| DRESDEN 3 | \$576,494.31 | \$55,350.10 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| QUAD CITIES 1 | \$571,450.19 | \$57,975.40 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PALISADES | \$1,560.00 | \$285,360.80 | \$1,244,539.11 | \$714,045.81 | -- | -- | -- | -- | -- | -- | -- |
| BROWNS FERRY 1 | \$442,789.22 | \$947,804.80 | \$297,727.87 | \$61,210.07 | -- | -- | -- | -- | -- | -- | -- |
| BROWNS FERRY 2 | \$405,618.21 | \$832,772.30 | \$230,599.76 | \$55,527.07 | -- | -- | -- | -- | -- | -- | -- |
| ROBINSON 2 | \$601,919.60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| MONTICELLO | -- | \$482,319.09 | \$1,713,494.67 | \$609,679.05 | -- | -- | -- | -- | -- | -- | -- |
| QUAD CITIES 2 | \$556,196.89 | \$49,545.50 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| POINT BEACH 1 | \$21,216.00 | -- | \$1,656,205.70 | \$35,362.38 | -- | -- | -- | -- | -- | -- | -- |
| VERMONT YANKEE | -- | -- | \$210,755.53 | \$2,096,604.13 | \$1,529,023.30 | \$251,950.60 | \$113,620.00 | \$148,425.60 | -- | -- | -- |
| SALEM 1 | -- | -- | -- | -- | -- | -- | \$866,825.30 | \$1,043,418.81 | -- | -- | -- |
| DIABLO CANYON 1 | -- | -- | -- | -- | -- | -- | \$797,269.35 | \$1,120,579.06 | \$26,901.25 | \$9,166.50 | -- |
| PEACH BOTTOM 2 | \$1,248.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PEACH BOTTOM 3 | \$312.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PRAIRIE ISLAND UNIT 1 | -- | -- | -- | -- | \$75,671.40 | \$1,216,020.80 | \$273,918.88 | \$258,039.00 | \$17,738.00 | -- | -- |
| FORT CALHOUN | \$174,013.20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| INDIAN POINT 3 | -- | -- | -- | \$434.00 | \$1,277,157.75 | \$628,628.44 | \$273,633.59 | \$250,145.05 | \$228,477.00 | \$262,424.50 | \$32,776.00 |
| THREE MILE ISLAND 1 | -- | -- | -- | -- | \$726,218.40 | \$1,399,580.40 | \$62,423.27 | -- | -- | -- | -- |
| PILGRIM 1 | -- | -- | \$204,462.16 | \$2,198,914.58 | \$863,943.85 | -- | \$36,673.90 | \$141,807.45 | \$43,242.50 | -- | -- |
| BROWNS FERRY 3 | \$384,246.22 | \$810,308.67 | \$216,518.59 | \$54,604.57 | -- | -- | -- | -- | -- | -- | -- |
| COOPER | -- | -- | -- | -- | -- | \$2,068,410.40 | \$1,668,376.00 | \$290,913.50 | \$3,239.91 | -- | -- |
| POINT BEACH 2 | \$17,113.20 | -- | \$1,644,219.10 | \$35,362.38 | -- | -- | -- | -- | -- | -- | -- |
| CRYSTAL RIVER | -- | -- | -- | -- | -- | \$658,969.60 | \$2,685,649.69 | \$947,003.88 | \$76,181.09 | \$22,742.00 | -- |
| KEWAUNEE | -- | -- | -- | -- | -- | \$1,404,413.20 | \$1,397,133.20 | \$511,767.55 | -- | -- | -- |
| PRAIRIE ISLAND UNIT 2 | -- | -- | -- | -- | \$76,161.60 | \$1,224,907.00 | \$262,017.78 | \$286,695.80 | \$17,192.00 | -- | -- |
| SALEM 2 | -- | -- | -- | -- | -- | -- | \$795,008.62 | \$755,085.82 | -- | \$19,996.33 | -- |
| COOK 1 | \$528,855.11 | \$546,155.17 | \$47,351.14 | -- | -- | -- | -- | -- | -- | -- | -- |
| COOK 2 | \$523,872.29 | \$528,733.27 | \$45,451.93 | -- | -- | -- | -- | -- | -- | -- | -- |
| DIABLO CANYON 2 | -- | -- | -- | -- | -- | -- | \$846,563.97 | \$1,075,278.72 | \$26,014.00 | \$4,589.50 | -- |
| BRUNSWICK 2 | -- | \$1,126,433.78 | \$533,762.20 | \$165,904.45 | \$4,991.00 | -- | -- | -- | -- | -- | -- |
| BRUNSWICK 1 | -- | \$1,153,327.28 | \$602,030.50 | \$167,238.15 | \$868.00 | \$258.00 | -- | -- | -- | -- | -- |
| SEQUOYAH 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | \$2,166,297.51 | ##### |
| SEQUOYAH 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | \$2,018,884.36 | ##### |
| DUANE ARNOLD | -- | -- | -- | -- | -- | \$533,224.20 | \$2,269,841.63 | \$352,825.86 | \$116,533.14 | -\$173,888.88 | -- |
| FITZPATRICK | -- | -- | -- | \$2,890,420.09 | \$495,680.76 | -- | -- | -- | -- | -- | -- |
| BEAVER VALLEY 1 | \$6,786.00 | \$59,612.48 | \$3,171.40 | \$217.00 | \$745,034.75 | \$420,308.20 | \$185,847.31 | -- | -- | -- | -- |
| ST. LUCIE 1 | \$26,216.65 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| MILLSTONE STATION | \$508,626.10 | \$639,949.01 | \$188,168.38 | \$39,333.54 | -- | -- | -- | -- | -- | -- | -- |
| DAVIS BESSE 1 | -- | -- | -- | -- | -- | -- | -- | \$2,976,654.41 | \$1,611,517.54 | \$640,657.78 | \$76,647.88 |
| FARLEY 1 | \$894,637.48 | \$277,990.36 | \$454.67 | -- | -- | -- | -- | -- | -- | -- | -- |
| LIMERICK 1 | -- | -- | -- | -- | -- | -- | -- | \$76,714.09 | \$2,340,080.59 | \$412,026.04 | \$57,052.00 |
| LIMERICK 2 | -- | -- | -- | -- | -- | -- | -- | \$73,179.86 | \$1,981,349.30 | \$383,599.86 | \$45,832.00 |

| | | | | | | | | | | | |
|-------------------------|----------------|--------------|--------------|--------------|----------------|--------------|----------------|----------------|----------------|----------------|-------------|
| HOPE CREEK 1 | -- | -- | -- | -- | -- | -- | \$1,438,452.62 | \$1,058,945.67 | -- | \$11,890.60 | -- |
| FARLEY 2 | \$855,798.68 | \$280,809.45 | \$1,274.66 | -- | -- | -- | -- | -- | -- | -- | -- |
| ARKANSAS 2 | \$1,574,730.71 | \$708,893.25 | \$137,037.81 | -- | -- | -- | -- | -- | -- | -- | -- |
| MCGUIRE 1 | \$1,840.80 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| MCGUIRE 2 | \$1,716.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SUSQUEHANNA 1 | -- | -- | -- | \$394,184.54 | \$629,014.41 | \$426,953.94 | \$42,156.43 | -- | -- | -- | -- |
| SUSQUEHANNA 2 | -- | -- | -- | \$459,913.19 | \$648,747.31 | \$389,862.60 | \$28,214.02 | -- | -- | -- | -- |
| ST. LUCIE 2 | \$25,982.65 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SUMMER 1 | \$1,222,903.76 | \$950.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| COLUMBIA GENERATING STA | -- | -- | -- | -- | -- | -- | \$1,153,323.63 | \$2,683,818.73 | \$1,069,658.62 | \$12,374.39 | -- |
| HARRIS 1 | -- | -- | -- | \$945,552.67 | \$1,124,137.04 | \$77,463.04 | -- | -- | -- | -- | -- |
| NINE MILE POINT 2 | \$32,416.80 | \$940,719.21 | \$702,216.39 | \$309,098.57 | -- | -- | -- | -- | -- | -- | -- |
| BEAVER VALLEY 2 | -- | \$65,468.58 | \$3,187.10 | \$217.00 | \$768,719.16 | \$418,184.26 | \$96,902.69 | -- | -- | -- | -- |
| CATAWBA 1 | \$1,825.20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CATAWBA 2 | \$1,716.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| GRAND GULF 1 | -- | -- | -- | -- | -- | -- | -- | -- | \$3,758,822.01 | \$1,288,193.68 | \$36,856.00 |
| MILLSTONE STATION | \$491,013.70 | \$632,805.51 | \$187,556.78 | \$39,333.54 | -- | -- | -- | -- | -- | -- | -- |
| VOGTLE 1 | -- | -- | -- | \$18,792.20 | \$1,116,318.46 | \$170,621.40 | \$3,937.82 | -- | -- | -- | -- |
| VOGTLE 2 | -- | -- | -- | \$18,662.00 | \$1,027,414.86 | \$151,192.40 | \$1,367.82 | -- | -- | -- | -- |
| SEABROOK 1 | -- | -- | -- | -- | -- | -- | \$120,661.50 | \$3,216,879.04 | \$1,116,779.22 | \$494,991.17 | \$87,625.61 |
| BYRON 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | \$524,050.00 | ##### |
| BYRON 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | \$486,438.50 | ##### |
| BRAIDWOOD 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | \$458,575.50 | ##### |
| BRAIDWOOD 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | \$398,009.50 | ##### |
| WOLF CREEK 1 | -- | -- | -- | \$72,703.60 | \$3,138,324.56 | \$113,997.94 | -- | -- | -- | -- | -- |
| CALLAWAY | -- | -- | -- | -- | -- | -- | -- | -- | \$3,709,560.30 | \$1,813,967.84 | \$92,956.00 |
| SOUTH TEXAS 1 | -- | -- | -- | -- | -- | -- | -- | \$1,517,131.63 | \$1,889,432.63 | \$415,146.94 | \$11,560.00 |
| SOUTH TEXAS 2 | -- | -- | -- | -- | -- | -- | -- | \$914,478.89 | \$1,470,578.72 | \$386,035.45 | \$9,724.00 |
| PALO VERDE 1 | -- | -- | -- | -- | -- | \$148,614.80 | \$1,125,500.65 | \$342,152.84 | -- | \$2,545.81 | -- |
| PALO VERDE 2 | -- | -- | -- | -- | -- | \$108,301.40 | \$865,317.57 | \$316,449.63 | -- | \$2,545.81 | -- |
| PALO VERDE 3 | -- | -- | -- | -- | -- | \$103,674.20 | \$905,907.97 | \$303,931.14 | -- | \$2,545.80 | -- |

QUESTION 8

| Site Name | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|--|---------|---------|---------------|-----------------|-----------------|-----------------|------------------|------------------|-----------------|-----------------|---------------|
| Progress Energy | | | \$ 11,000.00 | \$ 230,000.00 | \$ 1,494,000.00 | \$ 525,000.00 | | | | | |
| Nustart Energy - Bellefonte | | | \$ 320,000.00 | \$ 3,581,000.00 | \$ 4,821,000.00 | \$ 652,000.00 | \$ 6,000.00 | | | | |
| Dominion - North Anna | | | \$ 16,000.00 | \$ 174,000.00 | \$ 1,374,000.00 | \$ 88,000.00 | \$ 10,000.00 | | | | |
| Duke Energy Carolinas, LLC | | | \$ 10,000.00 | \$ 263,000.00 | \$ 1,750,000.00 | \$ 582,000.00 | \$ 8,000.00 | | | | |
| South Carolina Electric & Gas Company | | | \$ 17,000.00 | \$ 170,000.00 | \$ 580,000.00 | \$ 352,000.00 | \$ 2,000.00 | | | | |
| Nustart Energy - Grand Gulf | | | \$ 14,000.00 | \$ 142,000.00 | \$ 903,000.00 | \$ 291,000.00 | | | | | |
| Entergy Nuclear | | | \$ 2,000.00 | \$ 41,000.00 | \$ 156,000.00 | \$ 1,017,000.00 | \$ 10,000.00 | | | | |
| UniStar Nuclear Operating Services, L.L.C. | | | \$ 26,000.00 | \$ 552,000.00 | \$ 1,458,000.00 | \$ 386,000.00 | | | | | |
| NRG - South Texas | | | \$ 7,000.00 | \$ 676,000.00 | \$ 2,514,000.00 | \$ 123,000.00 | \$ 2,000.00 | | | | |
| Calloway COL | | | | \$ 88,000.00 | \$ 202,000.00 | \$ 2,018,000.00 | \$ 120,000.00 | | | | |
| Amarillo Power | | | | \$ 1,000.00 | \$ 5,000.00 | \$ 4,000.00 | | | | | |
| Commanche Peak Steam Electric | | | | \$ 120,000.00 | \$ 113,000.00 | \$ 1,933,000.00 | \$ 1,206,000.00 | | | | |
| Southern Nuclear Operating Co., Inc. | | | | | \$ 638,000.00 | \$ 265,000.00 | | | | | |
| Progress Energy - Levy Nuclear Plant Site | | | | \$ 67,000.00 | \$ 215,000.00 | \$ 2,956,000.00 | \$ 1,157,000.00 | | | | |
| DTE Energy - Fermi | | | | \$ 53,000.00 | \$ 70,000.00 | \$ 1,749,000.00 | \$ 174,000.00 | | | | |
| UniStar Nuclear Operating Services, L.L.C. - Nine Mile Point | | | | | \$ 125,000.00 | \$ 1,406,000.00 | \$ 198,000.00 | | | | |
| Exelon Corporation - Greenfield Site | | | | | \$ 207,000.00 | \$ 1,237,000.00 | \$ 9,000.00 | | | | |
| PPL LLC. - Bell Bend | | | | | \$ 212,000.00 | \$ 2,015,000.00 | \$ 937,000.00 | | | | |
| Florida Power & Light Company | | | | | \$ 47,000.00 | \$ 394,000.00 | \$ 1,134,000.00 | | | | |
| MIDAMERICAN NUCLEAR | | | | | \$ 24,000.00 | | | | | | |
| UniStar Nuclear Operating Services, L.L.C. | | | | | \$ 2,000.00 | \$ 5,000.00 | | | | | |
| STP Nuclear Operating Co. | | | | | | \$ 10,000.00 | \$ 105,000.00 | \$ 660,679.25 | \$ 750,342.31 | \$ 705,714.30 | \$ 123,498.16 |
| South Texas Project, Unit 3 | | | | | \$ 2,827,000.00 | \$ 8,617,000.00 | \$ 16,148,000.00 | \$ 12,465,451.90 | \$ 6,682,263.09 | \$ 3,462,226.34 | \$ 575,224.00 |
| South Texas Project, Unit 4 | | | | | \$ 10,000.00 | \$ 2,000.00 | \$ 90,000.00 | \$ 457,633.00 | \$ 61,673.50 | \$ 114,655.34 | \$ 35,930.50 |
| Bellefonte 3 | | | | | \$ 3,078,000.00 | \$ 6,107,000.00 | \$ 2,664,000.00 | \$ 495,506.11 | \$ 30,153.78 | \$ 9,438.25 | \$ 1,125.43 |
| Bellefonte 4 | | | | | \$ 1,000.00 | \$ 3,000.00 | \$ 17,000.00 | \$ 59,756.00 | \$ - | \$ 11,706.52 | \$ - |
| Calvert Cliffs 3 | | | | | \$ 680,000.00 | \$ 6,008,000.00 | \$ 5,680,000.00 | \$ 4,987,444.42 | \$ 3,631,096.16 | \$ 3,234,515.81 | \$ 680,169.50 |
| North Anna Unit 3 | | | | | \$ 2,702,000.00 | \$ 4,680,000.00 | \$ 2,438,000.00 | \$ 3,735,869.06 | \$ 3,165,709.72 | \$ 1,716,101.74 | \$ 341,090.50 |
| Duke Lee 1 | | | | | \$ 1,134,000.00 | \$ 3,120,000.00 | \$ 1,336,000.00 | \$ 2,890,359.06 | \$ 3,749,148.63 | \$ 2,349,773.44 | \$ 625,176.36 |
| Duke Lee 2 | | | | | \$ 1,000.00 | \$ 15,000.00 | \$ 14,000.00 | \$ 67,793.25 | \$ 3,118.71 | \$ 2,457.61 | \$ 68.50 |
| Shearon Harris Unit 2 | | | | | \$ 395,000.00 | \$ 3,631,000.00 | \$ 2,188,000.00 | \$ 1,083,790.43 | \$ 603,139.76 | \$ 268,587.33 | \$ 21,543.34 |
| Shearon Harris Unit 3 | | | | | \$ 4,000.00 | \$ 8,000.00 | \$ 12,000.00 | \$ 24,455.75 | \$ 3,118.71 | \$ 2,457.61 | \$ 68.50 |
| Grand Gulf Unit 3 | | | | | \$ 679,000.00 | \$ 2,656,000.00 | \$ 31,000.00 | | | | |
| Vogtle Unit 3 | | | | | \$ 17,000.00 | \$ 1,567,000.00 | \$ 4,599,000.00 | \$ 4,282,584.06 | \$ 4,219,894.79 | \$ 4,229,795.22 | \$ 907,527.21 |
| Vogtle Unit 4 | | | | | | \$ 9,000.00 | \$ 9,000.00 | \$ 50,204.56 | \$ 513,220.38 | \$ 528,010.09 | \$ 100,907.08 |
| V. C. Summer Unit 2 | | | | | | \$ 3,671,000.00 | \$ 7,068,000.00 | \$ 3,912,657.35 | \$ 2,356,964.60 | \$ 2,974,501.26 | \$ 664,737.57 |
| V. C. Summer Unit 3 | | | | | | \$ 14,000.00 | \$ 2,000.00 | \$ 224,917.90 | \$ 287,137.98 | \$ 533,633.25 | \$ 153,030.12 |
| Levy County Nuclear Plant 1 | | | | | | \$ 1,864,000.00 | \$ 3,299,000.00 | \$ 4,595,318.23 | \$ 4,502,029.54 | \$ 3,373,389.21 | \$ 443,186.49 |
| Levy County Nuclear Plant 2 | | | | | | \$ 22,000.00 | \$ 33,000.00 | \$ 80,349.50 | \$ 108,883.25 | \$ 58,247.00 | \$ 1,986.50 |
| Victoria County Station Unit 1 | | | | | | \$ 18,000.00 | \$ 17,000.00 | | | | |
| Victoria County Station Unit 2 | | | | | | \$ 6,000.00 | \$ 60,000.00 | | | | |
| Fermi 3 | | | | | | \$ 1,368,000.00 | \$ 4,160,000.00 | \$ 4,720,543.91 | \$ 5,966,570.04 | \$ 3,313,175.49 | \$ 559,849.00 |
| Comanche Peak 3 | | | | | | \$ 2,191,000.00 | \$ 5,795,000.00 | \$ 4,310,604.57 | \$ 2,740,851.95 | \$ 2,349,153.07 | \$ 344,026.88 |
| Comanche Peak 4 | | | | | | \$ 4,000.00 | \$ 46,000.00 | \$ 51,185.78 | \$ 40,636.75 | \$ 270,411.06 | \$ 47,465.12 |
| River Bend Station Unit 3 | | | | | | \$ 70,000.00 | \$ 9,000.00 | \$ 2,149.00 | \$ - | \$ 621.60 | \$ 1,224.00 |
| Callaway Plant Unit 2 | | | | | | \$ 1,448,000.00 | \$ 114,000.00 | \$ 59,321.42 | \$ - | \$ 14,660.03 | \$ - |
| Nine Mile Point 3 NPP | | | | | | \$ 572,000.00 | \$ 288,000.00 | \$ 69,369.40 | \$ 4,429.32 | \$ 46,647.76 | \$ - |
| Bell Bend Nuclear Power Plant | | | | | | \$ 1,246,000.00 | \$ 2,499,000.00 | \$ 1,660,089.16 | \$ 2,578,287.77 | \$ 3,705,762.93 | \$ 444,497.92 |
| Turkey Point Unit 6 | | | | | | | \$ 413,000.00 | \$ 4,222,273.83 | \$ 4,396,992.65 | \$ 4,739,535.37 | \$ 681,151.44 |

| | | | | | | | | | | | |
|---------------------|--|--|--|--|--|--|-------------|-------------|--------------|--------------|--------------|
| Turkey Point Unit 7 | | | | | | | \$ 1,000.00 | \$ 1,569.54 | \$ 13,548.22 | \$ 34,891.91 | \$ 11,497.50 |
|---------------------|--|--|--|--|--|--|-------------|-------------|--------------|--------------|--------------|

Notes on Costs Billed for COL Applications

1. NRC did not have any costs billed for Fiscal Years 2004 and 2005

QUESTION 9

| Site Name | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|--|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| AP1000 Pre-Application Review | | | | | \$ 25,000.00 | \$ 32,000.00 | \$ 625,000.00 | \$ 830,266.00 | \$ 155,277.50 | \$ - | \$ - |
| GE ESBWR - Design Certification | \$ 890,000.00 | \$ 1,100,000.00 | \$ 8,400,000.00 | \$ 3,009,000.00 | \$ 5,000.00 | \$ 4,000.00 | | | | | |
| ACR-700 | \$ 1,689,000.00 | \$ 1,131,000.00 | \$ 42,000.00 | | | | | | | | |
| IRIS Reactor Design | \$ 24,000.00 | \$ 16,000.00 | \$ 1,000.00 | \$ 6,000.00 | \$ 32,000.00 | \$ 34,000.00 | \$ 16,766.00 | | | | |
| Areva NP Inc. | | | | | | | | \$ 494,217.50 | \$ 499,831.15 | \$ 396,160.56 | \$ 129,085.60 |
| AREVA NP Inc. EPR | | \$ 20,000.00 | \$ 274,000.00 | \$ 1,138,000.00 | \$ 3,473,000.00 | \$ 5,737,000.00 | \$ 1,791,000.00 | \$ 49,658.07 | \$ 14,333.70 | \$ 2,072.00 | \$ - |
| US-APWR Pre-Application Review | | | | \$ 510,000.00 | \$ 3,289,000.00 | \$ 4,295,000.00 | \$ 2,924,000.00 | | | | |
| Toshiba 4S Reactor | | | | | \$ 36,000.00 | \$ 13,000.00 | | | | | |
| GE Renewal of ABWR Cert | | | | | | | \$ 3,850.00 | \$ 330,434.58 | \$ 5,365.15 | \$ 613.83 | \$ - |
| Toshiba Renewal of ABWR Cert | | | | | | | | \$ 434,424.00 | \$ 58,133.25 | \$ 123,098.50 | \$ - |
| Babcock & Wilcox mPower, Inc. | | | | | | | \$ 49,000.00 | \$ 654,359.00 | \$ 1,206,822.75 | \$ 983,396.50 | \$ 437,448.00 |
| Korea Electric Pwr Corp DCD Pre-App | | | | | | | \$ 2,000.00 | \$ 84,965.50 | \$ 158,203.50 | \$ 954,239.50 | \$ 297,748.00 |
| Westinghouse Small Modular Reactor | | | | | | | | \$ - | \$ 37,128.00 | \$ 218,297.25 | \$ 176,296.50 |
| Holtec Inherently Safe Modular (HI-SMUR) | | | | | | | | \$ - | \$ 1,092.00 | \$ 28,158.00 | \$ 7,394.00 |
| ABWR | | | | \$ 337,000.00 | \$ 218,000.00 | \$ 470,000.00 | | \$ - | \$ 208,836.00 | \$ - | \$ - |
| SYSTEM 80 PLUS | | | | | | | | \$ - | \$ 421,078.00 | \$ - | \$ - |
| AP1000 | | | | | \$ 3,917,000.00 | \$ 8,443,000.00 | \$ 7,362,000.00 | \$ 7,965,962.33 | \$ 1,725,829.27 | \$ 250,174.41 | \$ 32,251.59 |
| ESBWR | | | \$ 908,000.00 | \$ 9,653,000.00 | \$ 13,440,000.00 | \$ 12,690,000.00 | \$ 8,607,000.00 | \$ 3,756,438.15 | \$ 849,523.96 | \$ 607,207.97 | \$ 160,175.52 |
| EPR | | | | | \$ 2,718,000.00 | \$ 13,633,000.00 | \$ 13,264,000.00 | \$ 12,462,226.22 | \$ 10,537,144.99 | \$ 9,229,540.31 | \$ 2,389,799.88 |
| USAPWR | | | | | \$ 1,532,000.00 | \$ 12,167,000.00 | \$ 12,721,000.00 | \$ 15,393,306.03 | \$ 15,708,038.99 | \$ 11,711,441.70 | \$ 2,593,287.00 |
| Toshiba Renewal of ABWR Cert | | | | | | | | \$ - | \$ 33,852.00 | \$ 127,032.85 | \$ 16,133.24 |
| GE Renewal of ABWR Cert | | | | | | | | \$ - | \$ 400,497.93 | \$ 252,678.95 | \$ 106,689.74 |



**NEW REACTOR LICENSING PROCESS
LESSONS LEARNED REVIEW:
10 CFR PART 52**

April 2013

Executive Summary

The U.S. Nuclear Regulatory Commission (NRC) fully implemented the licensing portion of its new reactor licensing process¹ with the issuance of combined licenses (COLs) for Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3. Following the issuance of these licenses, the NRC initiated a lessons learned review to identify potential enhancements to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” licensing process and contribute to more effective and efficient reviews of future applications. This lessons learned review is limited to the licensing portion of Part 52 and does not include experiences from post-COL issuance activities. To facilitate this lessons learned review, the NRC conducted an extensive outreach effort to solicit feedback from external and internal stakeholders on their experiences using the new reactor licensing process. Specifically, the NRC staff drew on previous assessments of portions of the new reactor licensing process, lessons shared at the NRC’s 2012 Regulatory Information Conference, feedback received at a public meeting on lessons learned, and the results of internal and external surveys on the new reactor licensing process.

Although design certification and combined license reviews have taken longer and have been more technically challenging than anticipated, the results of this lessons learned review revealed no significant problems or impediments associated with the Part 52 licensing process. Its implementation achieved the intended result of resolving safety and environmental issues before authorizing plant construction. Overall, the NRC received positive feedback on the licensing process and best practices that made the successful execution of the Part 52 licensing process possible. The design-centered review approach, as supported by design-centered working groups, standard designs, and standard format and content of licensing applications, was frequently cited as a licensing process success. Several other best practices were identified, such as frequent meetings between the applicants and the NRC to resolve complex technical issues.

As expected with any new process, the first-time implementation of the Part 52 licensing process has resulted in challenges. An evaluation of these challenges identified the following lessons:

1. High-quality applications, with sufficient level of design detail and environmental information, are a significant contributor to overall project performance.

¹ 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants”

2. Timely development and maintenance of regulatory guidance are important to support the development of a high-quality application as well as contribute to an efficient regulatory review.
3. Strong design standardization contributes to an efficient regulatory review while on-going design changes have the opposite effect.
4. Early identification and timely resolution of complex technical issues minimize impacts on the review schedules.
5. Improvements to NRC's management system for requests for additional information (RAIs) can further enhance project knowledge management and contribute to a more efficient review.
6. Concurrent reviews of design certifications and combined license applications contribute to maximizing standardization. Design certification rulemakings should not commence until all design issues are resolved.
7. Updates to the regulations incorporating lessons learned will contribute to an enhanced licensing process.

Stakeholders also identified communications as a critical cross-cutting area. A commitment by all parties to engage in an open, transparent, and timely manner, more than any other action, has led to, and will continue to result in, the successful implementation of the Part 52 licensing process.

This lessons learned review identified several planned and potential actions that can be used to enhance the licensing process and improve the efficiency of future licensing reviews. Planned actions for each of the lessons learned are listed below:

1. Quality of Applications

- The NRC staff plans to review its acceptance review guidance to identify areas in need of enhancement.
- The NRC staff plans to adhere more strictly to acceptance review criteria for future applications.
- The NRC staff plans to engage future applicants with regards to the best timing for pre-application audits. The audits will evaluate level of detail of the application to ensure consistency with lessons-learned in reviews since 2006.

2. New Reactor Review Guidance

- The NRC staff plans to update Regulatory Guide 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” consistent with budgeted resources.
- The NRC staff will consider establishing a process for synchronizing updates to Regulatory Guide 1.206 with updates to the Standard Review Plan. The NRC staff will consider reorganizing Regulatory Guide 1.206 to be more consistent with the organization of the Standard Review Plan. The NRC staff will also incorporate review experience by considering the results of commonly asked RAIs and their respective responses when Regulatory Guide 1.206 is updated.
- The NRC staff plans to continue its systematic Standard Review Plan update, consistent with budgeted resources, in a timely manner to support combined license, design certification, early site permit, and limited work authorization application reviews.
- The NRC staff plans to proceed with environmental review guidance updates, consistent with budgeted resources.

3. Standardization

- The NRC staff plans to review ISG-11, “Finalizing Licensing-Basis Information,” to identify areas in need of enhancement.
- The NRC staff plans to work with industry to expand the design-centered working group role to address common technical issues to ensure consistency across different design centers.

4. Identification and Resolution of Technical Issues

- The NRC staff plans to update its staff guidance to ensure consistent use of best practices that facilitate timely resolution of complex technical issues and to more quickly engage higher levels of NRC and applicant management, when necessary, to resolve complex technical issues.
- The NRC staff plans to continue to engage stakeholders, including vendors, standards organizations, and other regulatory bodies on complex and evolving technologies to enhance safety while streamlining the review process.

5. Knowledge Management

- The NRC staff plans to enhance its RAI management system to improve search capability, consistent with budgeted resources.
- The NRC staff plans to continue to examine its RAI process to ensure that RAIs are tracked consistently across design centers and information is communicated to applicants and management in a timely fashion.

6. Application Timing and Sequencing

- The NRC staff plans to apply the rulemaking process for future design certifications consistent with the 2009 streamlined approach, in which all design issues have been resolved before rulemaking begins.

7. Updates to Regulations

- Although this lessons learned effort did not identify any significant problems or impediments with the Part 52 licensing process, it has identified areas that could be enhanced. In fact, the staff has been identifying and collecting ideas for improvements since the 2007 Part 52 update. The NRC staff plans to communicate potential regulatory enhancements to the Commission along with a proposed rulemaking plan to obtain Commission approval to move forward with an update to Part 52 and associated regulations.

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I. BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) revised its regulations in 1989 to establish Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” (Part 52) as an alternative to the existing process for reactor licensing under 10 CFR Part 50 (Reference 1). The NRC updated Part 52 in 2007 ([72 FR 49517](#) and [72 FR 57446](#)) to increase regulatory certainty and stability and to enhance the NRC's regulatory effectiveness and efficiency in implementing its licensing and regulatory approval processes. This new licensing and regulatory approval process encouraged design standardization and provided a more predictable licensing process by resolving safety and environmental issues before authorizing plant construction. Under Part 52, an applicant may seek a combined license (COL) that provides authorization to construct and operate— subject to specific conditions—a nuclear power plant. Part 52 also includes the design certification (DC) process to approve a standard reactor design, and the early site permit (ESP) process to approve the suitability of a site for a nuclear power facility. The process also includes provisions for approval to perform limited construction activities before a COL is issued under a limited work authorization (LWA). A brief description of these licensing processes is provided in Appendix A, “New Reactor Licensing Process,” to this report, and additional details are available in NUREG/BR-0468, “Frequently Asked Questions About License Applications for New Nuclear Power Reactors” (Reference 2).

A growing interest in new nuclear power generation in the industry gained support from the U.S. Department of Energy in 2002, through its Nuclear Power 2010 program, and the U.S. Congress in 2005, through incentives included in the Energy Policy Act of 2005, which included production tax credits, loan guarantees, and standby support in the event of regulatory delays. In preparation for the submittal of a large number of applications to construct and operate new nuclear reactors, in 2006 the NRC created the Office of New Reactors (Reference 3) to better prepare the agency for the anticipated new reactor licensing and construction inspection activities.

On September 17, 2009—by which time there had been three DC applications, two DC amendment applications, and COL applications for 28 reactors at 18 sites submitted to the NRC for review—U.S. Representatives Joe Barton and Greg Walden sent a letter to former Chairman Jaczko expressing concerns about potential regulatory delays in the licensing process for new reactors (Reference 4). In response, former NRC Chairman Jaczko requested that the Bipartisan Policy Center review the NRC’s licensing process for new reactors to determine whether there were unnecessary delays in that process caused either by the NRC or the nuclear industry.

The Bipartisan Policy Center issued its report on April 6, 2010 (Reference 5), and stated that it did not find any evidence that either the NRC or the nuclear industry had needlessly delayed or extended the licensing process. The Bipartisan Policy Center further concluded the following:

Although the licensing process is new, both the NRC and the industry have done a remarkable job in very trying circumstances assuring the thorough and timely evaluation of license applications. The fact that all parties have experienced some problems in navigating the process was to be expected under the circumstances. But it is apparent that all those involved have been diligent in working through the issues in a forthright manner.

Nonetheless, the Bipartisan Policy Center recommended that the Commission “... ensure that the lessons learned in the first round of applications are rigorously applied to make the processing of subsequent applications more efficient.”

In response, the NRC staff has undertaken a review to identify, assess, and document enhancements to the new reactor licensing review process one year after issuance of the first COL.

II. SCOPE AND METHODOLOGY

The NRC staff reviewed the new reactor licensing process, and assessed the experiences to date to identify enhancements that would increase the effectiveness and efficiency in future application reviews. The results are discussed in Section III of this report. The scope of this effort included the ESP, LWA, DC, and COL licensing processes (see Appendix A). A separate NRC lessons learned effort has addressed the mandatory hearing process. Post-COL activities (e.g., license amendments; inspections, tests, analyses, and acceptance criteria inspectability and closure; construction inspection) are being assessed in a separate activity initiated upon completion of the first year of safety-related construction at Vogtle and Summer.

The NRC staff drew on previous assessments of portions of the new reactor licensing process, lessons shared at the NRC’s 2012 Regulatory Information Conference, feedback received at a public meeting on lessons learned, and the results of internal and external surveys on the new reactor licensing process (References 6 - 18). In addition, lead project managers, first line supervisors, and team leaders of NRC technical and licensing staff were interviewed to gather additional insights and lessons learned from experiences performing the ESP, LWA, DC, and COL reviews.

An NRC working group conducted this lessons learned effort. From the sources described above, the working group identified seven lessons and associated planned actions that have the potential for positive gains in licensing review effectiveness and efficiency.

III. ANALYSIS OF FEEDBACK AND SUGGESTED ENHANCEMENTS

Overall, respondents commended the Part 52 process as an improvement over the two-step 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” licensing process because of reduced regulatory uncertainty through early resolution of safety and environmental issues before authorizing plant construction. Respondents also generally found implementation of the licensing process to be effective. They cited several items as key factors in the success of the process, including standardization; development of the design-centered review approach (Reference 19), based on a concept of industry standardization of COL applications referencing a standard design; and the formation of design-centered working groups comprised of DC applicants and one or more COL applicants referencing the same design. From 2007 to the present, both the NRC and industry have developed and adopted numerous best practices and improvements, some of which are described in this report. Further licensing process enhancements were identified from feedback received, and those are presented under the areas discussed below.

Lesson 1: Quality of Applications

One of the most important factors in the success of the licensing process is the submittal of a complete and high-quality application. Many of the schedule challenges in past and ongoing reviews can be linked to application quality as a root cause. Stakeholders indicated three areas that would enhance the quality of applications: (1) pre-application engagement, (2) an enhanced acceptance review process, and (3) the availability of guidance on level of detail.

Pre-application Engagement

The NRC highly encourages pre-application interactions, particularly in areas where applicants are proposing new concepts or novel design features. Feedback indicated that these interactions are most helpful when they are focused on specific topics and detailed enough to enable a thorough understanding of the concept or design feature. This enhances the staff’s ability to identify any related technical or policy issue and develop a timely course of action.

Additionally, pre-application interactions are most effective when initiated well in advance of the expected application date. This allows the NRC adequate time to address any significant technical or policy issues and develop new regulatory tools that may be needed in advance of the application. It also allows an applicant to address staff concerns before submittal, and to prepare a complete and high-quality application.

Another component to pre-application interaction are pre-application audits. These interactions are intended to assess the applicant's readiness to submit a complete and high-quality application. Experience has shown that such audits could be more effective if the audits evaluated level of detail and if they are completed well in advance of the planned application date so that the applicant has time to incorporate any needed changes.

The NRC is incorporating these lessons learned in its current pre-application interactions. The NRC is currently engaged in comprehensive and detailed pre-application interactions in preparation for DC applications for small modular reactors. These efforts are primarily to support the development of design specific review guidance for small modular reactors that will inform content of the applications and enhance review efficiency. The staff is also engaged in detailed pre-application interactions with the Korea Hydro and Nuclear Power, in preparation for an anticipated application for certification of the APR1400 large light water reactor design in calendar year 2013.

Acceptance Review Process

The NRC conducts acceptance reviews to ensure that the application is complete and of high quality before the NRC staff begins its detailed technical review. Acceptance reviews are conducted in accordance with the guidance in Office Instruction NRO-REG-100, "Acceptance Review Process for Design Certification and Combined License Applications," (Reference 20). A robust and detailed acceptance review can identify challenging review areas early in the licensing process. This helps both staff and applicants to identify areas that warrant additional focus and resources, and supports the establishment of a predictable and stable review schedule. At the conclusion of the acceptance review, a determination is made to accept the application for docketing, or not. In some cases, the NRC determined that a new reactor application was acceptable for docketing, notwithstanding numerous deficiencies that were identified in the application that prevented the NRC from establishing a review schedule at the time of docketing. While this approach was deemed the best course of action at the time so the staff could begin to review the initial wave of COL applications, this ultimately led to significant challenges in conducting these reviews in an efficient manner and contributed to prolonged review schedules. The staff plans to adhere more strictly to acceptance review guidance for future applications to avoid these challenges in the future.

Guidance on Level of Detail

Feedback from stakeholders indicated ambiguity about the level of detail needed in order for an application to be docketed. As discussed in NRO-REG-100, the NRC staff uses Regulatory Guide 1.206 (Reference 21), which provides guidance on the standard format and content of COL applications, and the review guidance in NUREG-0800, the Standard Review Plan (Reference 22) and NUREG-1555, the Environmental Standard Review Plan (Reference 23). The information required to docket an application must be sufficient for the staff to conduct its review. Currently, the NRC staff is reviewing its acceptance review guidance in NRO-REG-100 for potential clarifications and enhancements to better differentiate what level of detail is acceptable for docketing. The staff also believes it is beneficial to update Regulatory Guide 1.206, the Standard Review Plan, and the Environmental Standard Review Plan to address ambiguity in the level of detail that the NRC considers sufficient to meet the NRC's regulations. In the interim, applicants can enhance the efficiency of a review by modeling their application to address issues at the level of detail included in previous certified designs and previous authorized ESPs and COLs.

Lesson 2: New Reactor Review Guidance

Stakeholders emphasized the importance of developing and maintaining regulatory guidance as a key factor in successful implementation of the licensing process. Some feedback indicated that the NRC should be more proactive rather than reactive in developing and issuing guidance to address emergent issues to support an effective and efficient licensing process. The staff agrees with this comment.

In fact, to support the anticipated submittal of new reactor license applications, in 2007 the NRC issued a comprehensive update to the Standard Review Plan. This was the first comprehensive update to the Standard Review Plan since 1981. In addition, in 2007 the NRC issued Regulatory Guide 1.206 to provide guidance on information to be submitted in a COL application. NRC development of Regulatory Guide 1.206 and the update to the Standard Review Plan were resource intensive and comprehensive. This interoffice effort included extensive outreach through numerous public workshops. The NRC had previously developed guidance to support the reviews of ESP applications (Reference 24). In addition, a major update to the Part 52 regulations (Reference 25) was processed at the same time. Stakeholders noted the challenges that both the NRC staff and industry faced with the development and issuance of new and revised guidance, at the same time that the first wave of COL applications was being prepared for submittal; but recognized that the communications, public interaction, and outreach during the development of the new

reactor licensing regulatory infrastructure was helpful in facilitating effective implementation of the new licensing process. Both internal and external stakeholders credited the issuance of Regulatory Guide 1.206 and the comprehensive updates to the Standard Review Plan and Part 52 in 2007 as major accomplishments that helped facilitate application submittals that were of sufficient quality and completeness to begin NRC application reviews.

Subsequent to the updates to the Standard Review Plan and Part 52 in 2007, the staff recognized the need to ensure that guidance was developed or revised in a timely manner when new technical issues arose during the reviews. To address this need, NRC issued several interim staff guidance (ISG) documents. The ISGs will be incorporated into the Standard Review Plan or Regulatory Guides, as applicable, as time and resources allow. Examples of ISGs that were issued to provide timely guidance include the following:

- DC/COL-ISG-1, Interim Staff Guidance on Seismic Issues of High Frequency Ground Motion
- DC/COL-ISG-7, Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures
- DC/COL-ISG-015, Post-Combined License Commitments

A complete listing of the DC/COL/ISGs may be found on the NRC's public Web page: <http://www.nrc.gov/reading-rm/doc-collections/isg/col-app-design-cert.html>.

For digital instrumentation and control systems, the staff also developed and issued several ISG documents to provide additional guidance on new issues associated with application of digital technology in new reactor design. Examples of ISGs applicable for new reactors include the following:

- DI&C-ISG-02, Diversity and Defense-in-depth Issues
- DI&C-ISG-04, Highly-Integrated Control Rooms – Communications Issues
- DI&C-ISG-05, Highly-Integrated Control Rooms – Human Factors Issues

DI&C-ISG-02 has already been incorporated into Revision 6 of Standard Review Plan Branch Technical Position 7-19, and other ISGs are to be incorporated into the formal staff guidance. These digital instrumentation and control ISGs are listed on the NRC's public

Web page: <http://www.nrc.gov/reading-rm/doc-collections/isg/digital-instrumentation-ctrl.html>.

The staff also recognized that a process was needed to address new regulatory requirements that arose during reviews. The most significant examples encountered during the licensing process were the new requirements put in place following the accident at Fukushima. In SECY-12-0069, "Process for Addressing Late-Breaking Issues during a Combined License Application Review," dated May 4, 2012, the staff proposed a process to address post-Fukushima requirements and other "late-breaking" issues at various stages during the COL review process. In its Staff Requirements Memorandum, the Commission approved the staff's proposed approach and stated that the staff should strive to raise new issues before the completion of the mandatory hearing in order to afford applicants and other potential interested parties the greatest opportunity to provide comment.

It should be noted that applicants are required to meet all applicable regulations in effect at the time of DC, and at the time of issuance of the license or permit for COLs and ESPs. Therefore, it is prudent for the staff and applicants to be forward-thinking and proactive in addressing emerging technical and regulatory issues as they arise during the review process to avoid or mitigate schedule impacts. For example, new regulatory guidance and generic communications should be promptly evaluated by the NRC staff to ensure that when new guidance is being created to address new requirements, the guidance is clear about how it pertains specifically to new reactor applications.

Going forward, the staff continues its commitment to a continuous, on-going effort to update guidance. For example, several Standard Review Plan sections have been updated since 2007, including the following:

- Standard Review Plan 2.5.4, Stability of Subsurface Materials and Foundations, Revision 4, May 2010
- Branch Technical Position 7-19, Guidance for Evaluation of Diversity and Defense-in-Depth in Digital Computer-Based Instrumentation and Control Systems, Revision 6, July 2012
- Standard Review Plan 13.6.6, Cyber Security Plan, Revision 0, November 2010 (Initial issuance)
- Standard Review Plan 13.6.1, Physical Security – Combined License and Operating Reactors, Revision 1, October 2010

- Standard Review Plan 13.6.2, Physical Security – Design Certification, Revision 1, October 2010

The current version of all Standard Review Plan Sections may be found on the NRC’s public Web page: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0800/>.

The NRC staff is in the process of revising a significant number of Standard Review Plan sections to incorporate lessons learned from completed licensing reviews and to reflect guidance for the new regulatory requirements. The staff is focusing its guidance development efforts on review areas in which a significant number of complex requests for additional information (RAIs) have been needed, review areas that are typically a critical path on the review schedule, and areas that have needed more staff resources than anticipated.

As one example, the areas of seismic analysis and structural (addressed in Standard Review Plan Sections 3.7 and 3.8) have proven to be challenging reviews. During the reviews of recent DC and COL applications, the NRC staff identified a number of significant issues related to seismic analysis and structural design that required the applicants to submit additional information. These reviews also tended to be resource intensive and a critical path on the review schedule. The lessons learned from these reviews were used to identify 11 key technical areas related to seismic analysis and structural designs in which the NRC staff guidance in Standard Review Plan Sections 3.7 and 3.8 could be improved to facilitate a more effective and efficient review process for future applications. The enhanced review guidance is intended to clarify the technical issues and staff expectations, and ensure a more uniform review process. The draft revision to seismic and structural review guidance was published for use and comment in February 2013 (Reference 26).

In addition, Standard Review Plan sections in several other technical areas also have been revised to incorporate lessons learned and were recently issued for public comment, including Standard Review Plan Chapter 12, “Radiation Protection” and Standard Review Plan Section 19.0, “Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors.” New Standard Review Plan Section 19.3, “Regulatory Treatment of Non-Safety Systems for Passive Advanced Light Water Reactors,” was issued to incorporate lessons learned from the review of the Economic Simplified Boiling-Water Reactor and AP 1000 advanced passive reactor designs to support future reviews of small modular reactor designs incorporating passive features. New Standard Review Plan Section 19.5, “Adequacy of Design Features and Functional Capabilities Identified and Described for Withstanding Aircraft Impacts,” was issued to provide review guidance to address the requirements of 10 CFR 50.150, “Aircraft Impact Assessment,” and to reflect staff

experience with completed reviews. Further, a significant number of additional Standard Review Plan sections are scheduled to be issued this calendar year, including Standard Review Plan Sections 2.5.1 through 2.5.5, regarding site seismology and geology; Standard Review Plan Chapter 11, “Radioactive Waste Management;” Standard Review Plan Section 14.3, “Inspections, Tests, Analyses, and Acceptance Criteria;” Standard Review Plan Chapter 18, “Human Factors Engineering;” and new Standard Review Plan Section 19.4, “Loss of Large Area due to Explosions and Fire;” addressing the requirements of 10 CFR 50.54 (h)(h)(2). The NRC plans to continue to develop Standard Review Plan updates to support future applications reviews, including the APR1400 and small modular reactor designs, consistent with budgeted resources.

As a significant new initiative, the NRC has embarked on an effort to incorporate design-specific risk insights and lessons learned from the reviews of large light water reactors and apply these to future reviews of small modular reactors to make them more effective and efficient. To implement these insights and lessons learned, the NRC is developing design specific review standards for staff review of two anticipated small modular reactor DC applications². These review standards will incorporate the lessons learned from staff reviews of both active and passive plant designs and provide greater focus on structures, systems, and components that perform significant functions important to minimizing the accident risk and ensuring plant safety.

For example, in Chapter 7 of the mPower design specific review standard (Reference 27), the NRC incorporated key lessons learned with completed and ongoing reviews of digital instrumentation and control systems. All of the new reactor designs, such as AP1000, U.S. Evolutionary Power Reactor, Economic Simplified Boiling-Water Reactor, and the U.S. Advanced Pressurized-Water Reactor, contain highly-integrated and complex digital instrumentation and control systems and present issues that are not relevant to analog systems. The staff’s licensing reviews to determine the safety of these digital instrumentation and control systems have been resource-intensive and challenging. These reviews have often been on or near a critical path for each of the projects. To address the significant lessons learned from these reviews, the staff undertook an innovative, integrated approach to develop design specific review standards that will allow future review to be more effective and efficient. This integrated approach contributes to the

² The NRC is currently in pre-application discussions with Generation mPower, LLC on their mPower™ small modular reactor design and NuScale Power on their small modular reactor design. The NRC plans to issue design specific review standards for each these small modular reactor designs prior to expected submittal date of the DC applications.

efficiency of the staff reviews by facilitating the timely identification and resolution of the key safety issues involving digital instrumentation and control systems, and enhances the safety focus of the reviews by emphasizing the safety-significant aspects of the design. As one example, in the challenging area of communication independence, the guidance provides greater clarity with respect to the review steps and acceptance criteria. These modifications are intended to discourage unnecessary complexity by encouraging simpler designs with less interdivisional communications. Another example is that the guidance is restructured so that fundamental design principles for instrumentation and control design (e.g., redundancy, independence, and diversity and defense-in-depth), are explicitly discussed to focus the staff's review. As experience is gained with using this new guidance, the NRC staff plans to apply the guidance more broadly to other new reactor application reviews.

As discussed above, the NRC staff has made good progress on updating the Standard Review Plan. Feedback from stakeholders indicates that the NRC should also update Regulatory Guide 1.206 to be consistent with the updated Standard Review Plan information and to incorporate the review experience. The staff agrees this would be beneficial and will also consider the insights from RAIs issued and RAI responses to inform the update. Such an update could help reduce the number of future RAIs. The staff plans to proceed with an update to Regulatory Guide 1.206, consistent with budgeted resources.

With regard to environmental reviews, there are a number of initiatives that are being considered or underway to update and enhance guidance. For example, the NRC plans to issue two environmental ISGs in calendar year 2013, one to clarify the guidance in the Environmental Standard Review Plan to incorporate lessons learned from completed reviews, and another to clarify the guidance as applied to environmental reviews for licensing applications for small modular reactors. While portions of the Environmental Standard Review Plan were updated in 2007, many sections have not been updated since 2000. Consequently, a full update is needed to incorporate changes in review methods and numerous lessons learned over the past several years. Progress in updating the Environmental Standard Review Plan has been limited due to competing priorities and resource availability.

The NRC also plans to update regulatory guides associated with the environmental reviews to incorporate lessons learned, specifically Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," which provides format and content guidance for environmental reports, and Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations," which provides specific technical guidance for determining the suitability of sites for the construction and operation of nuclear power

stations. The NRC plans to proceed with environmental review guidance updates, consistent with budgeted resources.

In addition to NRC's review guidance, the interactions between NRC and the other agencies with a role in the overall regulatory process could be enhanced. There are numerous other Federal and State regulatory agencies from which a COL or ESP applicant must receive regulatory approval, in addition to the requested NRC license or permit. Experience with the environmental review process has shown that applicants should resolve issues with other Federal and State permitting agencies early in the project development process, so that an issue with another regulatory agency does not cause a delay in the NRC's review. For example, for sites where building the facility may involve impacts to wetlands that require a permit from the U.S. Army Corps of Engineers (USACE), the USACE may require an applicant to demonstrate that its proposal is the Least Environmentally Damaging Practicable Alternative (LEDPA). Applicants should ideally consider the USACE's LEDPA requirements concurrent with preparing their environmental report as part of a COL or ESP application. Doing so will help ensure that an applicant's assessment of potential environmental impacts will meet both NRC and USACE requirements. In light of these concerns, the NRC has worked with industry and other Federal and State agencies to develop guidance for potential applicants. As a result of these interactions, the industry has developed NEI 10-07, Revision 1 (Reference 28) to provide guidance to industry. The staff held two public meetings with other Federal and State agencies to help inform the guidance. The agencies involved included the U.S. Environmental Protection Agency, USACE, U.S. Fish and Wildlife Services, Bureau of Land Reclamation, Advisory Council on Historic Preservation, and the Commonwealth of Virginia.

Lesson 3: Standardization

The DC process is designed to reduce licensing uncertainty by resolving design issues early in the licensing process and to facilitate standardization of future plants. To execute an effective and efficient review of multiple license applications referencing the same certified design, the NRC developed an implementation strategy that leveraged design standardization consistent with Commission policy. This implementation strategy is called the design-centered review approach and is based on a concept of industry standardization of COL applications referencing the same standard design. This approach uses, to the maximum extent practical, a "one issue, one review, one position–multiple applications" strategy. That is, for any given technical, policy, or regulatory issue, the NRC will review that issue one time and develop a single position. That position can then be applied across all COL applications within a design center, as applicable, without requiring further review by the NRC staff.

Standardization of COL information through the implementation of the design-centered review approach was a major factor that made implementation of Part 52 possible when regulations, guidance, and processes were under development. This approach also added efficiency to the licensing process. Stakeholders frequently cited this practice as particularly effective and regarded it as instrumental in the success of COL reviews.

Stakeholders further indicated that the design-centered working groups that were established to support the design-centered review approach were effective in communicating and identifying issues early and resolving them within the established review schedule. Stakeholders mutually agreed on the effectiveness of the design-centered working groups and regarded it as a major factor in the success of the licensing process, so much so that it was suggested that the concept be a mandatory element of the licensing process. Also, because of its efficiency and prominent role in issue resolution, the design-centered working group concept can be expanded to address common technical issues to ensure consistency across different design centers. The staff agrees and continues to encourage the application of the design-centered review approach to certification and licensing reviews.

One difficulty the staff encountered was the number of requests for substantial design changes initiated by DC and COL applicants during the application review process. In these cases, the NRC staff has to re-review portions of the DC application, thus causing schedule delays and reducing review efficiency. Feedback also indicated that changes to the site-specific content in COL and ESP applications during ongoing application reviews can result in schedule delays and inefficiencies.

Stakeholders commonly recognized that a “freeze point” in the design proposed in the DC, COL, or ESP application needs to be established, such that the NRC staff can perform its review efficiently and on a predictable schedule. Ideally, the design would be frozen before submittal to the NRC for review. Recognizing that this is not always achievable, minimizing changes after submittal of an application substantially increases the effectiveness and efficiency of the review. To provide guidance in this area, ISG-11, “Finalizing Licensing-Basis Information,” (Reference 29) outlines a differentiation between the types of changes that must be made before certification or licensing and the types of changes that could be deferred until after certification or licensing. Feedback indicated that ISG-11 guidance could be further clarified. The NRC plans to evaluate the implementation of ISG-11 and determine if additional guidance is warranted.

Lesson 4: Identification and Resolution of Technical Issues

When the staff receives a DC, ESP, or COL application, an acceptance review is conducted to determine if the application is sufficiently complete for the staff to begin its review. If the application is accepted, a baseline review schedule is developed. That schedule is predicated on general expectations for the complexity of the review and on anticipated time for the applicant to respond to RAIs from the staff.

Experience with the reviews that have been conducted shows that the staff identifies issues of varying complexity; some are simple clarifications, while others raise specific and detailed issues. Applicant responses to RAIs on simple to moderately complex issues generally are provided in the 30-day response time the staff anticipated in developing the review schedule. However, some of the complex issues, and resulting complex RAIs, may require detailed analysis or testing to resolve and have led to changes in the design. The time needed for an applicant to address complex issues and RAIs can significantly exceed the anticipated 30-day response time, which adversely affected the overall schedule for some reviews.

The staff and industry have developed and applied best practices to address complex RAIs, and thereby minimize adverse schedule impacts. For example, the staff may issue draft RAIs before the final RAIs are issued to ensure a common understanding of the additional information being requested and the reason. The NRC staff may also hold public meetings with the applicant to discuss, in depth, difficult technical issues in an effort to resolve them in a timely manner. Stakeholders indicated another best practice the NRC uses to ensure that the staff understands the documentation supporting the application, which can facilitate the staff's review of complex issues, is the conduct of audits. Despite the preceding actions, resolution of complex issues and the associated RAIs still presents significant challenges. These challenges are often exacerbated when multiple rounds of RAIs and responses result in little progress toward resolution. One lesson learned from the RAI and issue resolution experience is that both the staff and applicant need to identify issues as early as possible and elevate them expeditiously, openly, and candidly so that the root cause of the disagreement can be identified and addressed. When applicant response to an RAI does not lead to resolution, NRC division management will hold a meeting with the applicant to help bring closure or mutual agreement to the issue. The NRC staff plans to update its internal guidance to more quickly identify these complex issues, and engage higher levels of NRC and applicant management to resolve these disagreements and to bring about timely resolution.

Another aspect of technical issue resolution identified in industry feedback was the level of detail the NRC staff requested to reach its safety conclusions. The feedback indicated that in some cases, the industry felt that the NRC staff requested applicants to provide more information than was necessary to support the safety finding. Thus, there is the potential for more information to be included in the licensing basis (e.g. in the design control document or final safety analysis report) than is required to support the staff's safety findings. A concern was expressed that the level of detail in the AP1000 design control document may necessitate changes to the licensing basis as the detailed design is completed and construction proceeds for the COLs. According to these industry commenters, determining the appropriate balance between the level of detail required for the NRC to reach safety conclusions (to allow design certification or license issuance and to achieve the finality and standardization contemplated by Part 52) and the flexibility to make changes during construction continues to be a challenge. Recent experience with the construction of the AP1000 reactor at the Vogtle and Summer sites indicate there is some merit to this comment. Such an example is the identification of a specific weld configuration to connect components of the steel-concrete composite modules. The relevant characteristic of the weld in this condition is the capacity, which would be achieved by selecting a weld type. Several weld configurations could be documented in the field. The issue of necessary level of detail will be considered during the NRC staff's guidance development efforts, particularly with respect to updating Regulatory Guide 1.206, discussed above in Lesson 2. In addition, the staff will incorporate post-COL implementation enhancements that are identified as part of the staff's ongoing self-assessment, into a proposed rulemaking activity as appropriate.

The staff believes that the primary issues causing schedule and resource problems have been due to application quality, completeness and level of detail, and technical issue resolution, and are not specifically due to Part 52 license process issues. Complex technical issues and evolving-technology issues (e.g., seismic, structural, and digital instrumentation and control) are being addressed under separate initiatives, such as the Standard Review Plan updates described under Lesson 2.

Lesson 5: Knowledge Management

The NRC established the design-centered review approach to make the reviews of COL applications that reference the same standard design more efficient and effective. One result of design-centered review approach implementation is the standardization of common COL information. This approach leads to efficiency in reviews.

In the past, there were instances where the staff issued RAIs that were duplicative or not relevant to a specific design center, and so proved unnecessary for the particular recipient. This required expenditure of unnecessary resources but did not result in appreciable schedule impacts. A process to ensure consistency across design centers and, more importantly, maintain project knowledge for future applications would be beneficial. In 2007 the staff developed an RAI management system in anticipation of the large number of applications expected. This system is also a database that has searching and reporting capabilities that allow reviewers to see prior questions that have been asked on the same section of the regulation. While the current system has some search capability, it is limited, and the NRC is exploring upgrades to the system to improve this feature.

The NRC's RAI system was recently upgraded to add features to assist with project knowledge management, including enhanced capabilities to monitor and track the status of RAIs. From the initiation of an RAI through its closure, there can be significant interaction between the NRC staff and applicant. It is essential for the staff and the applicant to have accurate and timely information regarding RAI status to facilitate timely resolution. The NRC recognized this as an area in need of improvement and recently formed an internal working group to examine how the NRC staff ensures RAIs are tracked consistently across design centers and that timely information about RAIs is communicated to applicants and management.

Feedback also indicated that the NRC's RAI system was not being used for environmental reviews to capture and track environmental RAIs. Recently, the NRC adopted the RAI process for environmental reviews, including the Levy and Bell Bend COL applications, and plans to follow this practice for future reviews.

The broader subject of knowledge management has been recognized to be a continuing challenge. This is particularly true in highly specialized technical areas where a limited set of experts are available within and outside the agency. For example, the NRC has a limited number of reviewers for seismic margins assessments, as supplemented by contractor support. This can contribute to delays in resolving difficult technical issues. The NRC is evaluating this and other key review areas, where it would be prudent to develop more staff expertise in order to support parallel application reviews. The NRC is also taking actions to transfer knowledge from senior staff before they leave the agency. As an example, the NRC has conducted several knowledge management seminars with senior environmental review staff. It is important that such actions be considered by the industry as well to address limited technical resources.

Lesson 6: Application Timing and Sequencing

Concurrent DC and COL Reviews

To maximize the benefits of standardization and issue finality available under Part 52, a COL application should reference a certified design. However, most COL applicants have submitted applications referencing DC applications or DC amendment applications that are still under NRC review. Feedback indicated both benefits and challenges to this approach. It maximizes the ability to address issues generically in the DC thus enhancing design standardization and minimizing subsequent departures during COL reviews. However, feedback indicated that difficulties can arise if the first application referencing a particular design is submitted too quickly after the DC application is submitted. Subsequent changes to the standard design resulting from the review have required the COL applicant to supplement its COL application to a greater degree than the applicant expected during the review process, resulting in schedule impacts and increased costs. In summary, the Part 52 licensing process allows for concurrent reviews. While this may incur some inefficiencies, there may be situations where the benefits outweigh the challenges.

Commencement of Design Certification Rulemaking

Experience with DC rulemakings, such as the originally certified AP1000, indicated that some schedule efficiencies could be gained in the rulemaking process. To address this, the DC rulemaking process was streamlined in 2009 to reduce the nominal 24-month rulemaking process to 12.5 months and to initiate the rulemaking earlier in the review process (Reference 30). This shorter duration and earlier start were based on a number of assumptions, including that all design issues would be resolved and no design changes would be initiated after the rulemaking process is started.

More recent experience has indicated that initiating the rulemaking process too early in the DC review can result in rework and schedule delays. For example, in an attempt to gain further schedule efficiencies, the rulemaking process for the AP1000 DC amendment began when some significant open items remained. There also were a number of “confirmatory items” for which final resolution had not been completed. Following publication of the proposed rule, the staff concluded that these items required evaluation beyond simple confirmation. In addition, the applicant submitted analysis changes that required additional review. The need for additional staff evaluation of such issues added to the complexity of moving from the proposed to final rules.

While other application-specific factors such as the unusually high volume of public comments also contributed to delays in the schedule, the AP1000 amendment rulemaking took 17 months to complete. This was, in part, due to ongoing review of design changes and associated RAI resolution, some of which were due to errors identified by the applicant after publication of the proposed rule for public comment. The staff continues to believe that completion of a final rule is possible in 12.5 months if all assumptions for the streamlined process are adhered to, including ensuring that all design issues have been resolved before the rulemaking begins. Accordingly, the NRC has scheduled future DC rulemakings in accordance with this approach.

Lesson 7: Updates to Regulations

The NRC updated Part 52 in 2007 to incorporate enhancements that were the result of lessons learned during DC and ESP reviews and stakeholder discussions about the ESP, DC, and COL review processes. For example, one key change included in the 2007 rulemaking was to include a DC amendment process. This process was provided to enhance standardization by further completing or correcting the certification information. This process allows an amendment to the DC notwithstanding otherwise applicable backfitting standards if, for example, the amendment (1) reduces unnecessary regulatory burden and maintains protection to public health and safety and common defense and security; (2) provides the detailed design information necessary to resolve selected design acceptance criteria; (3) corrects material errors in the certification information; (4) substantially increases overall safety, reliability, or security of a facility, and the costs of the change are justified in view of that increase; or (5) contributes to increased standardization of the certification information.

During this same timeframe, the NRC also redefined construction by amending its regulations applicable to limited work authorizations (LWAs) (Reference 31) to clarify that certain activities associated with site development for production and utilization facilities are not defined as “construction” and therefore do not require NRC authorization, so they may commence before a construction permit or COL is issued. As a result of Commission direction that nuclear power plant designers take into account the potential effects of the impact of a large, commercial aircraft, the NRC issued regulations on aircraft impacts in 2009 (Reference 32).

Since the issuance of the 2007 Part 52 rule update, NRC staff has been gathering corrections, clarifications, and other potential enhancements to the regulations in Part 52 and associated requirements. This effort was further informed by stakeholder feedback

obtained as part of this lessons learned effort. Examples of possible enhancements to regulations include:

- Consider adding a process to allow changes in the information contained in an LWA. A process similar to that provided in 10 CFR 50.59, “Changes, Tests, and Experiments,” for changes not requiring prior NRC approval and 10 CFR 50.90, “Application for Amendment of License, Construction Permit, or Early Site Permit,” for license amendments is envisioned.
- Consider a change to the 10 CFR Part 73, “Physical Protection of Plants and Materials,” requirements, particularly as they apply to holders of a COL. The 2009 revision to 10 CFR Part 73 (i.e., 10 CFR 73.55(b)(4)) requires operating reactor security programs be implemented before receiving unirradiated fuel within the protected area. For a COL holder, this may impose an unnecessary burden because the possession and storage of unirradiated fuel is no different in radiological hazards or risks from a license issued under 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material.” Therefore, the staff would revise Part 73 (3) to better align Part 52 licensing requirements to those in Part 50 which currently requires a holder of a construction permit to meet the 10 CFR Part 70 requirements for receipt of fuel on site and the Part 73 requirements for protecting a nuclear power reactor are implemented prior to receiving the operating license (i.e., just prior to irradiating fuel).

In addition, the staff will incorporate post-COL implementation enhancements that are identified as part of the staff’s ongoing self-assessment, into a proposed rulemaking activity as appropriate.

Lastly, the staff is preparing a notation-vote paper for Commission consideration of potential policy options relating to the NRC’s requirements and process for evaluating the financial qualifications for merchant plant COL applicants. Industry representatives have asserted that it is difficult, if not impossible, for merchant plant COL applicants to secure project funding to meet the financial qualifications requirements in advance of initial license issuance. The staff will describe various licensing approaches and discuss the benefits and challenges of those approaches for addressing financial qualifications for merchant plant COL applicants.

The staff plans to communicate appropriate regulatory enhancements to the Commission along with a proposed rulemaking plan to obtain Commission approval to move forward with an update to Part 52 and associated regulations. The staff recognizes that the time

required to complete rulemaking would not support having a final rule in place in time to support development of future Part 52 applications including the anticipated small modular reactor and APR1400 applications. However, engaging the public and interested stakeholders in dialogue regarding these potential enhancements and moving forward with potential rulemaking are important steps in making the new reactor licensing process more effective and efficient. Further, through early interactions with stakeholders during the regulatory basis development, future applicants will be fully informed of any potential regulatory changes.

IV. PATH FORWARD AND SUMMARY

Although DC and COL reviews have taken longer and have been more technically challenging than anticipated, the results of this lessons learned review revealed no significant problems or impediments associated with the Part 52 licensing process itself. The first-time implementation of the licensing process has resulted in challenges, as expected with any new process. Feedback indicated that many lessons have already been learned and applied, and best practices implemented. This lessons learned effort identified further enhancements that could be taken to address remaining challenges; these actions are listed below. The staff intends to assess the resource needs of the suggested actions and will address these needs through the Planning, Budgeting and Performance Management process.

1. Quality of Applications

- The NRC staff plans to review its acceptance review guidance to identify areas in need of enhancement.
- The NRC staff plans to adhere more strictly to acceptance review criteria for future applications.
- The NRC staff plans to engage future applicants with regards to the best timing for pre-application audits. The audits will evaluate the level of detail of the application to ensure consistency with lessons-learned in reviews since 2006.

2. New Reactor Review Guidance

- The NRC staff plans to update Regulatory Guide 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” consistent with budgeted resources.
- The NRC staff will consider establishing a process for synchronizing updates to Regulatory Guide 1.206 with updates to the Standard Review Plan. The NRC staff will consider reorganizing Regulatory Guide 1.206 to be more consistent with the organization of the Standard Review Plan. The NRC staff will also incorporate review experience by considering the results of commonly asked RAIs and their respective responses when Regulatory Guide 1.206 is updated.
- The NRC staff plans to continue its systematic Standard Review Plan update, consistent with budgeted resources, in a timely manner to support COL, DC, ESP, and limited work authorization application reviews.
- The NRC staff plans to proceed with environmental review guidance updates, consistent with budgeted resources.

3. Standardization

- The NRC staff plans to review ISG-11, “Finalizing Licensing-Basis Information,” to identify areas in need of enhancement.
- The NRC staff plans to work with industry to expand the design-centered working group role to address common technical issues to ensure consistency across different design centers.

4. Identification and Resolution of Technical Issues

- The NRC staff plans to update its staff guidance to ensure consistent use of best practices that facilitate timely resolution of complex technical issues and to more quickly engage higher levels of NRC and applicant management, when necessary, to resolve complex technical issues.
- The NRC staff plans to continue to engage stakeholders, including vendors, standards organizations, and other regulatory bodies on complex and evolving technologies to enhance safety while streamlining the review process.

5. Knowledge Management

- The NRC staff plans to enhance its RAI management system to improve search capability, consistent with budgeted resources.
- The NRC staff plans to continue to examine its RAI process to ensure that RAIs are tracked consistently across design centers and information is communicated to applicants and management in a timely fashion.

6. Application Timing and Sequencing

- The NRC staff plans to apply the rulemaking process for future design certifications consistent with the 2009 streamlined approach, in which all design issues have been resolved before rulemaking begins.

7. Updates to Regulations

- Although this lessons learned effort did not identify any significant problems or impediments with the Part 52 licensing process, it has identified areas that could be enhanced. In fact, the staff has been identifying and collecting ideas for improvements since the 2007 Part 52 update. The NRC staff plans to communicate potential regulatory enhancements to the Commission along with a proposed rulemaking plan to obtain Commission approval to move forward with an update to Part 52 and associated regulations.

In addition to the Part 52 process, the staff has identified technical topics that will be the subject of continuing attention. Issues of high technical complexity (e.g., seismic and structural issues), evolving technologies (e.g., digital I&C applications), and policy matters (e.g., financial qualifications) are among those that warrant the focus of NRC, applicants, and other external organizations to achieve desired improvements in Part 52 implementation.

One area that would require only minimal resources, but have the potential for substantial benefits to the licensing process, is a continued commitment by all parties to communicate more effectively. Even in the most challenging of circumstances, issues were most efficiently resolved when the NRC staff and applicants engaged in open, transparent, and timely communications. Effective communications, more than any other action, has led to successful implementation of the Part 52 licensing process.

Appendix A—New Reactor Licensing Process

Early Site Permit

An early site permit (ESP) approves a site for one or more nuclear power facilities separate from the filing of an application for a construction permit or combined license (COL), providing early resolution and finality for siting issues. ESP requirements are contained in Subpart A, “Early Site Permits,” to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, “License, Certifications, and Approvals for Nuclear Power Plants.” In reviewing an ESP application, the staff addresses site-safety issues, environmental issues, and plans for coping with emergencies, independent of the specific nuclear plant design review. ESPs are valid for 10 to 20 years and can be renewed for an additional 10 to 20 years. The NRC staff has issued ESPs for the Clinton, Grand Gulf, Vogtle, and North Anna sites. One ESP application is under NRC review for the Salem/Hope Creek site.

Limited Work Authorization

A limited work authorization (LWA) is a part of the licensing process that provides Commission approval to perform a limited and defined set of construction activities on production and utilization facilities before a COL or construction permit (CP) for the facility is issued. The LWA rule is not specific to 10 CFR Part 52; the applicable definitions and safety provisions are contained in 10 CFR 50.10, “License Required: Limited Work Authorization,” which includes provisions for new reactor license applicants. An LWA application may be submitted in conjunction with an ESP or COL application (or a CP application under 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities”), or in advance of the CP or COL application under 10 CFR 50.10(d)(2). Those applications address the proposed LWA scope of work. Per 10 CFR Part 51, an LWA is a major Federal action that requires the staff to prepare an environmental impact statement. The interim staff guidance document COL/ESP-ISG-004, “Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations,” dated February 23, 2009, provides guidance related to LWAs including the definition of construction, preconstruction activities, and those activities that require prior NRC approval. LWAs under the current rule have been granted for Vogtle Units 3 and 4.

Design Certification

The design certification (DC) process allows an applicant to obtain Commission approval of a design through rulemaking. For COL applicants, referencing a certified design reduces licensing uncertainty by resolving design issues generically, outside the scope of the COL review. It also facilitates standardization of future plants. The requirements for DCs are contained in Subpart B, “Standard Design Certifications,” of 10 CFR Part 52. The review of a

standard design is focused on ensuring that the design is safe as a result of compliance with the Commission's regulations. The DC review does not address site-specific design features, operational programs, and environmental impacts of building the design at a particular site. The process for a DC concludes with a rulemaking. Once issued, a DC is valid for 15 years. The Commission recently certified the amended AP1000 and advanced boiling-water reactor designs. The Commission previously certified the System 80+ and AP600 designs. The Economic Simplified Boiling-Water Reactor, U.S. Evolutionary Power Reactor and U.S. Advanced Pressurized-Water Reactor DC applications currently are under NRC review.

Combined License

A combined license (COL) is a combined construction permit and conditional operating license. The requirements for a COL are contained in Subpart C, "Combined Licenses," of 10 CFR Part 52. It authorizes both construction and operation of a new nuclear power facility. A COL application can reference an ESP, a certified design, both, or neither, as long as it addresses all applicable requirements and provides sufficient information for the review. Per 10 CFR Part 51, issuance of a COL is a major Federal action that requires the staff to prepare an environmental impact statement. To date, four COLs have been issued for Vogtle, Units 2 and 3, and V.C. Summer, Units 3 and 4. Several additional COL applications currently are under NRC review.

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July 22, 2013

MEMORANDUM TO: Glenn M. Tracy, Director
Office of New Reactors

FROM: James Luehman, Deputy Director **/RA/**
Division of Construction Inspection
and Operational Programs
Office of New Reactors

SUBJECT: POST-COMBINED LICENSE PART 52 IMPLEMENTATION
SELF-ASSESSMENT WORKING GROUP REPORT

The internal communication plan associated with the Post-Combined License of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52 Implementation Self-Assessment Review Report has been completed and the report, which is enclosed, will be made public on the NRC's Agencywide Documents Access and Management System under Accession No. ML13196A403. Issuance of the report concludes the working group's actions under its charter.

Enclosure:
10 CFR Part Implementation Self-Assessment
Review Report

cc: M. Johnson, EDO
V. McCree, Region II
M. Doane, OGC
R. Zimmerman, OE

Contact: Phil O'Bryan, NRO/DCIP
910-399-5393

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ADAMS ACCESSION No.: ML13196A403

NRO-002

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**TITLE 10 OF THE CODE OF FEDERAL
REGULATIONS PART 52 IMPLEMENTATION
SELF-ASSESSMENT REVIEW:
1 YEAR POST-COMBINED LICENSE ISSUANCE**

July 2013

Executive Summary

The U.S. Nuclear Regulatory Commission (NRC) issued the first combined licenses (COL) to Vogtle, Units 3 and 4, on February 10, 2012, and to V. C. Summer, Units 2 and 3, on March 30, 2012. Approximately 1 year after the issuance of these licenses, the NRC initiated a series of self-assessment reviews to identify potential enhancements to the regulatory processes of Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52. This self-assessment review complements a number of other broad programmatic assessments such as the “New Reactor Licensing Process Lessons Learned Review: 10 CFR 52,” (available on the NRC’s Agencywide Documents Access and Management System (ADAMS) using Accession No. ML13059A239) and SECY-13-0042, “Construction Reactor Oversight Process (cROP) Self-Assessment for Calendar Year 2012,” (ADAMS Accession No. ML13045A462).

To facilitate this review, the post-combined license 10 CFR Part 52 implementation self-assessment working group (WG) conducted an extensive outreach effort to solicit feedback from external and internal stakeholders. Specifically, the WG conducted interviews with over seventy current or former NRC staff, held three public meetings, and separately contacted several members of the public with interest in construction activities at the Vogtle and V. C. Summer sites. The WG performed an in-depth review of actions taken by the NRC staff following issuance of the COLs at Vogtle, Units 3 and 4, and V. C. Summer, Units 2 and 3. The WG concludes that: (1) the NRC staff carried out its implementation of post-COL oversight with safety as its primary focus, (2) most aspects of Part 52 implementation were performed effectively and efficiently, (3) those conclusions were confirmed in each area that the WG reviewed, and (4) a few areas would benefit from recommended enhancements.

The WG’s suggested enhancements are drawn from a limited set of licensing and inspection activities taken over a short time period for only two licensees and should be evaluated in that context. In addition, the WG’s review was limited to actions taken by the NRC staff and did not have the benefit of any formal self-assessments or lessons-learned reviews performed by the nuclear industry and, in particular, the licensees.

Noteworthy examples of NRC staff implementation activities include:

- Timely and good quality inspections
- Effective training, preparation, and program support of inspectors

- Prompt, accurate, and well-documented licensing and technical support of Region II by the Office of New Reactors and the Office of General Counsel
- Well-documented bases for both the 10 CFR Part 52 Construction and Vendor Inspection Programs
- Timely processing of preliminary amendment requests and license amendment requests
- Effective feedback processes within the implementation guidance that promote self-correction of the program.

An example of the NRC staff's ability to identify and correct issues is the staff's recognition of needed clarification with regards to the application of 10 CFR Part 50.55a, Codes and Standards, to 10 CFR Part 52 licensed reactor plants. The AP-1000 Design Certification Rule (10 CFR Part 52, Appendix D) does not clearly specify that an exemption to Tier 1 is not required if a licensee complies with an NRC-authorized alternative to a code requirement rather than the code requirement itself. This will be addressed in future design reviews.

Although the WG also identified a number of opportunities for program enhancement (which are listed below and discussed in detail in Section III of this report), the WG concluded that this self-assessment revealed no significant problems or impediments associated with the 10 CFR Part 52 regulatory processes (inspection, assessment, enforcement, licensing, and technical support). As expected with any new process, the first-time implementation of the 10 CFR Part 52 regulatory processes has resulted in challenges. The WG identified the following lessons:

- 1.** Clarity of design control document (DCD) Tier 2* information (i.e. information for which prior NRC review and approval is needed before changes can be implemented) could be enhanced.
- 2.** Clear and timely regulatory decision making in the construction environment can be enhanced through better communications.
- 3.** NRC staff acceptance of submitted Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) closure notifications (ICN) will require continued, effective interface with licensees.
- 4.** The vendor oversight program would benefit from further clarification of its objectives and its relationship to the Reactor Oversight Program (ROP) and the cROP; and enhanced communications of vendors' performance issues with operating reactor and construction licensees.

5. NRC staff and the licensees should monitor the ongoing implementation of the current licensing basis change processes to identify where additional process enhancements may be warranted.

This self-assessment identified several planned and potential actions that can enhance NRC processes and improve efficiency. Proposed enhancements to address each of the lessons learned are provided below. The WG notes that staff effort is already underway to address some of the WG's proposed actions.

1. Clarity of DCD Tier 2* Information

- The AP-1000 DCD Tier 2* information should be reviewed to determine if ambiguity is problematic in areas of the AP-1000 DCD other than those noted by the WG. If so, then the DCD Tier 2* information for future design certification reviews and combined licenses should also be reviewed and the guidance for designation and documentation of DCD Tier 2* information should be enhanced. In addition, for the AP1000 design, specific effort should be undertaken to ensure common understanding between the NRC staff and the AP1000 licensees relative to Tier 2* information. The WG noted that the NRC staff has begun that effort for the remaining critical sections discussed in Section 3H.5 of the AP1000 DCD.

2. Regulatory Decision Making during Construction

- The NRC staff should consider a process for escalating engagement with licensee management to resolve significant unresolved construction inspection findings. Internally, to ensure clear and timely regulatory decisions, prompt enforcement action should be taken when the evidence available to inspectors indicates that a violation has occurred.

3. ITAAC Closure

- NRC staff should continue to conduct workshops or other stakeholder interactions to identify and resolve differences on the expected level of detail in ICNs, and to enhance ICN guidance as the result of ongoing lessons learned. Additionally, for future design reviews such as those anticipated for Small Modular Reactors, the NRC staff should consider the use of standard terms or formats across designs to make ITAAC closure lessons more generally applicable.

4. Vendor Oversight

- The NRC staff should continue to communicate and clarify the Vendor Inspection Program objectives and the program's relationship to the cROP, and document its relationship to the ROP. The NRC staff should also consider

formulating a process to enhance communications with licensees about their vendors. This would provide the NRC staff with additional information about trends in vendor performance, and facilitate the NRC providing specific licensees notice when there are indications of vendor quality issues affecting their facilities. Additional information exchange as part of the Multinational Design Evaluation Program should be considered to help prioritize vendor inspections.

5. Changes to the Licensing Basis during Construction

- The NRC staff should continue to assess the implementation of the processes for making licensing basis changes as additional experience is gained during construction. The NRC staff should continue to engage industry on additional process enhancements.
- To increase the efficiency of the licensee evaluations, the NRC Changes during Construction Working Group should finalize its recommendation regarding industry use of the screening process used in the operating fleet for evaluating plant changes against 50.59 as an acceptable method of evaluating changes during construction.

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I. BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) issued the first combined licenses (COLs) to Vogtle, Units 3 and 4, on February 10, 2012, and to V. C. Summer, Units 2 and 3, on March 30, 2012. Since the issuance of the COLs, the NRC has exercised first-of-a-kind regulatory processes associated with construction of plants licensed under Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52. In a memorandum dated March 8, 2013, the Director of the Office of New Reactors approved the charter of a working group (WG) to assess the NRC’s requirements, policies, procedures, and practices during the first year of post-COL implementation of Part 52 (the WG charter is included in this report as Appendix A). As discussed in the charter, the WG was directed to select, with internal and external stakeholder input, the most significant licensing, inspection, and other regulatory actions during the first phase of post-COL Part 52 implementation. The WG was directed to evaluate whether the outcomes of new reactor program activities have been effective, realistic, and timely. Where improvements could be made in keeping with the NRC’s Principles of Good Regulation (Independence, Openness, Efficiency, Clarity, and Reliability), the WG was directed to make appropriate recommendations. This report summarizes the WG’s efforts and provides its recommended program enhancements.

II. SCOPE AND METHODOLOGY

The WG reviewed the NRC regulatory processes using a vertical slice approach to identify enhancements that would increase the effectiveness and efficiency in 10 CFR Part 52 regulatory processes. The vertical slice method of evaluating specific issues and identifying broader lessons from these issues was useful in focusing the WG on key topics of concern. The WG chose three actions through which to evaluate the outcomes of new reactor program activities during the first year of post-COL implementation. These actions were identified through discussions with NRC staff, input from representatives of the nuclear industry collected at a public meeting held on March 28, 2013, and conversations with interested members of the public. The topics of industry interest presented to the WG during the March 28, 2013 public meeting are included in Appendix B to this report.

During its review, the WG interviewed or held discussions with more than seventy current and former members of the NRC staff. The WG also reviewed many NRC policies, procedures, and other guidance documents, which are listed in Appendix C to this report. Where appropriate, the WG created timelines of both internal and external interactions related to the activities and determined at various points on the timelines:

- Which office or division had the lead?
- Which offices or divisions were in support?
- What was the task or the deliverable?
- Did the existing regulations, policies, procedures and practices adequately support those roles, and were they understood by the involved staff?

The results are discussed in Section III of this report.

The WG and stakeholders made several observations that were more appropriately considered in other processes and were already being addressed. As directed by the WG charter, observations which were referred included three issues to the construction reactor oversight process (cROP) self-assessment program, one issue to the Vendor Inspection Program's self-assessment process, and one issue referred to the Changes during Construction Working Group.

The first issue referred to the cROP self-assessment program involved the cROP significance-determination process contained in Inspection Manual Chapter (IMC) 2519P, "Construction Significance Determination Process – Pilot," and was related to an inspection finding affecting a structure that had not been constructed. The inspection finding was characterized as potentially greater-than-green by an NRC Significance and Enforcement Review Panel. However, the guidance for significance determination in IMC 2519P does not clearly state that a structure, system or component that has not yet been constructed can be considered non-functional, which is one of the criteria for a potentially

greater-than-green finding. Thus, clarity in the related guidance is warranted. This issue will be addressed in the 2013 cROP self-assessment.

The second issue referred to the cROP assessment process concerns the requirement in paragraph (e)(3), "Procedures," of Section 55, "Conditions of Construction Permits, Early Site Permits, Combined Licenses, and Manufacturing Licenses," of 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities" (10 CFR 50.55(e)(3)). This paragraph requires that a licensee report to the NRC any "significant breakdown in any portion of the quality assurance program..." External stakeholders questioned how this provision is to be interpreted and implemented for a reactor plant being constructed and is subject to the cROP. This issue will be addressed in the 2013 cROP self-assessment.

Process enhancements have already been completed for the third issue referred to the cROP assessment process. This issue involved the NRC's assessment of the Part 52 licensees' corrective action programs (CAP). Specifically, the NRC staff did not formally validate that the licensees' CAPs were effective until the end of 2012. However, the original intent of the NRC inspection program was to provide a validation of the licensees' CAPs soon after each licensee received its COL or early site permit. The delay was primarily due to ambiguity in NRC guidance for the CAP effectiveness evaluation which implied that the results of a CAP inspection were the sole basis for the evaluation. NRC staff recognized problems with the CAP evaluation process and changed the associated NRC inspection and assessment program guidance to allow NRC management to consider all CAP inspection activity cumulatively and perform the CAP evaluations during the mid-cycle and end-of-cycle evaluations. This issue was resolved as part of the "Construction Reactor Oversight Process (cROP) Self-Assessment for Calendar Year 2012" (Agencywide Document Access and Management System (ADAMS) Accession No. ML13045A462).

The issue referred to the Vendor Inspection Program self-assessment process is related to inspections occurring at vendor facilities that could inform the NRC staff's review of inspections, tests, analyses, and acceptance criteria (ITAAC) closure notifications (ICN). The WG observed that, though there were tools in use by NRC staff to track these issues, there was no formal procedural guidance for NRC staff to provide feedback to licensees that ITAAC at their facility were potentially affected. External stakeholders also noted that they perceived ambiguity concerning whether the vendors or the licensees were responsible for findings at vendor facilities. The WG noted that these issues were previously identified by the NRO Division of Construction Inspection and Operational Programs and program enhancements were being formulated at the time of this WG report. They include identifying findings that could impact licensee's ICNs and listing the associated ITAAC numbers in vendor inspection reports, providing this information to all affected licensees, and following up on vendor ITAAC findings to verify satisfactory resolution.

The issue referred to the Changes during Construction WG relates to their ongoing review of Nuclear Energy Institute (NEI) 96-07 Appendix C, "Guidelines for Implementation of Change Control Processes for New Nuclear Power Plants Licensed Under 10 CFR Part 52."

The NRC staff should continue to assess the implementation of the processes for making licensing basis changes as additional experience is gained during construction.

III. LESSONS LEARNED

Lesson 1: Clarity of DCD Tier 2* Information

Observation: Clarity of design control document (DCD) Tier 2* information (i.e. information for which prior NRC review and approval is needed before changes can be implemented) could be enhanced.

Discussion: As established in 10 CFR Part 52 Appendices A through D, information contained in the DCD is divided into three categories (Tier 1, Tier 2, and Tier 2*). The definitions of these categories are uniform across the Part 52 appendices. Tier 1 information is the portion of design related information in the generic DCD that is approved and certified by the Part 52 appendices and requires prior NRC approval to change. Tier 2 information is approved by the Part 52 appendices but not certified, and can be changed via the change process outlined in Section VIII of the appendices. With some exceptions, Tier 2 information can be changed without prior NRC approval. Like Tier 2 information, Tier 2* information is not certified by the Part 52 appendices, but unlike Tier 2 information, Tier 2* information requires prior NRC approval to change per Section VIII.B.6 of the Part 52 appendices.

The guidance for the designation of Tier 2* information is contained in section 14.3 of the Standard Review Plan (SRP). Section 14.3 of the SRP states that documentation of the basis for each “area” of Tier 2* information should be included in the safety evaluation report. However, the term “area” appears to be inconsistent with SRP structure and may have resulted in overly general statements documented as the basis for Tier 2* information. Documenting the basis for Tier 2* information in a general way may be appropriate when that information is programmatic, but may not be appropriate for detailed and specific information because it can create ambiguity regarding the scope of changes that may require prior NRC approval.

For example, Revision 19 of the AP1000 DCD, as incorporated into the Vogtle Units 2 and 3 Final Safety Analysis Report (FSAR), contains a note in section 3H.5 that states “[The design implemented in fabrication and construction drawings and instructions will have the design shown, an equal design, or a better design for key structural components]*.” The basis for this statement is not clearly documented in the safety evaluation report or the DCD, and this has led to different interpretations by NRC staff and licensees. The WG found through interviews with NRC staff that the NRC staff’s interpretation of this statement is that it only applies to minor dimensional deviations. The licensee has interpreted it more broadly to include more general design changes.

Another example of ambiguity in Tier 2* information is the use of the word “typical” on figures in the DCD, such as in the title “Typical Wall Section Column Line 1” of figure 3H.5-3 of the AP1000 DCD, revision 19. Since the basis for the use of the word “typical” is not clearly documented in the safety analysis report or the DCD, different interpretations of the meaning of the word arise. The NRC staff generally interpreted the meaning to be that the

drawing represents one of many identical or very similar wall sections, whereas the licensee interpreted it to mean that information contained in the drawing was generally representative of the construction of various wall sections. Neither the note in section 3H.5 or the use of the word “typical,” as discussed in the preceding paragraphs are clarified further in the DCD or the safety evaluation report.

To demonstrate how the lack of clarity in DCD Tier 2* information can lead to delays in regulatory decision making, a discussion of the inspection findings associated with rebar in the nuclear island basemat and walls at Vogtle Unit 3 is useful (Inspection Report 05200025-008, ADAMS Accession No. ML12173A289). The inspection findings involved: 1) a design control violation due to the licensee making a design change that did not comply with the applicable construction code, American Concrete Institute (ACI) code 349-01, and 2) changing Tier 2* information without prior NRC approval. The WG found that, although the root cause of the issue was the failure of the licensee to comply with the ACI 349-01 code, the NRC staff delayed enforcement action during interactions between NRC Region II, the NRC Office of New Reactors, and the licensee concerning interpretation of Tier 2* information. Specifically, Region II required clarification of the statement “[The design implemented in fabrication and construction drawings and instructions will have the design shown, an equal design, or a better design for key structural components]*” contained in section 3H.5 of the Vogtle FSAR, and requested formal response from NRO via the Technical Assistance Request (TAR) process (TAR # AP-V3-C-006 “Licensing Question on the Last Paragraph in Tier 2 Section 3H.5”). Additional ambiguity, such as the use of the word “typical” discussed above, was dealt with outside the TAR process but also contributed to delays.

While the delays were appropriate and necessary in this example to ensure satisfactory resolution of the issue, the WG concludes that for the AP1000 design, specific effort should be undertaken to ensure common understanding between the NRC staff and the AP1000 licensees relative to Tier 2* information. If the NRC staff finds additional areas of the AP-1000 DCD Tier 2* information contain potential ambiguities, then the DCD Tier 2* information for future design certification reviews and combined licenses should also be reviewed and the guidance for designation and documentation of DCD Tier 2* information should be enhanced.

Lesson 2: Regulatory Decision Making during Construction

Observation: Clear and timely regulatory decision making in the construction environment can be enhanced through better communications.

Discussion: One of the themes of the “New Reactor Licensing Process Lessons Learned Report,” April 2013, is “Identification and Resolution of Technical Issues.” Specifically, the review acknowledges that challenges remain with the Request for Additional Information (RAI) process. The report states, “These challenges are often exacerbated when multiple rounds of RAIs and responses result in little progress toward resolution. One lesson learned from the RAI and issue-resolution experience is that both the staff and the applicant need to enhance the identification of such situations and elevate them

expeditiously, openly, and candidly so that the root of disagreement can be identified and addressed.” While the requirements and procedures in the inspection process are different than those in the licensing process, similar challenges exist.

An example of a situation where the exchange of information between the NRC staff and a Part 52 construction licensee could have been more efficient is the inspection finding at V. C. Summer related to rebar in the nuclear island basemat (Inspection Report 05200027/2013008, ADAMS Accession No. ML13085A058). This issue was identified by NRC inspectors on September 12, 2012, and involved a deviation of the as-built configuration of the rebar from the description in the V. C. Summer FSAR. On the next day, September 13, 2012, the NRC inspectors characterized the issue as an unresolved item because the licensee asserted that information was available to show that the rebar configuration met the applicable code requirements. Over the next 3 months, the NRC staff and the licensee exchanged information concerning the issue several times. None of these exchanges of information resulted in the NRC staff changing its position that the issue was a potential violation. On December 21, 2012, the licensee indicated that it would submit a license amendment request (LAR) to change rebar configuration requirements. The LAR was accepted and approved by the NRC. The NRC staff held a final exit meeting for the issue on February 12, 2013, and characterized the issue as an apparent violation.

The period of time from initial identification of the issue until a LAR was submitted was over 3 months. The period of time from initial identification to characterization of this finding as an apparent violation was 5 months. The WG found that a significant amount of the time was spent after the licensee requested additional time to prepare various submittals of additional information for NRC staff consideration. The WG also found that once the licensee provided additional information for NRC staff consideration, that information was commented on by the NRC staff in a relatively expeditious manner. NRC staff stated during WG interviews that as the information exchanges continued without resolution, it appeared clear to NRC staff members that an apparent violation relating to design control existed. At the public meeting held on March 28, 2013, to gather stakeholder input for this assessment, licensee staff opined that, in retrospect, if the NRC staff had made this an apparent finding earlier, it would likely have brought this issue to resolution sooner. It was also the licensee staff’s general view that the NRC staff’s ongoing willingness to accept additional information was an indication that there was still an opportunity to convince the NRC of the acceptability of their positions.

The multiple rounds of information exchange described have strong parallels with the Licensing Lessons Learned Report’s discussion of the challenges in the RAI process and resolving technical differences. The WG concludes that the NRC staff should strive to resolve such issues more efficiently than was the case for the V. C. Summer basemat rebar finding. In the WG’s view, there are two components to such a process, one being externally focused and the other internally focused.

The levels of management involvement for both the NRC and the licensee should increase as it becomes clear that issues are not coming to timely resolution. Because the complexity of issues varies, there is no specific timeframe or number of information exchanges that

should trigger this escalation. However, factors such as the amount of time the issue has been under discussion, the number of rounds of information exchanged, and repeated disagreements on the same technical or regulatory positions are all indicators of when such escalation may be appropriate. When the NRC provides its view that compliance has not been demonstrated, the NRC should clearly communicate that it is the licensee's prerogative to pursue alternative approaches to achieve compliance. However, at the time a noncompliance is identified, the enforcement process should begin, with significance and corrective actions determined as a function of that process.

The NRC staff should communicate with the licensee in a clear, reliable, and timely manner. The NRC staff should consider interfacing with the licensee in a series of escalating steps rather than parallel engagement at multiple levels. Under such an engagement approach, it would be easier to assure that the licensee receives communication of a consistent NRC position at every level of the organization. Engagement at successively higher levels of NRC and licensee management would send a clear message that the issue is not getting resolved in a timely manner at the lower levels of the respective organizations.

NRO and Region II have different, but complementary, roles in implementing the cROP. A key element in the success of this program is the ability of the NRC to make clear and timely regulatory decisions. Therefore, the WG concludes that the NRC staff should promptly initiate enforcement action when sufficient information is available to support a violation of regulatory requirements, even though the NRC may not yet be able to fully characterize all aspects of the non-compliance(s) or the extent of the condition. Licensees will have the opportunity to formally contest the violation if they subsequently are able to provide information relevant to the issue.

Lesson 3: ITAAC Closure

Observation: NRC staff acceptance of submitted ICN will require continued, effective interface with licensees.

Discussion: The concept of ITAAC and its implementation for construction of a nuclear power plant under 10 CFR Part 52 represents a significant difference from the process for construction under 10 CFR Part 50. For construction under 10 CFR Part 52, accurate ITAAC completion is instrumental in ensuring that plants are built in accordance with their approved licenses. Therefore, the ITAAC ICN submitted to the NRC by the licensees must provide adequate information for the NRC staff to conclude that the "ITAAC were performed, and that the prescribed acceptance criteria are met." (10 CFR Part 52.99(c)(1)).

Additional guidance for writing ICNs is contained in NEI 08-01, "Industry Guidance for the ITAAC Closure Process Under 10 CFR Part 52," Revision 4, July 2010 (ADAMS Accession No. ML102010051). The guidance in NEI 08-01, revision 4, is endorsed by the NRC via Regulatory Guide 1.215 "Guidance for ITAAC Closure Under 10 CFR Part 52," Revision 1, dated May 2012. NEI 08-01 quotes from NRC guidance on what constitutes sufficient information in an ICN, stating in part that "[t]he NRC expects the notification to be sufficiently complete and detailed for a reasonable person to understand the bases..." In

keeping with the NRC's transparency policy and 10 CFR Part 52.99(e)(2), the ICNs are made public, and this level of detail is necessary for public understanding of the ICNs.

Understanding the difficulty in gauging the level of detail required for "a reasonable person" to understand the bases for ICNs, the NRC staff and the industry spent significant time planning and preparing for ICN submittals. NEI 08-01, Revision 4, has several ICN templates and represents extensive efforts by the industry and the NRC staff. In addition, the NRC staff has ensured internal reviews of ICNs are done in an efficient and effective manner through the development of the Verification of ITAAC Closure, Evaluation, and Status system and its integration with the Construction Inspection Program Information Management System.

However, in its first ICN submittal to the NRC (ADAMS Accession No. ML12328A160), one licensee did not include key information and the NRC staff concluded that the ICN contained insufficient information. In a letter dated January 8, 2013, (ADAMS Accession No. ML12356A469), the NRC notified the licensee that the ICN did not contain sufficient information to demonstrate the ITAAC had been successfully completed and explained the basis for that determination. The letter also stated that this conclusion was not a determination by the NRC of whether the ITAAC was met. On February 1, 2013, the licensee submitted a revised ICN (ADAMS Accession No. ML13032A592). The NRC subsequently accepted the revised ICN.

Considering the large number of ITAAC for an AP1000 plant (over 800 individual ITAAC in several different technical areas), the WG concludes that ongoing interactions concerning ITAAC closure reporting should continue. As ICNs are submitted for each successive AP1000 ITAAC, increased quality and efficiency is expected. Lessons learned from AP1000 ITAAC should continue to be documented and communicated to licensees, and applied to future AP1000 construction projects.

The WG also concludes that any lessons learned from the AP1000 ITAAC closure process may have limited applicability to the ITAAC for other plant designs. Specifically, even accounting for design differences, the number, types, and specific wording of ITAAC for similar systems and functions vary widely across designs. Those variations limit the applicability of lessons learned from the AP1000 ICNs. Additionally, the WG concluded that for future design reviews (e. g. Small Modular Reactors), the NRC staff should consider the use of standard terms or formats to make ITAAC closure lessons more generally applicable.

Lesson 4: Vendor Oversight

Observation: The vendor oversight program would benefit from: further clarification of its objectives and its relationship to the Reactor Oversight Program (ROP) and cROP; and enhanced communications of vendors' performance issues with operating reactor and construction licensees.

Discussion: The Vendor Inspection Program (VIP) Plan, Revision 6, dated April 2013 (ADAMS Accession No. ML13092A421) is the document that provides an overall approach for vendor inspection, including goals, priorities, performance metrics, and resource-management strategies. Appendix A of the plan outlines the strategies for identifying primary and sub-tier vendors, and Appendix B of the plan outlines the strategies used to prioritize vendor inspection efforts. Presently, there are over 400 domestic and 160 foreign vendors in at least 17 countries supplying the U.S. nuclear industry.

Reactor licensees are responsible for the quality of the components used in their facilities. The licensees check vendor quality through a number of mechanisms, including approval of vendor programs, detailed procurement requirements, direct audits, Nuclear Procurement Issues Committee (NUPIC) audits, and third-party oversight such as by the American Society of Mechanical Engineers (ASME). Reactor licensees are in direct contact with vendors, receive and inspect vendor products, and provide vendors feedback on issues affecting quality. NRC inspection oversees the licensee programs through a limited, but informed sampling process. NRC programs and processes should continue to communicate and clarify the different roles and responsibilities of vendors and licensees.

The VIP also uses other sources of information about vendor performance. In addition to NRC vendor inspections, the NRC staff has access to insights from interactions with groups such as NUPIC and ASME. Internationally, the NRC staff has benefited from participation in the Multinational Design Evaluation Program (MDEP) Vendor Inspection Cooperation Working Group. However, information exchanges between MDEP members and the NRC could be further enhanced. Despite differences in regulatory approaches amongst the various members of MDEP, additional routine exchanges of information related to quality issues at common vendors would be useful input to help further inform NRC vendor inspection priorities.

In addition, enhanced communications with licensees could provide the NRC with more details of vendor performance that do not reach the threshold of reporting to the NRC in accordance with 10 CFR Part 21, "Reporting of Defects and Noncompliance." For example, vendor issues trended in licensees' corrective action programs could be used by the NRC staff when formulating vendor inspection plans.

Communications from the NRC staff to licensees could also be improved in the area of vendors' performance. If a significant vendor quality issue affects many licensees, the NRC staff uses the generic communications process to inform the industry. Additionally, the NRC makes the results of all vendor inspections available to all reactor licensees. In the case of vendor inspections affecting Part 52 COL holders, the NRC provides copies of the reports directly to the Part 52 licensees. However, beyond sharing inspection reports, there is no formal process in the VIP to engage a single licensee or small group of licensees if a significant quality issue exists at one of their vendors. Such a process could aid the NRC in understanding the licensees' resolutions of the issues.

Lesson 5: Changes to the Licensing Basis during Construction

Observation: NRC staff and the licensees should monitor the ongoing implementation of the current licensing basis change processes to identify where additional process enhancements may be warranted.

Discussion: Implementation of 10 CFR 52.63, 52.98, and Section VIII of each DCD ensures that licensees construct to their current licensing basis. Since 2010, the nuclear industry and the NRC have been engaged in public discussions on ways to provide additional flexibility to continue construction during the NRC evaluation of a license amendment request (LAR).

The current change processes build upon the well-established change processes used for the current nuclear reactor operating fleet. As with the 10 CFR Part 50 licensed operating plants, a licensee must conduct evaluations to determine if prior NRC approval is required prior to making a change to its facility, via a license amendment or exemption, or if the licensee may implement the change with no prior NRC approval. If prior NRC approval is required, the licensee would follow the LAR process. One difference from Part 50 is that the Part 52 combined licenses issued to date have included provisions that permit the licensees to follow the guidance of COL-ISG-25 (ISG-25) "Interim Staff Guidance on Changes during Construction under 10 CFR Part 52," also referred to as the Preliminary Amendment Request (PAR) process.

ISG-25, together with the authorizing license condition, provides for a process by which a licensee may engage in construction (related to a specific licensing basis change request) while the NRC staff is evaluating a LAR, but only when a PAR has been submitted and the licensee has received a No Objection Letter from the NRC. The PAR No Objection Letter is strictly conditioned on the licensee's commitment to return the plant to its current licensing basis if the LAR is subsequently denied or withdrawn.

The WG looked at three areas in its evaluation of changes permitted by 10 CFR Part 52, all of which have been, or are being, addressed by the NRC staff's "Changes during Construction Working Group."

Changes Not Requiring Prior NRC Approval:

A licensee must evaluate all changes to the Updated Final Safety Analysis Report to determine if prior NRC approval is necessary. A licensee documents all changes not requiring prior NRC approval in a report submitted to the NRC semiannually. To date, the NRC has received reports from each of the current Part 52 licensees documenting departures. The NRC staff has evaluated these reports and found no need for further inspection. Additionally, the NRC staff inspects the licensees' change evaluation processes as part of routine quality assurance (QA) inspections for each of the sites and, to date, has not identified any issues.

Interim Staff Guidance (ISG)-25/PAR Process:

For changes that do require prior NRC approval, the licensee must submit a LAR to change the licensing basis of the plant. In order to avoid unnecessary construction delays related to changes during construction, the NRC has implemented the PAR process, as described in ISG-25.

The NRC staff and industry have participated in a series of public meetings over a 27-month period to address the challenges of changes to the licensing basis during construction. The NRC issued ISG-25 for use and comment in January 2011. The ISG-25 process is incorporated into the licensing basis of Vogtle, Units 3 and 4, and V.C. Summer, Units 2 and 3, by a license condition. The NRC can deny or grant the PAR. If granted, the NRC will issue a No Objection Letter, which allows the licensee to proceed with the construction activities associated with the LAR, pending the outcome of the NRC staff's detailed technical review of the LAR. However, if the LAR is subsequently denied or withdrawn, the licensee is obligated to return the plant to its current licensing basis. As of May 1, 2013, the NRC staff has issued No Objection Letters for eleven PARs.

The NRC staff has identified areas for improvement related to the timing and interaction of the PAR and LAR reviews and to the required content of PARs. Prior to the first use of the ISG-25 process, the NRC staff identified a potential problem with ISG-25 in that it allowed for issuance of the PAR No Objection Letter after receipt of the LAR, but prior to the completion of the LAR acceptance review. The NRC staff adopted a practice of not issuing the PAR No Objection Letter until after the LAR acceptance review was completed. This practice allows the staff time to determine whether the LAR contains sufficient information to enable the NRC staff to complete its detailed technical review. This practice also avoids the possibility of the licensee proceeding in accordance with a LAR that is subsequently not accepted for review.

With this change to the timing of the No Objection Letter, it is unnecessary for the NRC staff to review the independent submission of the no significant hazards consideration determination or the categorical exclusion from environmental review (which are prerequisites for invoking the PAR process) as part of the PAR evaluation. Instead, the licensee includes this information in the LAR submittal and it is considered as part of the staff's acceptance review. ISG-025 is being revised to eliminate the duplicative information in PARs and LARs, which will improve the NRC staff's efficiency when reviewing PARs. The revised ISG will also ensure the completion of the NRC staff's acceptance review of the LAR prior to issuance of the PAR No Objection Letter.

Emergent Conditions:

ISG-25 allows for construction during the NRC staff's safety evaluation of a LAR. However, industry is concerned with construction impacts during the period of time needed to evaluate an unanticipated change in order to determine if prior NRC approval is required. Industry views halting construction during this evaluation period as an unnecessary delay.

NEI submitted NEI 96-07 Appendix C, *"Guideline for Implementation of Change Control Processes for New Nuclear Power Plants Licensed Under 10 CFR Part 52,"* to the NRC for endorsement. Industry proposed a resolution in Appendix C, Subsection 4.1.1.1, *"Nonconforming conditions during construction,"* which would allow a licensee to continue constructing in parallel with the licensees' evaluation to determine if prior NRC approval is required. Over the past 10 months, the NRC, industry representatives, and other stakeholders have participated in three public meetings and three public teleconferences to discuss the industry proposed change to the implementation of the Part 52 departure process as presented in Subsection 4.1.1.1.

As part of its consideration of NEI 96-07 Appendix C, the NRC Changes during Construction WG is finalizing its recommendation regarding industry use of the screening process used in the operating fleet for evaluating plant changes against 50.59 as an acceptable method of evaluating changes during construction. The WG agrees that finalizing this recommendation will provide further clarity regarding the change processes already available to licensees under 10 CFR Part 52. However, the Changes during Construction WG has reaffirmed the NRC staff's position that construction that differs from the current licensing basis cannot continue concurrently with the licensee's evaluation to determine whether "prior NRC approval" is required. If construction activities and licensee evaluation activities (which are in part undertaken to determine if NRC approval is necessary) continue concurrently, changes requiring NRC approval might be made prior to the licensee's evaluation. This position was communicated to the industry in a May 9, 2013, letter to NEI.

Overall, the WG concludes that the NRC staff (principally through the efforts of the Changes during Construction WG) has remained focused on ensuring that licensees continue to construct to their current licensing basis, consistent with what is allowed by the regulations in 10 CFR Part 52. The NRC staff has considered the industry views relative to additional process changes, while at the same time maintaining its view of what changes can be made consistent with 10 CFR Part 52 without prior NRC review and approval. The WG concludes that, at this time, the NRC staff has explored the flexibilities allowed to the licensees with regard to the treatment of emergent (and potentially nonconforming) conditions during construction within the limits of the current regulations. The NRC staff positions on these processes are consistent with the current regulations, and the WG agrees with the NRC staff that no changes to Part 52 related to the licensing basis change processes are needed at this time.

IV. ENHANCEMENTS

The WG has identified areas where enhancements could be of benefit to further implementation of 10 CFR Part 52. Where appropriate, the working group has provided specific suggestions for implementation of those enhancements. However, the WG fully expects that upon further review of this report by the NRC staff, additional or different approaches may be found to address the lessons learned and different priorities might be established to address those lessons learned.

1. Clarity of DCD Tier 2* Information

- The AP-1000 DCD Tier 2* information should be reviewed to determine if ambiguity is problematic in areas of the AP-1000 DCD other than those noted by the WG. If so, then the DCD Tier 2* information for future design certification reviews and combined licenses should also be reviewed and the guidance for designation and documentation of DCD Tier 2* information should be enhanced. In addition, for the AP1000 design, specific effort should be undertaken to ensure common understanding between the NRC staff and the AP1000 licensees relative to Tier 2* information. The WG noted that the NRC staff has begun that effort for the remaining critical sections discussed in Section 3H.5 of the AP1000 DCD.

2. Regulatory Decision Making during Construction

- The NRC staff should consider a process for escalating engagement with licensee management to resolve significant unresolved construction inspection findings. Internally, to ensure clear and timely regulatory decisions, prompt enforcement action should be taken when the evidence available to inspectors indicates that a violation has occurred.

3. ITAAC Closure

- NRC staff should continue to conduct workshops or other stakeholder interactions to identify and resolve differences on the expected level of detail in ICNs, and to enhance ICN guidance as the result of ongoing lessons learned. Additionally, for future design reviews such as those anticipated for Small Modular Reactors, the NRC staff should consider the use of standard terms or formats across designs to make ITAAC closure lessons more generally applicable.

4. Vendor Oversight

- The NRC staff should continue to communicate and clarify the Vendor Inspection Program objectives and the program's relationship to the cROP,

and document its relationship to the ROP. The NRC staff should also consider formulating a process to use enhanced communications with licensees about their vendors in order to provide the NRC staff with additional information about trends in vendor performance and facilitate the NRC staff with providing specific licensees notice when there are indications of vendor quality issues affecting their facilities. Additional information exchange as part of the MDEP should be considered to help prioritize vendor inspections.

5. Changes to the Licensing Basis during Construction

- The NRC staff should continue to assess the implementation of the processes for making licensing basis changes as additional experience is gained during construction. The NRC staff should continue to engage industry on additional process enhancements.
- To increase the efficiency of the licensee evaluations, the NRC Changes during Construction WG should finalize its recommendation regarding industry use of the screening process used in the operating fleet for evaluating plant changes against 50.59 as an acceptable method of evaluating changes during construction.

Appendix A – Post-Combined License Part 52 Implementation Self-Assessment Working Group Tasking Memo and Charter

March 8, 2013

MEMORANDUM TO: James G. Luehman, Deputy Director
Division of Construction Inspection
and Operational Programs
Office of New Reactors

FROM: Glenn M. Tracy, Director */RA/*
Office of New Reactors

SUBJECT: POST-COMBINED LICENSE PART 52 IMPLEMENTATION
SELF-ASSESSMENT

This memorandum transmits the enclosed Post-Combined License (COL) Part 52 Self-Assessment Working Group Charter. The purpose of the Working Group is to assess the U.S. Nuclear Regulatory Commission's (NRC's) licensing and inspection requirements, policies, procedures, and practices during the first year of post-COL implementation of Part 52. The Working Group is comprised of inter-office staff that have broad knowledge of, and experience in, agency licensing and inspection practices and procedures.

As the lead for the assessment, you should ensure the Working Group focuses on solutions that, going forward, enhance existing NRC requirements and guidance related to Part 52 implementation, where necessary. In addition to the members in your group, additional Headquarters or Regional support will be provided to you, as requested. The Working Group should document its recommendations and their bases in a report to me on June 7, 2013. In addition, documentation of the recommendations should be completed in accordance with Management Directive 6.8 "Lessons-Learned Program," and submitted to the contact for that program.

Enclosure:
Post-Combined License Part 52
Implementation Self-Assessment
Working Group Charter

Post-Combined License Part 52 Implementation Self-Assessment Working Group Charter

PURPOSE

The purpose of this working group (WG) is to assess the implementation of U.S. Nuclear Regulatory Commission (NRC) licensing and inspection requirements, policies, procedures, and practices during the first year of Post-Combined license (COL) implementation of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52. It is being established by the Office of New Reactors (NRO) as a continuous improvement initiative. The assessment should evaluate whether the outcomes of new reactor program activities have been effective, realistic, and timely, and where improvements can be made in keeping with the NRC's Principles of Good Regulation (Independence, Openness, Efficiency, Clarity, and Reliability).

WORKING GROUP MEMBERSHIP

The WG will be led by James Luehman, Deputy Director, Division of Construction Inspection and Operational Programs (DCIP), NRO. The other full time members are David Matthews, Director, Division of New Reactor Licensing, NRO, and Mark Miller, Deputy Director, Division of Construction Projects, Region II. Catherine Scott, Acting Assistant General Counsel for New Reactors or her designee will provide the WG legal support with additional technical support provided by staff from the Division of Advanced Reactors and Rulemaking and DCIP, NRO.

SCOPE

The WG should select a group of the most significant licensing, inspection, and other regulatory actions taken during the first phase of post-COL Part 52 implementation to assess. While this assessment will be an internal agency review, the WG should provide early opportunity for external stakeholders to suggest areas for review by the WG and ensure due consideration of those actions that external stakeholders view as significant. The significance of the staff actions to be reviewed should be based on considerations, such as safety significance and NRC or licensee staff resources required.

PROCESS

As there are several ongoing new reactor program reviews associated with 10 CFR Part 52, the WG should endeavor to remain well informed and avoid duplicating work already in process or completed as part of those efforts. This specific assessment should include vertical slice reviews of the major licensing, inspection and other regulatory actions and decisions made during initial post-COL Part 52 implementation. Vertical slice reviews are examinations of the portions of the requirements, policies, procedures or guidance applicable to the specific actions considered significant within this assessment. WG observations that are best suited for incorporation into other new reactor program reviews, such as the Vendor Inspection Program Self-Assessment, the Part 52 Licensing Lessons-Learned Assessment and the Construction Reactor Oversight Process Pilot Self-Assessment, should be coordinated and submitted for such consideration. The WG should develop specific opportunities for external stakeholder input and comment regarding the content of the report and its recommendations.

DOCUMENTATION

The WG should provide a written report to the Office Director of NRO, by June 7, 2013, which at a minimum documents the areas of review, findings, and any WG recommendations. The report will be made publically available.

Appendix B—Industry Issues Presented at the March 28, 2013 NRC Working Group Public Meeting

| Activity | Challenges |
|---|--|
| Basemat rebar construction and interpretation of Tier 2* figures in the Updated Final Safety Analysis Report (UFSAR) leading to rework activities. | <p>Interpretation of the Licensing Bases under Part 52</p> <ul style="list-style-type: none"> ● Level of detail in UFSAR ● Clarity of Tier 1 and Tier 2* scope |
| T-headed shear reinforcement Unresolved items and licensee response concerning the design basis compliance with the licensing basis which lead to two license amendment request (LAR) | <p>Interpretation of the Licensing Bases under Part 52</p> <ul style="list-style-type: none"> ● Differing views on the application of ACI code requirements ● Licensee authority/flexibility to make technically based code interpretations which are not explicitly addressed in the licensing basis ● Open, timely communications between Region II, the Office of New Reactors (NRO) and Licensee ● Clarification of the definition of a ‘construction activity,’ when a construction activity is subject to Nuclear Regulatory Commission (NRC) inspection; and therefore, when must the safety significance of an issue be assessed for enforcement ● Documentation of licensee position as reviewed by the NRC |
| Development and submittal of the first ITAAC closure notice and its subsequent non-acceptance by the Staff | <p>Part 52 process first-time implementation</p> <ul style="list-style-type: none"> ● Level of detail provided in ITAAC Closure Notifications (ICN) did not meet NRC interpretations or expectations for fulfilling spirit of Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) 52.99 ● Learning curve associated with first-time Part 52 process and level of detail for Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) closure notifications ● NRC ITAAC Closure Verification Process <ul style="list-style-type: none"> ○ Timely feedback to licensees ○ Timely completion of ICN acceptance process ● Longer term, need for disciplined ICN reviews that avoid subjective judgments of “sufficient” information or second-guessing of settled guidance and examples ● Similar challenges for existing construction related regulatory processes that have not been exercised in many years, e.g., 10 CFR 50.55(e) |

**Appendix B—Industry Issues Presented at the March 28, 2013 NRC Working Group
Public Meeting (continued)**

| Activity | Challenges |
|---|--|
| Vendor inspections that involve ITAAC supporting activities | <p>Part 52 process first-time implementation</p> <ul style="list-style-type: none"> ● Clarity regarding vendor vs. licensee inspections <ul style="list-style-type: none"> ○ Based on inspection purpose ○ Based on inspection team ○ Can this change mid-inspection? ● Tracking of ITAAC items that are identified during vendor inspections and subsequent inclusion in the ITAAC closure notice |
| Resolution of generic process issues, e.g., changes during construction | <p>Need for more timely and efficient resolution of key issues to support ongoing construction activities</p> <ul style="list-style-type: none"> ● What process improvements are needed to more rapidly understand and resolve these types of issues? ● Need NRC to clearly document position or identified deficiency |

Appendix C – References

Publicly Available Documents

1. *U.S. Code of Federal Regulations*, “Domestic Licensing of Production and Utilization Facilities,” Part 50, Chapter I, Title 10, “Energy.”
2. *U.S. Code of Federal Regulations*, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” Part 52, Chapter I, Title 10, “Energy.”
3. U.S. Nuclear Regulatory Commission, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” NUREG-0800, Section 14.3, “Inspections, Tests, Analysis, and Acceptance Criteria,” Initial Issuance, March 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML070660618).
4. Southern Nuclear Operating Company, Inc., “Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, Updated Final Safety Analysis Report (Public Version),” August 31, 2012 (ADAMS Accession No. ML12249A432). (In particular, see Section 3.8, “Design of Category I Structures” (ADAMS Accession No. ML12254A964), and Appendix 3H, “Auxiliary and Shield Building Critical Sections” (ADAMS Accession No. ML12254A994).)
5. South Carolina Electric and Gas Company, Inc., “V. C. Summer Nuclear Station Units 2 & 3 Combined Operating License Application (Final Safety Analysis Report)” June 28, 2011 (ADAMS Accession No. ML11187A074).
6. U.S. Nuclear Regulatory Commission, “Interim Staff Guidance on Changes during Construction under 10 CFR Part 52,” COL-ISG-025 (ADAMS Accession No. ML111530026).
7. U.S. Nuclear Regulatory Commission, “Combined License Applications for Nuclear Power Plants (LWR Edition),” Regulatory Guide 1.206, June 20, 2007 (ADAMS Accession No. ML070720184).
8. U.S. Nuclear Regulatory Commission, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design,” NUREG-1793, Initial Report, September 2004, Supplement 1, December 2005, and Supplement 2, September 2011.
9. U.S. Nuclear Regulatory Commission, “Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design,” NUREG-1503, Main Report and Appendices, July 1994, and Supplement 1, May 1997 (ADAMS Accession No. ML080670592).
10. U.S. Nuclear Regulatory Commission, “Construction Inspection Program: Inspections of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Related Work,” NRC Inspection Manual Chapter 2503, Appendix A, “IMC-2503 Inspection Procedures,” Attachment and Inspection Procedure (IP) 65001.01, “Inspection of ITAAC-Related Foundations & Buildings” (ADAMS Accession No. ML071580740).

11. U.S. Nuclear Regulatory Commission, "Construction Inspection Program: Inspection of Construction and Operational Programs," NRC Inspection Manual Chapter (IMC) 2504 (ADAMS Accession No. ML12298A106).
12. U.S. Nuclear Regulatory Commission, "Periodic Assessment of Construction Inspection Program Results – Pilot," NRC IMC 2505P, Revision 1 (ADAMS Accession No. ML13002A227).
13. U.S. Nuclear Regulatory Commission, "Construction Reactor Oversight Process General Guidance and Basis Document," NRC IMC 2506 (ADAMS Accession No. ML12297A077).
14. U.S. Nuclear Regulatory Commission, "Construction Inspection Program: Vendor Inspections," NRC IMC 2507 (ADAMS Accession No. ML110871798).
15. U.S. Nuclear Regulatory Commission, "Construction Significance Determination Process – Pilot," NRC IMC 2519P (ADAMS Accession No. ML113180355).
16. U.S. Nuclear Regulatory Commission, "Quality Assurance Program Implementation during Construction and Pre-Construction Activities," Inspection Procedure 35007 (ADAMS Accession No. ML12355A330).
17. U.S. Nuclear Regulatory Commission, "Interim Staff Guidance: Finalizing Licensing-Basis Information," DC/COL-ISG-011, November 2009 (ADAMS Accession No. ML092890623).
18. U.S. Nuclear Regulatory Commission, "Vendor Inspection Program Plan," Revision 6, April 2013.
19. Westinghouse Electric Co., "AP1000 Design Control Document," Revision 19 (ADAMS Accession No. ML11171A500).
20. Southern Nuclear Operating Company, Inc., "Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment: Basemat Concrete/Rebar Details," LAR-12-007, August 1, 2012 (ADAMS Accession No. ML12215A084).
21. Southern Nuclear Operating Company, Inc., "Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment: Basemat Shear Reinforcement Design Details," LAR-13-004, January 18, 2013 (ADAMS Accession No. ML13024A054).
22. U.S. Nuclear Regulatory Commission, "South Carolina Electric and Gas (SCE&G), V.C. Summer Nuclear Station Unit 2 – U.S. Nuclear Regulatory Commission ITAAC Inspection," Inspection Report (IR) No. 05200027/2013008, March 26, 2013 (ADAMS Accession No. ML13085A058).
23. U.S. Nuclear Regulatory Commission, "Southern Nuclear Operating Company Vogtle Electric Generating Plant Unit 3 - NRC ITAAC Inspection," IR No. 05200025/2012-008, May 18, 2012 (ADAMS Accession No. ML12139A192).

24. Southern Nuclear Operating Company, Inc., "Southern Nuclear Company Vogtle Electric Generating Plant Unit 3 Completion of ITAAC E.2.5.04.05.05.01 [Index Number 874]," November 6, 2012, (ADAMS Accession No. ML12328A160).
25. U.S. Nuclear Regulatory Commission, "Notice of Insufficient Information to Support Inspection, Test, Analysis, and Acceptance Criterion Closure Verification of Vogtle Electric Generating Plant Unit 3, ITAAC E.2.5.04.05.05.01, "Backfill Compaction," January 8, 2013, (ADAMS Accession No. ML12356A469).
26. Southern Nuclear Operating Company, Inc., "Southern Nuclear Company Vogtle Electric Generating Plant Unit 3 Completion of ITAAC E.2.5.04.05.05.01 [Index Number 874]," February 1, 2013, (ADAMS Accession No. ML13032A592).
27. U.S. Nuclear Regulatory Commission, "Summary of October 4, 2012 Meeting with Southern Nuclear Company Operating Company to Discuss Repairs Made to the Reactor Vessel Nozzle-to-Safe-End Welds for Vogtle Electric Generating Station Unit 3," October 25, 2012, (ADAMS Accession No. 12298A300).
28. U.S. Nuclear Regulatory Commission, Letter to Russ Bell, Director of New Plant Licensing, Nuclear Generation Division, Nuclear Energy Institute (NEI) from Michael Mayfield, Director, Division of Advanced Reactors and Rulemaking, subject "Changes During Construction," May 9, 2013, (ADAMS Accession No. ML13044A443).



BIPARTISAN POLICY CENTER

April 6, 2010

Gregory B. Jaczko
Chairman
Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Dear Chairman Jaczko:

We are writing in response to your request that the Bipartisan Policy Center conduct a review of the NRC licensing process for new reactors. You asked that we examine whether there have been unnecessary delays in the licensing process for new nuclear plants caused either by the NRC or by the nuclear industry. In short, we did not find any evidence that either the NRC or industry has needlessly delayed or extended the licensing process. You also asked for a report on any findings and recommendations to improve the process going forward. This letter constitutes our response to your request.

To accomplish this task, we interviewed NRC staff and former NRC commissioners, representatives of reactor vendors, applicants for Combined Operating Licenses (COLs), nuclear engineering firms, and representatives of environmental and other organizations that have actively engaged in the licensing process. We also hosted a half-day forum to which we invited a broad group of stakeholders to discuss issues raised during the individual interviews and to elicit additional views and comments.

General Themes/Issues

In summary, we found that, while many of the stakeholders have encountered some problems in maneuvering through the licensing process, there was a near-unanimous view that all parties have acted appropriately and in good faith to resolve any problems. The NRC was not seen to have needlessly delayed or extended the licensing process. Based on our interviews, we believe that the difficulty of obtaining financing is a bigger obstacle to nuclear plant construction at the moment than licensing issues.

Nonetheless, a number of suggestions were made for improving the process going forward that we found to be well grounded and reasonable so we mention them in this report. In particular, the parties hope and expect that the lessons learned in the processing of the initial applications will result in changes that will improve the process and make it more transparent and efficient. Given the NRC's performance to date, we expect that this will be the case.

The licensing process for new reactors that is now underway has been a learning experience for all involved. Indeed, the NRC has confronted an unprecedented challenge

in processing the initial applications. The licensing system embodied in Part 52 of the NRC's regulations had envisioned that applications for COLs would reference designs that had been certified and sites that had the benefit of early site permits. It was anticipated that, with these pieces in place, the review process for COLs would be simplified and relatively straightforward. As it happened, numerous COL applications were filed in parallel with applications for certified designs. The staff thus had the challenge of dealing simultaneously with a large number of overlapping applications that were filed pursuant to an entirely new and largely untested licensing regime. This was further complicated by the fact that new-plant licensing at the NRC has been dormant for many years and needed to be resuscitated. And, at the same time, the NRC was undertaking the hiring and training of a large cadre of new employees and managers, while industry was simultaneously rebuilding its staff. Overall, we believe that the NRC staff has done a remarkable job under trying circumstances. Many stakeholders commented on the high level of commitment demonstrated by the NRC staff to resolve disputes in a fair, consistent, and clear manner.

It was also clear from our interviews, however, that there has on occasion been some miscommunication between NRC staff and applicants, leading to some confusion and delay. Much of the confusion can apparently be traced to misunderstandings as to NRC expectations in regard to the level of detail required in applications. Since the licensing process is new, successful templates by which an applicant can measure its filings do not yet exist. This has put the applicants (and interveners) in a difficult position when applications had to be supplemented as the process has moved forward. Some industry representatives acknowledged that they have not always been able to respond to NRC staff's Requests for Additional Information (RAIs) in as timely a manner as they would like -- the responses can on occasion require significant time and effort -- and they also accept some responsibility for past miscommunications. In our judgment, many of these issues should resolve themselves as all sides gain more experience. The Commission and NRC staff should also strive to provide clear guidance to applicants to minimize delays caused by miscommunications as subsequent applications make their way through the process.

Design Certification

The current Design Certification (DC) process has proven cumbersome, in large part because of the parallel submission of COL applications referencing a design then undergoing review for certification. As noted above, efficiencies would have been available if the design certifications had been completed before the NRC was required to process the COL applications referencing that design. The simultaneous processing of DC and COL applications has created some uncertainty arising from the interplay between the two processes. This put interveners in a difficult position by forcing them to monitor multiple proceedings. Nonetheless, all parties appear committed to make the best of the situation. These issues should resolve themselves when the current design certifications are completed and subsequent COL applications reference certified designs.

Scheduling certainty and clarity of NRC management expectations are critical for the vendors. Some vendors believe that the NRC staff has not been consistent over time in the detail that is expected from the vendor. We were told that there have been situations in which different reviewers have caused confusion by applying different standards for review. Indeed, some vendors have complained that issues that were believed to have been resolved were subject to reopening as different reviewers became involved. We conclude that the Commission should focus its attention on providing clear guidance on the level of design detail and analysis that is expected in applications. We understand that the NRC staff is paying attention to this issue, and we bring it up here because we believe that this is an area where a continuing active focus by the Commission and NRC management is warranted.

Ensuring a sensible path forward for future reactor design modifications was also an issue of concern for some stakeholders. There is an inherent tension between the policy goals of, on the one hand, building a standardized fleet of new reactors and, on the other hand, ensuring that modifications based on experience with a design are applied so as to improve safety and environmental performance. We understand that at least one design center has created a committee to look at the issue of how best to incorporate new technology changes into future reactor construction. We believe this is a sensible step and the Commission should closely monitor progress to ensure that there is a transparent and efficient methodology to achieve an appropriate balance between these two important goals.

Combined Operating License

Although there have been occasional “bumps in the road” in the processing of COL applications, the fact that problems have surfaced was neither unexpected nor have the problems proven insurmountable. The general sense is that the NRC staff has generally worked with the applicants in a direct way to resolve issues in a timely fashion. Because there has not yet been a successful application that has gone through the entire process from beginning to end, applicants have no model upon which to base their submissions. Both applicants and the NRC are learning as the initial applications are processed. Not surprisingly, there on occasion have been differing expectations as to what is required. Once the process has run its course a few times, we expect that many of these issues will resolve themselves.

Nearly all the applicants indicated that certainty in scheduling is more crucial than speed. Nonetheless, although the Part 52 process largely serves to move regulatory decisions as early in the process as they can reasonably be made, there often are significant expenditures that must be incurred for long-lead-time components before the licensing process has been completed. With hundreds of millions of dollars at stake, even a small delay can have a significant financial impact. Therefore, efforts should be made to avoid unnecessary delays.

Several applicants questioned the need for a mandatory uncontested hearing – a hearing that is held even in the absence of a successful intervention by a party opposing a license

-- at the end of the COL process. They observed that there are multiple opportunities for public involvement and expert review in the current licensing process, and that the mandatory hearing requirement is an anachronism from an earlier age. They noted the public access that is now a standard part of the staff's review of the licensing application and the environmental impact statement and the detailed review that is undertaken by the independent experts on the Advisory Committee on Reactor Safeguards. As a result, they claim that a mandatory uncontested hearing is a duplicative and time-consuming step that serves little purpose. Some intervenor groups, on the other hand, point out that the industry has been successful in recent time in rehabilitating public support for nuclear power and that the quickest way to subvert that momentum would be to eliminate the mandatory hearing requirement or to otherwise limit the confidence of the public in the integrity of the licensing process.

We understand that a mandatory hearing on each application for a construction permit is required by the Atomic Energy Act and therefore it is beyond the authority of the Commission to eliminate it. However, even in the absence of a legislative change, the Commission can reduce the uncertainty associated with the duration of the hearing. For example, the Commission might convene a legislative-style hearing to ascertain the sufficiency of the licensing review. Rather than limiting public involvement, a legislative-style hearing might allow appropriate and efficient wide-scale scrutiny to supplement the staff and the ACRS's licensing review. Of course, such a hearing would be in addition to any detailed review of contentions by the Atomic Safety and Licensing Board (ASLB) in cases in which there has been a successful intervention.

Another major issue that was brought to our attention relates to the environmental review process. We understand that, at least in respect to the initial COL applications, the EIS process is currently more advanced than the safety review process. In these cases, any effort to "speed up" the environmental reviews will have no effect on the overall licensing schedule. This may not continue to be the case for other applications in the queue. That is, the time needed for the safety review of subsequent COL applications referencing a certified design will likely be reduced because non-site specific issues will have already been addressed. Thus, the timing of the environmental review may become a critical consideration going forward.

One suggestion offered in our meetings was to allow the filing of contested issues on the draft EIS, instead of waiting until the final EIS to issue. It was argued that such an approach would allow any ASLB hearing to start earlier. However, the draft EIS would have to be of high quality for this approach to be effective and there is no certainty that time would be saved for every application. For example, intervenors would retain the right to file contentions relating to issues arising from any changes introduced in the final EIS. And perhaps little efficiency might be gained if the concurrence by other agencies has not been obtained on the draft EIS. Experience going forward should indicate whether such a change in process would be helpful.

Our comment on this point reflects a general rule: the NRC and the other stakeholders should seek to learn from the existing processing of applications and should seek to achieve efficiencies based on that knowledge going forward. The overall aim should be to reduce the licensing burden without affecting the quality, scope or the thoroughness of the review. A commitment to learn from experience should be the guide.

Summary

In sum, we note that there was near-universal respect and admiration for the NRC staff among the stakeholders we interviewed. Although the licensing process is new, both the NRC and the industry have done a remarkable job in very trying circumstances in assuring the thorough and timely evaluation of license applications. The fact that all parties have experienced some problems in navigating the process was to be expected under the circumstances. But it is apparent that all those involved have been diligent in working through the issues in a forthright manner.

The Commission can, and should, continue to exercise clear leadership to ensure that the processing of the applications continues with the same attention to detail and to efficiency as has been the case to date. The Commission should ensure that the lessons learned in the first round of applications are rigorously applied to make the processing of subsequent applications more efficient. We also believe that the changes we outlined above would have a modest, but measurable impact upon the process.

On behalf of the Bipartisan Policy Center, we thank you for giving us the opportunity to assess the progress that has been made in laying the foundations for the deployment of safe nuclear power in the U.S. We commend you for your willingness to invite an independent analysis, as well as for your commitment to ensuring the transparency and integrity of the NRC licensing process. We hope that this review is helpful.



Pete V. Domenici



Dr. Richard Meserve

CC: George Apostolakis, Commissioner
CC: William Magwood, Commissioner
CC: William Ostendorff, Commissioner
CC: Kristine Svinicki, Commissioner