UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	
	)	
SOUTHERN NUCLEAR OPERATING CO.	)	Docket Nos. 52-025-COL and 52-026-COL
	)	
(Vogtle Electric Generating Plant	)	
Units 3 and 4)	)	
	)	

NRC STAFF RESPONSES TO COMMISSION PRE-HEARING QUESTIONS

Pursuant to the Commission's Order (Transmitting Pre-Hearing Questions) of August 31, 2011, the staff of the U.S. Nuclear Regulatory Commission ("Staff") hereby responds to the questions posed in that Order. These questions generally pertain to subjects discussed in the Staff's Final Safety Evaluation Report ("FSER")[1] or Final Supplemental Environmental Impact Statement ("FSEIS").[2]

The Commission's Order directed some questions to the Staff, some to Southern Nuclear Operating Company ("Applicant," "SNC"), and some to both. Attachment A to this filing presents the Staff's responses. Where a question was directed to both the Staff and Applicant, the Staff's response is included in the attached; however, where a question or sub-question was directed solely to the Applicant, the Staff accordingly has not provided a response.

/Signed (electronically) by/
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Dated at Rockville, Maryland
This 13th day of September 2011

[1] Final Safety Evaluation Report for Vogtle Electric Generating Plant Units 3 and 4 (August 2011).

[2] NUREG-1947, Final Supplemental Environmental Impact Statement for Combined License (COLs) for Vogtle Electric Generating Plant Units 3 and 4 (March 2011).

ATTACHMENT A

NRC Staff Responses to Commission Questions

NRC Staff Responses to Commission Questions

1. **SECY-11-0110 mentions that "some portions of the VEGP FSER contain information from previously issued safety evaluations for Bellefonte." Is that statement intended to mean that the Vogtle FSER incorporates in some fashion portions of the incomplete Bellefonte DSER?**

Staff Response:

The "Final Safety Evaluation Report for Vogtle Electric Generating Plant Units 3 and 4" (August 2011) (FSER) does incorporate the previously issued and publicly available safety evaluations with open items for the Bellefonte Units 3 and 4 docket. Before early 2009, the reference COL (RCOL) applicant for the AP1000 design center was the Tennessee Valley Authority Bellefonte Nuclear Station Units 3 and 4; Southern Nuclear Operating Company (SNC), the applicant (on behalf of itself and four co-owners) for Vogtle Electric Generating Plant Units 3 and 4, was a subsequent COL (SCOL) applicant. In April 2009, the NuStart Energy Development, LLC, consortium submitted a transition plan, which the Staff accepted, to change the RCOL designation for the AP1000 design center from Bellefonte Units 3 and 4 to VEGP Units 3 and 4. A central element of that plan was to retain the Bellefonte SER with open items and close the open items on the Vogtle docket. In certain areas of the applications, the two applicants submitted similar information and, in accordance with "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach" (RIS 2006-06), the Staff determined that similar information would be treated as "standard content" for the AP1000 design center and that the evaluation that had been performed for the Bellefonte application would be directly applicable to the Vogtle review. In portions of the Vogtle FSER where the Staff made these determinations, the technical evaluation discussions are quoted directly from the corresponding sections of the previously issued and publicly available Bellefonte SER with open items.

2. **Since it appears that TVA may not pursue a combined license for a reactor at the Bellefonte site, why is it appropriate that Vogtle or other applicants have endorsed standard content in an application that may never proceed to licensing?**

Staff Response:

Material designated as "standard content" appears in each individual COL application unless that applicant has made some site-specific changes. As a result, the Staff's "design-centered" technical review of that content does not ultimately depend on whether the Bellefonte COL is licensed, even if the review was originally conducted while Bellefonte was the RCOL application. In determining whether it was appropriate for Vogtle (or other applicants) to endorse standard content from the Bellefonte COL application, the Staff focused on the nature of the issue rather than whether Bellefonte would proceed to licensing.

To ensure that the Staff's findings on standard content that were documented in the SER with open items issued for the Bellefonte COL application were equally applicable to the VEGP Units 3 and 4 COL application, the Staff undertook the following reviews:

1. The Staff compared the Bellefonte COL Final Safety Analysis Report (FSAR) to the Vogtle COL FSAR. In performing this comparison, the Staff considered changes made to the Vogtle COL FSAR (and other parts of the COL application, as applicable) resulting

from requests for additional information (RAIs) and open and confirmatory items identified in the Bellefonte SER with open items.

2. The Staff confirmed that all responses to RAIs identified in the corresponding standard content (from the Bellefonte SER with open items) evaluation were endorsed by the Vogtle applicant.

3. The Staff verified that the site-specific differences were not relevant.

This standard content material is identified in the Vogtle FSER by use of italicized, double indented formatting. The Vogtle FSER also documents the Staff's findings with respect to closure of all open items related to standard content, and will be used as the RCOL reference for other AP1000 SCOL application reviews.

3. The ACRS recommended that an effective ISI/IST program be in place to ensure operability of the squib valves in the automatic depressurization system. According to SECY-11-0110, it appears that such a program has not been developed yet. What steps have been taken to ensure that a requirement for this program will be imposed on an applicant or combined license holder?

Staff Response:

COL licensees are required by 10 C.F.R. § 50.55a(f)(4)(i) to implement the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) incorporated by reference in 10 C.F.R. § 50.55a 12 months before fuel loading. The Staff is participating in ASME activities to revise the OM Code to provide updated inservice testing (IST) requirements for pumps and valves in new reactors, including improved surveillance provisions for testing and internal inspection of squib valves. ASME has completed Phase 1 of the effort to provide improved IST provisions in the 2011 Addenda to the ASME OM Code. ASME is initiating Phase 2 that will consider additional improvements including squib valve surveillance activities. The NRC is reviewing the revised ASME OM Code (and will review future ASME Code editions) with respect to new reactors for incorporation by reference in 10 C.F.R. § 50.55a with appropriate modifications.

In response to a Staff request for additional information (RAI), SNC revised the Vogtle FSAR (Section 3.9.6.2.2) to require that the IST program for squib valves will incorporate lessons learned from the design and qualification process for these valves such that surveillance activities provide reasonable assurance of the operational readiness of squib valves to perform their safety functions. The IST program for squib valves will address appropriate inservice testing and internal inspection activities. The Staff is monitoring the development of IST provisions for squib valves through the design and qualification process being conducted by Westinghouse Electric Company, LLC (Westinghouse) and the valve vendor. Consequently, the NRC found in the FSER that because the NRC regulations in 10 C.F.R. § 50.55a require the application of the ASME OM Code for inservice testing of valves, and the VEGP FSAR adequately describes the IST program for squib valves for incorporating the lessons learned from the design and qualification process in developing surveillance activities, there is reasonable assurance of the operational readiness of squib valves to perform their safety functions.

As discussed in Commission Paper SECY-05-0197 (October 28, 2005), "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," the Staff will confirm the implementation of the Vogtle FSAR requirements for IST activities during inspections of the Vogtle IST operational program during plant construction. These inspections will include the surveillance activities for testing and internal inspection of squib valves at Vogtle Units 3 and 4. The Staff will base its inspection on the NRC regulations in 10 C.F.R. § 50.55a that will incorporate by reference the ASME OM Code edition 12 months before fuel load for squib valve surveillance activities with any modifications in the NRC regulations that reflect lessons learned from the squib valve design and qualification process.

4. Near-Term Task Force Recommendations

a) How much time and effort would it take the Staff to fully implement the Near-Term Task Force recommendations for near-term combined license applications as license conditions for Vogtle? As inspections, tests, analyses and acceptance criteria for Vogtle?

Staff Response:

Because the time and resources necessary for the Staff to implement fully the Near-Term Task Force (NTTF) recommendations for Vogtle will depend on the nature of the Commission's instructions on how to do so, the Staff does not yet have a clear estimate of those needs. However, assuming Commission direction regarding which NTTF recommendations to implement, the Staff anticipates that preparing an appropriate combination of license conditions and ITAAC would be a relatively straightforward process. That process would entail information gathering and coordination of technical experts, as well as appropriate communication with the applicant. Such an effort would likely take time on the order of weeks.

b) The Near-Term Task Force recommended that their recommendations be implemented as inspections, tests, analyses and acceptance criteria. Why did the Staff suggest implementation as license conditions in SECY-11-0110?

Staff Response:

The Staff did not intend to preclude the use of inspections, tests, analyses, and acceptance criteria (ITAAC). The use of ITAAC or license conditions is dependent on the specific issue being addressed and the ability to establish appropriate acceptance criteria for an ITAAC.

c) Would the NRC Staff face any additional administrative or regulatory hurdles if the implementation of the recommendations were delayed until after the Vogtle combined license has been issued?

Staff Response:

Yes. In general, there are fewer regulatory and administrative requirements for the Staff to follow when imposing license conditions before a license is issued versus after because the complete licensing basis has not yet been established. However, in the case of the Vogtle

application, certain elements of the licensing bases have already been established by the issuance of the ESP and the previous design certification. Therefore, with respect to those recommendations that affect areas already established in the ESP or the design certification rule, a regulatory basis would need to be established to impose the new requirements using the regulatory provisions found in 10 C.F.R. §§ 52.83, 52.98, and 50.109, regardless of whether the COL has been issued.

d) Considering that the Fukushima accident clearly indicates that multiple concurrent events can occur at a multi-reactor site, why is the Staff confident that the finding with regards to "inimical" to health and safety of the public has been met? Did the Staff consider accident scenarios that required a response to concurrent events at multiple-reactors and/or spent fuel storage facilities at the Vogtle site?

Staff Response:

No, the Staff did not consider multiple concurrent events at the Vogtle site in its review. This would constitute a beyond design basis event under the NRC's current requirements, and the Staff necessarily reviewed the application against current requirements. Because the application meets all current requirements, the Staff finds that the issuance of the Vogtle COLs would not be inimical to the common defense and security or to the health and safety of the public. However, should the Commission impose a new requirement for licensees to consider concurrent events at multiple reactors and/or spent fuel storage facilities, then the Staff would address the new requirement in accordance with the regulatory provisions found in 10 C.F.R. §§ 52.83, 52.98, and 50.109, depending on whether the requirements address matters within the scope of the referenced early site permit or certified design.

e) Which parts of the Vogtle draft license and FSER would need to be modified in order to implement all the recommendations of the Near-Term Task Force that are applicable to design certifications or combined licenses?

Staff Response:

If new license conditions or additional ITAAC were imposed, then Part 2 or Appendix C of the draft license would need to be modified. Rather than modify the FSER that was issued by the Staff, a supplemental safety evaluation report would be prepared to address any new requirements. The scope and content of such a supplemental safety evaluation report are unknown at this time and would be determined after new requirements are established by the Commission. For example, based on the NTTF recommendations, the Staff would likely need to supplement evaluations in the FSER, including, but not limited to, those contained in FSER Chapter 8, 9, 13, and 19, as well as the associated license conditions and ITAAC.

5. **The Vogtle draft combined license seems to contain a provision that would allow the licensee to make changes to the design prior to receiving NRC approval. Inclusion of such a provision seems contrary to the spirit of the finding that the facility will be constructed in accordance to the combined license. How is the Staff able to make the finding that the facility will be constructed in accordance with the license, if the COL holder can make changes prior to receiving NRC approval?**

Staff Response:

The draft COL for Vogtle contains a proposed license condition, "Changes during Construction (CdC)." This proposed condition would not allow the licensee to make changes to the design prior to receiving NRC approval. If the licensee wanted to change the nuclear plant design that is set forth in the licensing basis, it would have to request a change under one of the processes set forth in 10 C.F.R. § 52.98 (e.g., § 50.90 or § 50.59). Therefore, the licensing basis cannot be changed from that set forth in its final safety analysis report (FSAR) until the NRC has approved the license amendment request (LAR).

The proposed CdC condition provides the ability for a licensee, in conjunction with an LAR, to request a notification that the NRC has no objection to the licensee constructing the proposed changed design feature pending NRC's review of the LAR. If the LAR were subsequently approved, the licensee would change the licensing basis in the FSAR. If the LAR is subsequently denied, then the licensee must return the facility to its then current licensing basis. Therefore, under this CdC process, the Commission can find that the facility will be constructed in accordance with the COL.

6. **Pre-Operational Testing License Condition**

   a) **Each of the tests listed under heading (a) contains a note that test is to be performed by first plant or first three plants. Will this condition be included in all AP1000 combined licenses until a plant or first three plants have completed the tests?**

Staff Response:

Yes. All licensees that reference the AP1000 design will contain the license condition requiring that the licensee have to perform the subject tests. They can request a license amendment, after receiving their COL, based on an acceptable test result at another licensed plant that is applicable to their plant.

   b) **If the construction and operation of Vogtle proceed at a pace such that Vogtle is not the first or first of three that conducts the required test, how is the need to conduct or not conduct the tests communicated to the licensees?**

Staff Response:

All licensees that reference the AP1000 design will have to perform the first or first-three-plant tests. The Vogtle licensee will be in communication with other AP1000 licensees through the design-centered working group and will know whether the tests have been performed. At that

time, the licensee can request an amendment to the licensing basis to remove the subject license conditions.

c) **If the results of the tests identified in section (a) of the pre-operational testing license condition are not within an acceptable range, what actions are the first and subsequent "plants" required to perform? Where is that requirement described?**

Staff Response:

In accordance with the license condition, the licensee must re-perform such tests until the results are within the acceptable range as required by the license. Otherwise, the licensee must request a license amendment to either change the design or change the acceptance criteria for the tests.

7. **What criteria were used to decide which operational programs to include in the operational program implementation license condition?**

Staff Response:

SECY-05-0197, Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance, dated October 28, 2005, discussed the information on operational programs that COL applicants are required to provide in their application, implementation of operational programs, and license conditions for implementing operational programs. The NRC's regulations at 10 C.F.R. § 52.79 specify the contents for COL applications, including descriptions of operational programs and their implementation; however, the regulations do not specify implementation milestones for all operational programs. SECY-05-0197 proposed to the Commission that license conditions be used to specify implementation milestones for those operational programs required by regulations that did not have implementation milestones specified in the regulations. The Commission approved the Staff's proposal in its staff requirements memorandum (SRM) dated February 22, 2006.

In one case, 10 C.F.R. § 52.79(a)(40) requires a COL applicant to provide "a description of the fire protection required by § 50.48 of this chapter and its implementation"; however, a license condition for implementation of the fire protection was provided because the regulations did not specify an implementation milestone. In addition, 10 C.F.R. § 52.79(a)(10) requires a COL applicant to provide a description of the environmental qualification program required by 10 C.F.R. § 50.49(a) and its implementation. A license condition for implementation of the environmental qualification was provided because the regulation did not specify an implementation milestone. In another case, 10 C.F.R. § 52.79(a)(33) requires "a description of the training program required by § 50.120 of this chapter and its implementation." However, 10 C.F.R. § 50.120 specified implementation of the non-licensed plant staff training program for holders of a combined license to be no later than 18 months before the scheduled date for initial loading of fuel; therefore, a license condition was not necessary for implementation of that program.

8. Normally, the Atomic Safety and Licensing Board handles both the contested and uncontested hearings for limited work authorizations. Why is the second limited work authorization for the Vogtle site being addressed as part of the combined license mandatory hearing?

Staff Response:

Like issuance of a combined license, issuance of a limited work authorization (LWA) is a licensing action for which a hearing is required. The second LWA request for the Vogtle site was submitted as part of the Vogtle combined license application, and the Commission has determined that it will be the presiding officer for mandatory hearings on combined licenses. *See* Memorandum from Annette L. Vietti-Cook, Secretary, to Luis A. Reyes, Executive Director for Operations, et al., Staff Requirements - COMDEK-07-0001/COMJSM-07-0001 - Report of the Combined License Review Task Force (June 22, 2007) at 1.

Generally, when the Commission intends that an Atomic Safety and Licensing Board (ASLB) conduct a mandatory hearing on an application, it issues a referral memorandum or Order delegating that responsibility to the Chief Judge of the ASLB Panel. *See, e.g.*, *USEC, Inc.* (American Centrifuge Plant), CLI-04-30, 60 NRC 426, 428-29 (2004) (hearing notice and Order); *see also Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-07-24, 66 NRC 38, 39 (2007) (reaffirming delegation of Vogtle ESP mandatory hearing to Licensing Board in response to Board's certified question). The Commission has not delegated any aspect of the Vogtle mandatory hearing, including with respect to the second LWA, to the Atomic Safety and Licensing Board. The Staff accordingly addressed the LWA and associated findings in its SECY information paper.

9. Considering that a limited work authorization would permit the Applicant to start safety-related construction in specific areas prior to receipt of a combined license, what benefits, if any, are there to issuing a Vogtle combined license and limited work authorization concurrently?

Staff Response:

Applicants may request an LWA for a variety of reasons. The standard reason a COL applicant might request an LWA is to enable certain construction activities to begin before the COL is issued. However, depending on an applicant's plans and intended construction schedule, an LWA may also be of value as a contingency for managing potential delays associated with the issuance of the COL, whether related to the technical review, the NRC hearing process, or subsequent legal challenges. As explained below, this benefit may exist even where the COL and LWA are issued concurrently.

For example, an applicant might choose to include an LWA request in its application just in case issues arise during the NRC hearing process (whether contested or uncontested) regarding aspects of the COL application unrelated to the activities to be approved under the LWA. In such circumstances, if there are no outstanding technical concerns relevant to the LWA, the NRC may determine that it can issue the LWA. This approach would give the licensee one means to minimize the impact on its overall construction schedule pending the resolution of the unrelated COL issues, recognizing of course that if the LWA holder elects to proceed with the LWA activities it does so at the risk that the COLs could ultimately be denied. See 10 C.F.R.

§ 50.10(f). As another example, there is always a possibility of a post-issuance challenge to the COLs, including, for example, a judicial stay order. In that event, a licensee's having received the LWA concurrently with the COLs may allow it to proceed in the interim at least with the LWA activities, depending on whether the challenge extends to matters within the scope of the LWA.

The Vogtle applicants' stated purpose in requesting the second LWAs is to support the overall project schedule and ensure that the target dates for operation are met. *See* Southern Nuclear Operating Co., Combined License Application for VEGP Units 3 and 4, Part 6 (LWA Request), Revision 2, Applicant's Environmental Report – Limited Work Authorization Stage, at § 1.3 (ADAMS Accession No. ML102220380). SNC received an LWA as part of its ESP in 2009 and the construction activities authorized under that LWA are already underway at the Vogtle site. However, even if SNC did not consider receipt of the second LWAs in advance of the COLs to be necessary for SNC to maintain its anticipated schedule, the LWAs could still provide the other "contingency" benefits described above. In any event, because SNC has not withdrawn the LWAs from its application, the Staff is proceeding with the understanding that the LWAs should be issued even if concurrent with issuance of the COLs.

10. A number of operating reactors are still having difficulty resolving the long-standing issue of sump blockage. How did the Applicant address downstream effects associated with the Generic Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance"?

<u>Staff Response:</u>

Generic Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance," was resolved for the AP1000 in the AP1000 Design Control Document (DCD). The issue was resolved in part by the AP1000 design features that limit the amount of debris that can be generated during a loss-of-coolant accident (LOCA). However, a COL applicant referencing the AP1000 design remains responsible for developing a stringent containment cleanliness program that limits the amount of latent debris in the containment.

The principal AP1000 design features relevant to resolution of Generic Issue 191 include using low- or non-fibrous insulation (e.g., metal reflective insulation), limiting the amount of aluminum that can be submerged, and selecting coatings that limit debris generation and transport. The sump screens are designed to assure negligible reduction in the recirculation flows due to debris accumulation on them. These design features are specified in the AP1000 DCD Section 6.3, and verified through ITAAC Table 2.2.3-4. The downstream effects were addressed through a post-LOCA long-term cooling evaluation, which includes sensitivity analysis and fuel assembly head loss testing. The sensitivity analysis determined the maximum allowable head loss at the core inlet with core flow that maintains adequate core cooling, and therefore established the head loss criteria for fuel assembly debris blockage head loss testing. The fuel testing was performed to demonstrate acceptable head loss in the presence of design basis debris loading, thus demonstrating adequate core cooling is maintained under a post-LOCA environment. The design-basis debris loading included the allowed level of latent debris and LOCA-induced debris and chemical production. The long-term core cooling evaluation is described in Reference 3 (ML102170120) of Chapter 6.3 of the AP1000 FSAR. The Staff's evaluation is described in the AP1000 FSER section 6.2.1.8. The Staff found that the evaluations performed by Westinghouse showed that with the design-basis containment debris

loading, adequate core cooling in the AP1000 can be maintained during the post-LOCA recirculation long-term cooling period.

The Staff provided its final safety evaluation report to the ACRS, and briefed the Subcommittee on October 5, 2010, and the Full committee on November 4, 2010. In its letter of December 20, 2010, "Long-Term Core Cooling for the Westinghouse AP1000 Pressurized Water Reactor," the ACRS concluded that the regulatory requirements for long-term cooling for design basis accidents have been adequately met for the AP1000 design. This conclusion is based on the cleanliness requirements specified in the DCD amendment, which are identified as Tier 2* information and will require NRC review for any change.

The applicant's containment cleanliness program is described in Chapter 6.3 of the Vogtle FSAR, which provides details of the program and procedures to minimize the amount of debris that might be left in containment following refueling and maintenance outages, including requirements for cleanliness inspections and limits on materials introduced into containment. The Staff's evaluation of the program is described in the Vogtle FSER section 6.3. The Staff found that the Vogtle containment cleanliness program is acceptable because it is consistent with Regulatory Guide 1.82 recommendations and will limit the latent debris to acceptably small quantities used in the long-term cooling evaluation.

11. Does the Vogtle site fall within the portion of the United States that is being addressed under Generic Issue 199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants?" If so, how did the Applicant address the concerns stated in Generic Issue 199?

<u>Staff Response:</u>

Yes. Pursuant to the draft Generic Letter that was issued for public comment on September 1, 2011 (ML111710783), all 104 operating plants, including the existing Vogtle Units 1 and 2, will be requested to address the issues raised under GI-199. Because the Generic Letter has yet to be finalized and sent to each of the licensees for operating nuclear power plants in the United States, the licensee for Vogtle Units 1 and 2 has not yet responded to it. This Generic Issue arose during the review of the first Early Site Permits, when the Staff determined that certain seismic hazard estimates were higher than previously assumed.

While the draft GL is only addressed to current license holders, the concerns raised in the draft GL have been indirectly addressed by the Vogtle COL applicant because the ground motion response spectra (GMRS) for Vogtle Units 3 and 4 were developed using updated probabilistic seismic hazard estimates. Seismic site characteristics were established and resolved as part of the Vogtle ESP review. In its ESP application, the Vogtle applicant performed its probabilistic seismic hazard analysis (PSHA) using updated EPRI ground motion prediction equations as well as a revised EPRI seismic source model, considering more up-to-date scientific information. For example, the ESP review determined that the Vogtle site hazard is dominated by the Charleston seismic source zone, which was completely revised by the applicant as a result of recent paleoliquefaction data. Furthermore, in its ESP application, the applicant used the performance-based approach to develop the GMRS (Regulatory Guide 1.208, published in March 2007), which combines a conservative characterization of the ground motion hazard with equipment/structure performance (fragility characteristics) to establish a risk-consistent GMRS.

NRO staff has kept well abreast of new seismic source and ground motion studies in the Central and Eastern United States, and the Staff's review of the Vogtle Units 3 and 4 application focused on ensuring that the applicant properly updated seismic source models to account for newer information, in accordance with the Staff's current guidance in RG 1.208. None of this seismic source and ground motion information changed in the COL application; the ESP determinations were, accordingly, incorporated by reference and considered resolved in the COL application.

12. The Bellefonte SER is mentioned multiple times in the Vogtle FSER. Is the Bellefonte SER publicly available, and is the Staff planning to publish the Bellefonte SER as a NUREG? If so, will it be published on a comparable schedule as the Vogtle FSER?

Staff Response:

Yes, the Bellefonte SER with open items is publicly available. The Staff does not plan to issue the Bellefonte SER with open items as a NUREG. The Staff issued the SER with open items on a chapter-by-chapter basis between June and December 2009 (except for Chapter 6 of the SER with open items, which was issued in November 2010). The ADAMS accession numbers for the Bellefonte SER with open items are the following:

Chapter 1, ML090900401
Chapter 2, ML091540376, ML091590086, ML091590093, and ML091590097
Chapter 3, ML083440181
Chapter 4, ML091190476
Chapter 5, ML091260137
Chapter 6, ML093140300
Chapter 7, ML083390149
Chapter 8, ML091570002
Chapter 9, ML091120420
Chapter 10, ML091260128
Chapter 11, ML091330653
Chapter 12, ML091110669
Chapter 13, ML090750609
Chapter 14, ML091120120
Chapter 15, ML092590516
Chapter 16, ML091190268
Chapter 17, ML091190346
Chapter 18, ML091190760
Chapter 19, ML091110711

13. When will the Vogtle combined license holder be required to start making contributions to the decommissioning fund?

Staff Response:

The license holders must establish their decommissioning trust to the standards in 10 C.F.R. § 50.75 prior to initial fuel load.

Southern Nuclear Operating Company has stated in the COL application that the four owners of Vogtle Units 3 and 4 – Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and The City of Dalton, Georgia – have chosen to deposit funds for the decommissioning of Vogtle, Units 3 & 4, using the external sinking fund as described in 10 C.F.R. § 50.75(e)(1)(ii). In accordance with 10 C.F.R. § 50.75(e)(3), Southern Nuclear Operating Company, after issuance of the combined licenses, will submit a report for each unit, no later than thirty (30) days after the NRC publishes notice of intended operation in the *Federal Register* pursuant to 10 C.F.R. § 52.103(a). This report will contain a certification that financial assurance for decommissioning is provided in the amount specified in SNC's most recent updated certification, including a copy of the financial instrument to be used.

14. Foreign Ownership

a) **Understanding that none of the individual corporations or entities that will own Vogtle, Units 3 and 4 is owned, controlled, or dominated by a foreign corporation or foreign government, what will be the percent of domestic and foreign ownership?**

Staff Response:

Based on the information submitted in the application, the owners and operator will be 100% domestically owned.

b) **With regard to foreign ownership, the FSER contains the assertion that the Staff does not know or have reason to believe the Applicants are controlled, or dominated by a foreign corporation or foreign government, but does not describe how the Staff confirmed this to be true. What actions did the NRC Staff take to confirm that the individual corporations or entities that will own Vogtle, Units 3 and 4 are not owned, controlled, or dominated by a foreign corporation or foreign government? Where are the actions to confirm amount of foreign ownership summarized in the FSER?**

Staff Response:

Section 103 of the Atomic Energy Act of 1954, as amended, prohibits the Commission from issuing a license for a nuclear power plant under Section 103 to an alien or any corporation or other entity if the Commission knows or has reason to believe it is owned, controlled, or dominated by an alien, a foreign corporation or a foreign government.

The Staff primarily relies on the statements in the license application that the potential licensee(s) is not owned, controlled, or dominated by an alien, foreign corporation, or foreign government. 10 C.F.R. § 50.30(b) requires each license application to be executed in a signed original by the applicant or duly authorized officer thereof under oath or affirmation. 10 C.F.R. § 50.33(d) requires the application to identify applicants who are foreign citizens, businesses, or acting as agents or representatives of a foreign principal.

Moreover, in this particular case, the applicants for combined licenses to construct and operate Vogtle Units 3 & 4, are also the licensees and co-owners of Vogtle Units 1 & 2. By virtue of the

NRC's oversight of the existing reactor fleet, the licensees of Vogtle, Units 1 & 2, are well known entities to the Staff. For these reasons, at this time, the Staff has no reason to believe that the licensees are owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

FSER Section 1.5.4 (Pages 1-49 and 1-50) describes the actions taken to confirm that SNC and the owners of Vogtle Unit 3 & 4 are not owned, controlled, or dominated by a foreign corporation or foreign government.

15. ITAAC

a) **If inspections, testing, or analyses are not explicitly stated or described in individual ITAACs (including design certification, early site permit, or plant-specific), what publicly available document contain those specifics?**

Staff Response:

The purpose of ITAAC is to verify that a plant has been constructed and will operate in accordance with the license, the Atomic Energy Act, and NRC rules and regulations. This includes verifying that an as-built facility conforms to the approved plant design. Development of ITAAC spans the preceding two decades and was the subject of many Commission papers during the early years of developing and refining the Part 52 licensing process (e.g., SECY-91-178, SECY 91-210, SECY-92-053, and SECY-92-214). For the purposes of design certification, ITAAC was included in Tier 1 of the design control document (DCD) along with design descriptions and the necessary and relevant tables and figures. The format of the ITAAC consisted of three columns: (1) design commitments; (2) inspections, tests, and analyses, and (3) acceptance criteria. The inclusion of structures, systems, and components for verification by ITAAC was based on safety significance. This graded approach resulted in levels of detail for the design and its verification that were commensurate with the significance of the safety functions to be performed.

With respect to the inspections, tests, or analyses specified for demonstrating that the acceptance criteria are met, staff review guidance provided by SRP 14.3 indicates that the specific method to be used by the licensee is either an inspection, test, or analysis, or some combination of these. Definitions for these methods are also provided in the Tier 1 document to provide further clarity. Detailed supporting information for various inspections, tests, and analyses, including background material and context for the Tier 1 information, is typically included in the Tier 2 document of the DCD. When a COL references a certified design as part of its application, this Tier 2 information becomes a part of its FSAR. This information is currently available on the NRC's public webpage or through ADAMS. Many tests, inspections, and analyses are specified by various industry codes and standards that are referenced in design commitments and acceptance criteria (e.g., ASME, ASTM, IEEE, ACI, AWS, etc.) and the specifics are not included in the ITA column of the ITAAC table. Instead, reference to this information is provided in the Tier 2 document of the DCD (i.e., FSAR for the COL). The Tier 2 information may be revised according to a change process that is similar to 10 C.F.R. § 50.59, whereas changes to the Tier 1 document must be performed in accordance with a higher regulatory threshold (i.e., a COL must request a license amendment and an exemption to change ITAAC included in the referenced certified design and must request a license amendment to change plant-specific ITAAC). Supporting information for plant specific ITAAC may be changed consistent with the provisions of 10 C.F.R. § 50.59.

For the following ITAACs, please provide references for the applicable documents, including page numbers:

i) ITAAC 1 concerning backfill material in Table 2.5-1.

Staff Response:

This ITAAC is referenced as No. 874 (ITAAC No. E.2.5.04.05.05.01, Backfill Material) in Appendix C to draft COL for Vogtle Unit 3 (ML111780143). This ITAAC was proposed, reviewed, and approved as part of the previously-issued ESP and would be included in any issued Vogtle COL pursuant to 10 C.F.R. § 52.79(b)(3). Accordingly, discussions regarding the backfill design, backfill sources, and quality control and ITAAC for the backfill material are provided on pgs. 2.5.4-32 through 2.5.4-36 in Sections 2.5.4.5.3, 2.5.4.5.4, and 2.5.4.5.5, respectively, of the referenced Vogtle Unit 3 and 4 Early Site Permit Application (ML081020222). The modified Proctor compaction test is a commonly referenced test that is designated by American Society for Testing and Materials (ASTM) standard ASTM D1557.

ii) ITAAC 1 concerning mudmat in Table 3.8-1.

Staff Response:

This ITAAC is referenced as No. 873 (ITAAC No. E.3.8.05, Waterproof Membrane) in Appendix C to draft COL for Vogtle Unit 3 (ML111780143). This ITAAC was proposed, reviewed, and approved as part of the previously-issued ESP and would be included in any issued Vogtle COL pursuant to 10 C.F.R. § 52.79(b)(3). Accordingly, discussions regarding the waterproof membrane design and qualification program, which includes testing to demonstrate that the ITAAC design commitment for friction coefficient is met, are provided on pgs. 3.8-3 and 3.8-4 in Section 3.8.5.1.1, Waterproof Membrane, of the referenced Vogtle Unit 3 and 4 Early Site Permit Application (ML081020207).

iii) ITAAC 6 concerning reactor coolant pumps in Table 8.2A-1.

Staff Response:

This ITAAC is referenced as No. 676 (ITAAC No. C.2.6.12.06, Offsite Power) in Appendix C to draft COL for Vogtle Unit 3 (ML111780143). Discussions regarding grid stability and maintaining reactor coolant pump for three seconds following a turbine trip are provided on page 8.2-11 of the Vogtle Units 3 and 4 COL application (ML11180A1000).

iv) ITAAC 6.3 concerning release of radioactive materials in Table 13.3-1.

Staff Response:

This ITAAC is referenced as No. 755 (ITAAC No. E.6.3, Emergency Planning - Accident Assessment) in Appendix C to draft COL for Vogtle Unit 3 (ML111780143). The ITAAC requires that the referenced documents (i.e., emergency implementing procedures (EIPs) and Offsite Dose Calculation Manual (ODCM)) contain the specific details associated with calculating the onsite and offsite exposures and contamination. COL application Part 5,

"Emergency Plan," provides an Index of Procedures in V2 Appendix 1. This list includes a proposed EIP, entitled "Estimating Offsite [Dose]." ITAAC 9.1 for Units 3 and 4 states that "[t]he licensee has submitted detailed emergency implementing procedures (EIPs) for the onsite emergency plan no less than 180 days prior to fuel load." The EIPs and ODCM will also contain the specific methodology and details that reflect the as-built plant systems and parameters, and should enable the licensee to assess the impact of the release of radioactive materials to the environment, in regard to determining onsite and offsite exposures and contamination for various meteorological conditions. The details contained in the EIPs and ODCM accordingly will provide the specific objective criteria (e.g., system parameters and calculations) that will be used to determine whether the licensee has met Unit 3 ITAAC 6.3. (See also, Unit 3 ITAAC 6.2 and 6.6, and Unit 4 ITAAC 6.2, 6.3, and 6.6.) Thus, although the EIPs and ODCM are finalized later because they must reflect the as-built plant systems and parameters, and are thus not presently publicly available, they will contain the specific objective criteria for closing the ITAAC.

b) If it is determined after a combined license has been issued that the acceptance criteria for an ITAAC are unclear or are in dispute, what regulatory mechanisms are in place to provide the needed clarity or resolve the dispute?

c) If it is determined after a combined license has been issued that the test, inspection, or analysis used to demonstrate acceptability of the acceptance criteria was not adequate, what regulatory mechanisms are in place to provide the needed clarity or resolve the dispute?

Staff Response:

To answer both 15 b and 15 c, there are regulatory mechanisms for changing an ITAAC to clarify its meaning. The licensee bears the burden of demonstrating that the inspection, test, or analysis was successfully completed and that the corresponding acceptance criterion is met. If the licensee's performance of the inspection, test, or analysis is not adequate to demonstrate that the corresponding acceptance criterion is met, then the Commission would not have a basis to find under 10 C.F.R. § 52.103(g) that the acceptance criteria in the COL are met. Pursuant to 10 C.F.R. § 52.99(d), if the licensee is unable to demonstrate successful completion of the ITAAC, then the licensee must take corrective actions or request NRC approval for a change to the ITAAC. If there is a difference of opinion between the Staff and the licensee about the meaning of an ITAAC, this can be resolved through the inspection process or the ITAAC closure verification process. This can include interactions between the licensee and the NRC regarding the proper interpretation of the ITAAC in light of other information bearing on its meaning, particularly information in other parts of the licensing basis, such as Tier 2 or the FSAR. Ultimately, the NRC would be responsible for interpreting the requirements in the ITAAC.

Modifications to ITAAC can be initiated either by the licensee or by the NRC. Licensees can propose modifications to an ITAAC on a plant-specific basis pursuant to 10 C.F.R. § 52.98(f), "Finality of Combined Licenses; Information Requests." This paragraph states that any modification to, addition to, or deletion from the inspections, tests, analyses, or related acceptance criteria contained in the license is a proposed amendment to the license. If the licensee proposes to change an ITAAC, it must submit an application for a license amendment, in accordance with 10 C.F.R. § 50.90. In addition to a license amendment request, the licensee must also request an exemption from the applicable standard design certification rule before making any changes to ITAAC contained in the license that are within the scope of the referenced design certification rule (e.g., 10 C.F.R. Part 52, Appendix D, Section VIII.A.4).

In the event that the NRC believes that changes are required to an ITAAC and the licensee does not agree, the NRC can ultimately issue an order that modifies the license if the standards for imposing such a modification by order are met (10 C.F.R. § 50.109 for site-specific ITAAC and 10 C.F.R. § 52.63(a)(4) for ITAAC referenced from a standard design certification). For ITAAC contained in a design certification, the NRC can also generically change the ITAAC via rulemaking if the thresholds in 10 C.F.R. § 52.63(a)(1) are satisfied. According to 10 C.F.R. § 52.63(a)(3), a generic modification to a design certification rule would apply to all plants referencing the certified design unless the modification were rendered technically irrelevant by a plant-specific departure.

16. How many ITAACs does the Staff estimate will be standard ITAACs for other AP1000 COLs? Please identify those ITAACs.

Staff Response:

The total inventory (875) and sources for the ITAAC are identified in Appendix C to the draft combined license (COL) for Vogtle, Unit 3 (ML111780143). All of the ITAAC that were incorporated by reference (819) from the AP1000 design control document (DCD), which are identified in Appendix C, will be standard for the other COLs that reference the AP1000 standard design. Of the remaining ITAAC, 31 came from the Vogtle Early Site Permit and 25 came from the COL.

The unit-specific ITAAC are identifiable by the leading alpha character (either a C or an E) of the assigned ITAAC number. The standard AP1000 ITAAC do not have a leading alpha character.

17. Please provide a summary of COL items that are expected to be referenced in future COLs and those that will be strictly site-specific.

Staff Response:

FSAR information that addresses a DCD Combined License Information Item and is common to other COL applications is designated as a standard (STD) COL item. The standard information is expected to be referenced in future COL applications. Vogtle FSAR Table 1.8-202 (VEGP COL FSAR Pages 1.8-4 through 1.8-21) identifies each COL item in the Vogtle COL application and provides a cross-reference between the referenced DCD subsection and the FSAR section. Of the 133 COL items, 90 contain standard information. Standard information may be supplemented by plant-specific information and will be identified appropriately. The application contains 43 site-specific COL information items.

18. What process was used to determine which technical areas involved interfaces between the COL and matters addressed by the design certification that would have otherwise been excluded from consideration in the COL review?

Staff Response:

Consistent with 10 C.F.R. § 52.79(d)(2), applicants referencing a standard design certification must demonstrate that the interface requirements established for the design under § 52.47 have

been met. In a letter dated June 16, 2009, the Staff requested that the applicant explicitly identify how these interface items have been met. In its response dated July 16, 2009, SNC provided explicit identification of the FSAR location of information addressing the interface items identified in Section 1.8 of the DCD. Subsequently, the FSAR was updated to include a new Table 1.8-205 (VEGP COL FSAR Pages 1.8-25 through 1.8-31), which addresses these interface items.

19. Did any of the technical areas of interface discussed in Question 18, above, involve matters related to recent updates to the application for a certified design for the AP1000? If so, how did the Staff ensure that the COL review encompassed the most current information regarding the design certification?

Staff Response:

No recent updates to the application to amend the certified design for the AP1000 added interfaces. In developing the FSER for VEGP Units 3 and 4, the Staff examined the AP1000 DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to a particular review topic. Because of its reliance on both the AP1000 DCD and the DCD FSER, the Staff did not issue the VEGP FSER until the AP1000 design certification amendment (DCA) FSER was issued. This approach allowed the Staff to appropriately consider the AP1000 DCA FSER and identify any issues that could affect the review of the VEGP COL application.

20. What was the threshold or metric used by the Staff to determine if the changes were significant enough to warrant further interaction with the ACRS? Was ACRS notified of the changes?

Staff Response:

In its letter dated January 24, 2011, the Advisory Committee on Reactor Safeguards (ACRS) recommended that the Staff review with ACRS any changes in the design or commitments that are not yet incorporated in the Vogtle COL application or referenced in the DCD that significantly deviate from those presented during the ACRS review of the advanced SE (ASE) for Vogtle. The Staff completed its review of Revision 18 and 19 of the AP1000 DCD and corresponding Revision 4 and 5 of the VEGP FSAR and has closed all the confirmatory items identified in the Vogtle ASE. The Staff final safety evaluation report includes three additional items, which were not included in the ASE for Vogtle and thus not specifically reviewed by the ACRS. It is Staff's view that these three items were not of sufficient significance to warrant ACRS briefing. Two items arose from revisions in AP1000 DCD Revision 18 that necessitated Vogtle-specific changes to the COL application, while the third item is also Vogtle-specific but unrelated to the AP1000 DCD. These are described below:

- The early site permit application and limited work authorization request for the Vogtle site was based on the information contained in Revision 15 of the AP1000 DCD. In Revision 18 of the AP1000 DCD, Westinghouse revised the generic mudmat design description such that it is no longer consistent with the description provided and as approved in the Vogtle ESP. The DCD states that the lower and upper mudmat are a **minimum (**emphasis added) 6 inches thick of un-reinforced concrete. However, the lower and upper mudmat chosen and approved in the ESP will be each 6-inch layer (**nominal thickness**) and the remaining aspect of the lower and upper mudmats are

consistent with the DCD. It is the Staff's view that this departure was not of sufficient significance to warrant ACRS briefing.

- The performance requirements that COL applicants must meet for the waterproofing system are described in Section 3.4.1.1.1 of the AP1000 DCD. The AP1000 DCD, Revision 18 states that for applicants who choose to use the sprayed-on waterproofing membrane system for foundations, the waterproofing material will consist of 100-percent solid materials based on polymer-modified asphalt or polyurea. However, the Vogtle applicant proposed a Tier 2 departure. Specifically, the applicant stated that the material chosen for the VEGP Units 3 and 4 ESP SSAR is an elastomeric membrane material utilizing Methyl Methacrylate resins as the base material. The AP1000 DCD, Revision 15, did not specify or allow the type of material planned to be used for the LWA; therefore, the applicant in its ESP SSAR specified an alternate material (an elastomeric membrane material utilizing Methyl Methacrylate resins) as the base material. This material was reviewed and approved by the Staff during the ESP phase. It is the Staff's view is that this departure was not of sufficient significance to warrant ACRS briefing.

- The applicant intends to utilize a heavy lift derrick (HLD) during construction activities, of which the counterweight and ring foundation will be abandoned in place. The applicant submitted the associated changes to the VEGP FSAR and concluded that the presence of the HLD counterweight and ring foundation will have no effect on the VEGP site-specific analysis of soil-structure interaction (SASSI) soil-structure interaction (SSI) analyses. The Staff reviewed and accepted the applicant proposal. It is the Staff's view that this change was not of sufficient significance to warrant ACRS briefing.

Based on the above, the Staff determined that no briefings to ACRS were necessary regarding the above changes. This view was discussed with ACRS staff and, through ACRS staff, Mr. Harold Ray, Chairman, AP1000 ACRS Subcommittee, indicated that he agreed with the Staff that no further ACRS action regarding the Vogtle COL application was needed.

21. The Fukushima Task Force report contains three specific recommendations for near-term COL applications associated with confirming station blackout and spent fuel pool capabilities, enhancing onsite emergency response capability, and enhancing emergency planning to address prolonged station blackout and multi-unit accidents. The Commission could choose to adopt some or all of these recommendations and implement them in the COLs through license conditions prior to issuance of the COLs or the Commission could issue the COLs and later modify, add, or delete any terms or conditions of the COLs to reflect any new Commission requirements in accordance with existing regulatory provisions. In the latter case, implementation of any Commission decisions on the Task Force recommendations generally would be comparable for both the near-term COLs and for operating reactors. Are both of these alternatives equal in regulatory viability or is one preferable over the other?

<u>Staff Response:</u>

Both of these alternatives are equal in regulatory viability. In general, there are fewer regulatory and administrative requirements for the Staff to follow when imposing license conditions before

a license is issued versus after because the complete licensing basis has not yet been established. In the specific case of Vogtle's application, certain elements of the licensing bases have already been established by the issuance of the ESP and the previous design certification. Therefore, for those recommendations that affect matters resolved in the ESP or the design certification rule, a regulatory basis would need to be established to impose the new requirements using the regulatory provisions found in 10 C.F.R. §§ 52.83, 52.98, and 50.109, regardless of whether the COL has been issued.

22. In its review of the AP1000 design, the ACRS noted that the automatic depressurization system ADS-4 squib valves must operate to achieve passive long-term cooling after a loss-of-coolant accident. The valves, actuated by an explosive charge, are one-time-use valves until the internals are replaced. According to the ACRS, the development of an effective ISI/IST program to ensure the operability of the valves is needed. The ACRS suggested that periodic removal and firing of the explosive charge that initiates operation of the valve may not be sufficient for ensuring the operability of these critical components. The ACRS recommended that the NRC establish a regulatory requirement focused on the development of an ISI/IST program, including a review of the lessons learned from the valve design and qualification process. How are these valves to be proven operable prior to being placed in service?

Staff Response:

Prior to placing the squib valves at Vogtle Units 3 and 4 in service, the AP1000 ITAAC require that the squib valves be demonstrated to be capable of performing their safety functions as part of the design and qualification process. AP1000 DCD Tier 1, Table 2.1.2-4, "Inspections, Tests, Analyses, and Acceptance Criteria," includes ITAAC 12.a to verify the design and qualification of the squib valves in the Automatic Depressurization System (ADS) of the AP1000 reactor. In particular, Design Commitment 12.a states that the ADS valves identified in Table 2.1.2-1 will perform an active safety-related function to change position as indicated in the table. Inspections, Tests, Analyses (ITA) 12.a.iv states that tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design conditions. ITA 12.a.v states that an inspection will be performed for the existence of a report verifying that the as-built squib valves are bounded by the tests or type tests. Acceptance Criterion 12.a.iv states that a test report exists and concludes that each squib valve changes position as indicated in Table 2.1.2-1 under design conditions. Acceptance Criteria 12.a.v states that a report exists and concludes that the as-built squib valves are bounded by the tests or type tests.

AP1000 DCD Tier 1, Table 2.2.3-4, "Inspections, Tests, Analyses, and Acceptance Criteria," in ITAAC 12.a specifies that tests or type tests will be performed that demonstrate the capability of the Passive Core Cooling System (PXS) squib valves to operate under its design condition, and that an inspection will be performed for the existence of a report verifying that the as-installed squib valves are bounded by the tests or type tests.

The Staff conducted audits for the design and procurement specifications for AP1000 valves (including squib valves) at the Westinghouse offices as part of the review of the Vogtle COL application. The Staff is currently monitoring the design and qualification process of the AP1000 squib valves through attendance at design review and test planning meetings, and observation of prototype testing. The Staff will conduct vendor inspections to evaluate the design and

qualification process for the squib valves. The Staff will conduct inspections to verify completion of the AP1000 ITAAC for the squib valves to be used at Vogtle Units 3 and 4 in support of the Commission decision required by 10 C.F.R. § 52.103(g).

COL licensees are required by 10 C.F.R. § 50.55a(f)(4)(i) to implement the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) incorporated by reference in 10 C.F.R. § 50.55a 12 months before fuel loading. The Staff is participating in ASME activities to revise the OM Code to provide updated inservice testing (IST) requirements for pumps and valves in new reactors, including improved surveillance provisions for testing and internal inspection of squib valves. ASME has completed Phase 1 of the effort to provide improved IST provisions in the 2011 Addenda to the ASME OM Code. ASME is initiating Phase 2 that will consider additional improvements including squib valve surveillance activities. The NRC is reviewing the revised ASME OM Code (and will review future ASME Code editions) with respect to new reactors for incorporation by reference in 10 C.F.R. § 50.55a with appropriate modifications.

In response to a Staff request for additional information (RAI), SNC revised the Vogtle FSAR to require that the IST program for squib valves will incorporate lessons learned from the design and qualification process for these valves such that surveillance activities provide reasonable assurance of the operational readiness of squib valves to perform their safety functions. The IST program for squib valves will address appropriate inservice testing and internal inspection activities. The Staff is monitoring the development of IST provisions for squib valves through the design and qualification process being conducted by Westinghouse and the valve vendor. Consequently, the NRC found in the SER that because the NRC regulations in 10 C.F.R. § 50.55a require the application of the ASME OM Code for inservice testing of valves, and the VEGP FSAR adequately describes the IST program for squib valves for incorporating the lessons learned from the design and qualification process in developing surveillance activities, there is reasonable assurance of the operational readiness of squib valves to perform their safety functions.

As discussed in Commission Paper SECY-05-0197 (October 28, 2005), “Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria,” the Staff will confirm the implementation of Vogtle FSAR requirements for IST activities during inspections of the Vogtle IST operational program during plant construction. These inspections will include the surveillance activities for testing and internal inspection of squib valves at Vogtle Units 3 and 4. The Staff will base its inspection on the NRC regulations in 10 C.F.R. § 50.55a that will incorporate by reference the ASME OM Code edition 12 months before fuel load for squib valve surveillance activities with any modifications in the NRC regulations that reflect lessons learned from the squib valve design and qualification process.

23. What specifically were the differences between the final DCD (Rev. 19) and that which the ACRS reviewed? How did the Staff determine that there were no significant deviations between those versions such that an ACRS re-review was not necessary?

<u>Staff Response:</u>

The ACRS reviewed Revision 17, the Staff advance final safety evaluation report (AFSER) and associated references identified by the Staff in the AFSER as the basis for closure of open items. Revision 18 came at the completion of the ACRS review in December and incorporated

closure of confirmatory items and a few items to respond to ACRS requests. The differences between Revision 19 and what the ACRS reviewed fall into four broad areas: (1) Specific inclusion of DCD wording to satisfy confirmatory items (word-for-word as previously stated in the referenced correspondence); (2) minor cleanup items, for internal consistency, updating versions of reference documents and making some editorial corrections, such as in the Technical Specifications; (3) the final extent of discussion of structural topics within section 3.8 of the DCD and what information is designated as Tier 2*; and (4) a few technical issues that emerged during the confirmatory item closure process.

The technical issues were:

(a) Load combination for seismic loads and external temperature loads for the shield building;
(b) The method used for the analysis of sloshing in the passive containment cooling water storage tank; and
(c) Correction of identified errors in the containment peak pressure analysis.

The Staff provided its final safety evaluation report to the ACRS in these three areas, including the complete SER for section 3.8. Westinghouse and the Staff briefed the Subcommittee on August 16, 2011. A full committee meeting was held on September 8, 2011. Any associated ACRS correspondence concerning Revision 19 will be included, as appropriate, as part of the rulemaking record.

24. Describe the plant's ability to deal with a station blackout event.

This question was directed solely to the Applicant. Accordingly, the Staff has not provided a response.

25. a) Please provide a summary of how the DAC from the certified design were addressed in the context of the COL.

<u>Staff Response:</u>

The three areas in the certified design that had design acceptance criteria (DAC) were piping design; instrumentation and control; and human factors engineering.

For the piping design analysis, the original intent was for Westinghouse to complete the piping designs as part of the AP1000 design certification amendment to resolve the DAC. That work was not finished in time, so the DAC have been proposed as COL ITAAC; one that includes completion of the piping design and another that includes completion of the pipe break hazards analysis. These two ITAAC are included to perform reconciliation of the as-built piping with the piping design and with the pipe break hazards analysis. To allow for NRC inspection of the completed piping design, a license condition is included for notification of the Director of NRO of the availability of the completed design reports and a requirement that the as-designed piping analysis be completed prior to installation of piping and connected components. This activity will be performed after issuance of the COL through the ITAAC closure process. This is described in Section 3.12.5 of the Vogtle FSER (ML110450302).

For the instrumentation and control DAC, much of the DAC was completed in the AP1000 design certification amendment. The system definition phase relating to the hardware design for the protection and monitoring system remains as DAC for the licensee to complete in the

ITAAC closure process. The remaining DAC are described in Section 7.2.2 of the AP1000 DC amendment FSER (ML110190411).

For human factors engineering, the DAC were closed in the AP1000 design certification amendment. Please see chapter 18 of the AP1000 DC amendment FSER (ML102280424).

b) How does the Staff expect that follow-on COLs will treat these DAC, particularly in comparison with the Vogtle COL?

Staff Response:

Subsequent COLs will likely reference the same design reports for piping and I&C as will Vogtle by virtue of the standard design. The as-built piping reconciliations will be unique to each COL.

26. a) Were Requests for Additional Information issued on the topic of financial qualifications? If so, please provide references.

Staff Response:

Part 1 of the original application for the combined license (COL) included information regarding financial qualifications. (Note that in a separate letter dated March 28, 2008, (ML080920633) SNC included proprietary information regarding the estimated construction cost for Vogtle Electric Generating Plant Units 3 and 4). Part 1 of the application contained sufficient information; therefore, the Staff did not issue any requests for additional information.

b) The Staff's financial assessment was based on the construction period beginning in November 2011 and ending with Unit 3 operation in April 2016 and Unit 4 operation in April 2017. Do the current projected operation dates differ, and could this impact the Staff's analysis?

This question was directed solely to the Applicant. Accordingly, the Staff has not provided a response.

c) The FSER at p.1-40 (regarding financial qualifications) states that the Staff considers studies from independent sources and collects projected construction costs from COL applicants for comparison and reasonableness. What independent sources did the Staff consider and how were they used?

Staff Response:

The Staff has used the following independent studies:

1.) The 2003 Massachusetts Institute of Technology (MIT) interdisciplinary study entitled "The Future of Nuclear Power;"
2.) Update to the MIT 2003 "The Future of Nuclear Power," 2009;
3.) The U.S. Department of Energy's Energy Information Agency (EIA) 2004 Annual Energy Outlook (AEO);

4.) The Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development 2005 update on Projected Costs of Generating Electricity;
5.) The Keystone Center 2007 report entitled Nuclear Power Joint Fact-Finding.

The Staff has used the independent studies to assess the reasonableness of the projected construction cost estimates provided in the COL application.

d) Please describe the further steps necessary to ensure compliance with the decommissioning funding mechanism requirements (see FSER at p. 1-48).

Staff Response:

Southern Nuclear Operating Company has stated in the COL application that the four owners – Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and The City of Dalton, Georgia – have chosen to deposit funds for the decommissioning of Vogtle, Units 3 & 4, using the external sinking fund as described in 10 C.F.R. § 50.75(e)(1)(ii). In accordance with 10 C.F.R. § 50.75 (e)(3), Southern Nuclear Operating Company, after issuance of the licenses, will submit a report for each unit, no later than thirty (30) days after the NRC publishes notice of intended operation in the *Federal Register* pursuant to 10 C.F.R. § 52.103(a). This report will contain a certification that financial assurance for decommissioning is provided in the amount specified in SNC's most recent updated certification, including a copy of the financial instrument to be used.

The license holders must establish their decommissioning trust to the standards in 10 C.F.R. § 50.75 prior to initial fuel load.

Power reactor licenses are subject to biennial decommissioning funding reports requirement pursuant to 10 C.F.R. § 50.75(f)(1), and those biennial decommissioning funding reports are reviewed by the Staff.

27. Please explain the methodology for evaluating the exemption regarding the material control and accounting program. Is this a standard issue that has been or will be raised in other COL applications?

Staff Response:

The applicant requested an exemption from the requirements of 10 C.F.R. § 70.22(b), 10 C.F.R. § 70.32(c) and, in turn, 10 C.F.R. § 74.31, 10 C.F.R. § 74.41, and 10 C.F.R. § 74.51. The provision of 10 C.F.R. § 70.22(b) requires an application for a license for special nuclear material (SNM) to include a full description of the applicant's program for material control and accounting (MC&A) of SNM under 10 C.F.R. § 74.31; 10 C.F.R. § 74.33, "Nuclear material control and accounting for uranium enrichment facilities authorized to produce special nuclear material of low strategic significance"; 10 C.F.R. § 74.41; and 10 C.F.R. § 74.51. 10 C.F.R. § 70.32(c) requires a license authorizing the use of SNM to include and be subjected to a condition requiring the licensee to maintain and follow an SNM MC&A program. However, 10 C.F.R. § 70.22(b), 10 C.F.R. § 70.32(c), 10 C.F.R. § 74.31, 10 C.F.R. § 74.41, and 10 C.F.R. § 74.51 include exceptions for nuclear reactors licensed under 10 C.F.R. Part 50 but not for the nuclear reactors licensed under 10 C.F.R. Part 52. The regulations applicable to the MC&A of SNM for nuclear reactors licensed under 10 C.F.R. Part 50 are provided in 10 C.F.R. Part 74, Subpart B, 10 C.F.R. § 74.11 through 10 C.F.R. § 74.19, excluding 10 C.F.R. § 74.17. The

applicant stated that the purpose of this exemption request is to seek a similar exception for this COL under 10 C.F.R. Part 52, such that the same requirements will be applied to its SNM MC&A program as to nuclear reactors licensed under 10 C.F.R. Part 50. In addition, the applicant stated that the exemption request is subject to the criteria of 10 C.F.R. § 52.7, which incorporates the requirements of 10 C.F.R. § 50.12.

Pursuant to 10 C.F.R. § 70.17(a), the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

In addition, pursuant to 10 C.F.R. § 74.7, the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest.

Pursuant to 10 C.F.R. § 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 C.F.R. Part 52. 10 C.F.R. § 52.7 further states that the Commission's consideration will be governed by 10 C.F.R. § 50.12, "Specific exemptions," which states that an exemption may be granted when: (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Special circumstances are present whenever, according to 10 C.F.R. § 50.12(a)(2)(ii), "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The Staff reviewed the subject exemption, which will allow the applicant to have a similar exception for the COL under 10 C.F.R. Part 52, such that the same requirements will be applied to the SNM MC&A program as nuclear reactors licensed under 10 C.F.R. Part 50. Recognizing the appropriateness of treating the MC&A programs of both Part 50 and Part 52 licenses consistently, the Staff determined that this requested exemption will not present an undue risk to the public health and safety and is otherwise in the public interest. In addition, this exemption is consistent with the Atomic Energy Act and is authorized by law. Therefore, granting this exemption will not adversely affect the common defense and security. Further, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule. Since the exemption criteria in 10 C.F.R. § 50.12 are satisfied, the Staff considers that this request also demonstrates that the exemption criteria in 10 C.F.R. § 52.7, 10 C.F.R. § 70.17(a), and 10 C.F.R. § 74.7 are satisfied. Therefore, the Staff finds that the exemption from 10 C.F.R. § 70.22(b), 10 C.F.R. § 70.32(c) and, in turn, 10 C.F.R. § 74.31, 10 C.F.R. § 74.41, and 10 C.F.R. § 74.51, is justified.

The exemption regarding the MC&A program for SNM is considered a "standard content" item for the AP1000 COL applicants. The Summer COL applicant endorsed the Vogtle applicant's request for this exemption, indicated that it is applicable to Summer, and revised its application accordingly. As described in the Summer FSER Section 1.5.5, the Staff has likewise found the Summer applicant's exemption request to be acceptable.

28. SECY-11-0110 describes ensuring "the presence of appropriate controls on sources and materials during construction" and notes that license conditions were established to address this concern. What are those controls and how were they determined? Which license conditions address this concern?

Staff Response:

The applicant provided information regarding specific types of sources and byproduct material, the chemical or physical form, and the maximum amount at any time for the requested material licenses under 10 C.F.R. Parts 30 and 40. Byproduct material and source material shall be in the form of sealed neutron sources for reactor startup and sealed sources for reactor instrumentation, radiation monitoring equipment, calibration. The applicant stated that no byproduct material (Part 30) will be received, possessed, or used at AP1000 units of a physical form that is in unsealed form, on foils or plated sources, or sealed in glass, that exceeds the quantities in Schedule C of 10 C.F.R. § 30.72. The applicant committed in FSAR Section 12.2.1.1.10 that no 10 C.F.R. Part 40 specifically licensed source material, including natural uranium, depleted uranium and uranium hexafluoride will be received, possessed, or used during the period between issuance of the COL and the Commission's 10 C.F.R. § 52.103(g) finding for each of the VEGP Units 3 and 4 and in addition, SNC committed (see letter dated March 16, 2011, ML110770137; the enclosure to this letter is not publicly available because it contains security-related information)) that uranium hexafluoride will not be received, possessed or used after the 52.103(g) findings (from initial fuel load and subsequent plant operation).

A key element of the Staff review was to ensure the presence of appropriate controls on sources and materials during construction (i.e., prior to fuel load). Therefore, the draft license includes license conditions that establish controls in the form of limits on the type and quantity of materials that the licensee may possess before the finding in 10 C.F.R. § 52.103(g) is made. The Staff focused on the control of these materials during construction, because the Staff found that once the 52.103(g) finding is made, the requirements for these sources and materials are met by the control programs in place for the operation of the reactor. In particular, in the draft COL, license conditions 2.B.(4)(a) and 2.B.(5)(a)), which the Staff evaluated in Section 1.5.5 of the FSER, limit the applicant's possession of byproduct material (License condition 2.B(5)(a) and source material (License condition 2.B(4)(a) and 2.B.(5)(a)) prior to a Commission finding under 10 C.F.R. § 52.103(g). The applicant provided a commitment in the FSAR Section 12.2.1.1.10, Page 12.2-2, that no 10 C.F.R. Part 40 specifically licensed source material, including natural uranium, depleted uranium, and uranium hexafluoride would be received, possessed, or used during the period between issuance of the COL and the Commission's 10 C.F.R. § 52.103(g) finding. The Staff incorporated this limitation into the above license conditions. Additionally, for the period after a 10 C.F.R. § 52.103(g) finding, the Staff imposed a license condition (2.B(5)(b)) that the licensee could not receive, possess, or use uranium hexafluoride. This condition was added based on the applicant's commitment in a letter dated March 16, 2011 (ML110770137).

29. SECY-11-0110 states that, regarding the emergency response facility locations, an ITAAC for a full participation emergency response exercise was established to demonstrate adequacy of TSC location. Please describe this ITAAC.

Staff Response:

The full participation emergency response exercise is addressed in Unit 3 ITAAC 8.1, where the EP Program Element states in part that "[t]he licensee conducts a full participation exercise to evaluate major portions of emergency response capabilities." The basis for the technical support center (TSC) location is not so much its exact location, as it is its capability to communicate with the control room and have access to control room data; locating the TSC close to the control room facilitates these capabilities. As addressed during the Vogtle ESP mandatory hearing of March 23-25, 2009, the relevant issues associated with TSC location are 1) communications between the TSC and control room to allow for necessary management interaction and technical information exchange, and 2) TSC access to control room data. The specific ITAAC acceptance criteria associated with this exercise, which address TSC communication with the control room and access to control room data (described below), are included in Unit 3 ITAAC Acceptance Criteria 8.1.1.C.1, 8.1.1.C.2, 8.1.1.D.1, 8.1.1.D.2, 8.1.1.D.3, and 8.1.2.

Another ITAAC that reflects the adequacy of TSC location includes ITAAC Acceptance Criterion 5.1.4, which states that "[t]he TSC is located within the protected area, and no major security barriers exist between the TSC and the control room." This reflects additional guidance in NUREG-0696, which states in part that "[t]here should be no major security barriers between these two facilities other than access control stations for the TSC and control room." Additional ITAAC that reflect the adequacy of TSC location (i.e., adequacy of communications and data availability) include Unit 3 ITAAC 1.1.1, 3.1, 3.2, 5.1.2, 5.1.3, 5.1.8, 6.4, and 7.1.2. Collectively, all of the cited ITAAC–which were evaluated and found acceptable at the ESP stage—address the adequacy of the common TSC, and address all of the relevant NRC requirements and guidance.

30. Regarding the Applicant's cyber-security plan, what areas, if any, does the Staff consider to be the most significant deviations from Regulatory Guide 5.71, and why?

Staff Response:

The most significant deviation in Vogtle's cyber security plan (CSP) from the template in Regulatory Guide (RG) 5.71 was the description of its cyber defensive architecture (CDA).

The defensive architecture described in RG 5.71 includes five concentric cyber security defensive levels separated by security boundaries, such as firewalls and diodes, where digital communications are monitored and restricted. Safety and security CDAs are isolated at the highest level behind one-way communication devices, preventing any offsite communication to these devices. What is important about the defensive architecture provided in the regulatory guide is that systems associated with safety and security are isolated behind one-way communication devices, and have a minimum of two layers of defense. Defensive cyber security architecture provided in RG 5.71 is one example of many variations that provide the two layers of defense. Defensive cyber security architecture provided in RG 5.71 is one acceptable way to comply with the regulations.

The Staff expected that not all applicants and licensees would have exactly the same cyber security defensive architecture. However, all will have isolated systems behind one-way communication devices, and have a minimum of two layers of defense. Vogtle's cyber security architecture is unique to the design of the AP1000. As a result, its cyber security architecture does not fit the example exactly as described in RG 5.71. The specific details of the Vogtle architecture were submitted by the applicant with a request that the information be withheld under 10 C.F.R. § 2.390. Although it is accordingly not possible in a public setting to specifically describe the applicant's architecture, the Staff can say here that it does provide one-way isolation for safety and security systems, and as many protective layers as the RG 5.71 architecture.

The Staff's conclusion is that the cyber security architecture provided in the Vogtle CSP includes all features considered essential to such a program. The Staff anticipated deviations like this one, as applicants may have different architectures and will need to account for these site-specific conditions.

31. Since this is the first COL review regarding loss of large areas of the plant due to explosions or fire, please describe how the Applicant's approach was similar to that used by operating reactors under 10 C.F.R. Part 50. Where program details in the Mitigating Strategies document could not be finalized and implemented until the construction phase, the Applicant identified commitments for future action prior to fuel load. Please describe these commitments.

<u>Staff Response:</u>

Current reactor licensees comply with the requirements in 10 C.F.R. § 50.54(hh)(2) through the use of the following 14 strategies that have been required through license conditions. These strategies fall into the three general areas identified by § 50.54(hh)(2)(i), (ii), and (iii). The fire-fighting response strategy reflected in § 50.54(hh)(2)(i) encompasses the following elements:

1. Pre-defined coordinated fire response strategy and guidance.
2. Assessment of mutual aid fire fighting assets.
3. Designated staging areas for equipment and materials.
4. Command and control.
5. Training of response personnel.

The operations to mitigate fuel damage provision in § 50.54(hh)(2)(ii) includes consideration of the following:

1. Protection and use of personnel assets.
2. Communications.
3. Minimizing fire spread.
4. Procedures for implementing integrated fire response strategy.
5. Identification of readily-available, pre-staged equipment.
6. Training on integrated fire response strategy.
7. Spent fuel pool mitigation measures.

The provision in § 50.54(hh)(2)(iii) regarding actions to minimize radiological release includes consideration of the following:

1. Water spray scrubbing.
2. Dose to onsite responders.

Consideration was given to including these 14 strategies in § 50.54(hh)(2) when the rule was developed. However, the Commission adopted the more general performance-based language in § 50.54(hh)(2) to account for future reactor facility designs that may contain features that preclude the need for some of these strategies. The Statements of Consideration (SOC) for § 50.54(hh)(2) [74 FR 13926, March 27, 2009] include the following statement: "New reactor licensees are required to employ the same strategies as current reactor licensees to address core cooling, spent fuel pool cooling, and containment integrity." The SOC also states that: "The mitigative strategies employed by new reactors as required by this rule also need to account for, as appropriate, the specific features of the plant design, or any design changes made as a result of an aircraft assessment performed in accordance with the Aircraft Impact Assessment rule…."[3]

Many of the strategies that will be employed at Vogtle 3 & 4 are similar to those in place at current reactor licensees. This is especially true of strategies for fire fighting and also true for some strategies in the other two categories (i.e. operations to mitigate fuel damage and actions to minimize radiological release). This is because (1) these strategies do not rely on power plant design features and (2) Vogtle 3 &4 and current reactor licensees both have used the same prescriptive NRC guidance in developing these strategies. This guidance is in a document issued to current reactor licensees on February 25, 2005 and specified for use by new reactors in "Interim Staff Guidance for Compliance with 10 C.F.R. § 50.54(hh)(2) and 10 C.F.R. § 52.80(d), Loss of Large Areas of the Plant due to Explosions or Fires from a Beyond-Design Basis Event", DC/COL-ISG-016. Both of these guidance documents contain security-related information and are not publicly available. Differences between Vogtle 3 &4 and current reactor licensees with respect to these strategies are in implementation details such as a specific mustering location for fire fighters, the number and types of communication devices, size and location of equipment staging areas, or specific Memoranda of Understanding regarding assistance from outside organizations.

There are significant differences between Vogtle 3 & 4 and current reactor licensees with regard to strategies that address core cooling, spent fuel pool cooling, and containment integrity. These strategies rely upon design features of the facility to accomplish the safety functions of core cooling, spent fuel pool cooling, and containment integrity. Some of these differences are because of the passive safety features included in the AP1000 design. Other differences are because of design features and functional capabilities, which have been incorporated into the AP1000 design to satisfy the Aircraft Impact Rule. These features have been factored into the development of Vogtle 3 & 4 mitigating strategies.

Commitments were made by the applicant in areas where performance of an action was best taken closer to the completion of building Vogtle Units 3 and 4, but prior to initial fuel load. Some examples include that the applicant committed in the Mitigative Strategies Description and Plan(MSD) to include details in plant procedures and guidance for fire brigade staging and dress out areas, to perform preoperational tests, and to label LOLA-specific equipment. Some additional areas in which MSD commitments were made by the applicant include:

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[3] The Aircraft Impact Rule is stated in 10 C.F.R. § 50.150.

implementation of training that has been developed with the systematic approach to training (SAT); performance of a walk down of LOLA procedures and guidance; re-evaluation of offsite organizations, including associated memoranda of understanding (MOUs), that could significantly enhance needed skills, equipment, or abilities should a LOLA event occur; and development of protocols and procedures to mobilize additional response organizations, as necessary, at the county and state levels. All of these examples were instances where the applicant made a commitment to perform the action or complete the task prior to the initial fuel load.

32. The first full paragraph discusses the exemption from MC&A requirements in 10 C.F.R. Parts 70 and 74 to this application, which is under Part 52. Can this exemption be addressed generically for future applications, and, if so, does the Staff plan to do so and how would the Staff go about this?

Staff Response:

The Staff is currently in the process of developing interim staff guidance associated with COL application information requirements for compliance with the applicable regulations in Parts 30, 40 and 70. While the Staff expects this to be a standard exemption request for other COL applicants, the Staff has not, at this point, considered whether or not to address the exemption from MC&A requirements in Part 70 and 74 via rulemaking for future COL applications. Because of the design-centered review approach that the Staff has used for new reactor licensing applications, and the resultant close coordination between COL applicants and industry working groups, applicants have standardized approaches to the development of operational programs. Several standard operational programs were submitted and reviewed by the Staff, and the Staff was able to issue safety evaluation reports (e.g., Staff's SER for NEI 07-03, 'Generic Final Safety Evaluation Report Template Guidance for Radiation Protection Program Description', ML090510379, dated March 10, 2009) for those standard operational programs. This approach allowed COL applicants to reference NRC-approved standardized operational programs. Based on this experience, the Staff is reasonably confident that a similar approach for the MC&A program requirements will be acceptable. Notwithstanding, changes to the regulations in Parts 70.22 and 74 have been identified for Staff consideration as part of a Part 52 lessons-learned rulemaking; however, the scope and schedule for proposing such a rulemaking to the Commission has not yet been determined. Changes to regulations in Parts 70 and 74 with respect to requirements for a material control and accountability program along with issuance of associated guidance for COL applicants and review guidance for the Staff would obviate the need for these exemption requests by COL future applicants.

33. This departure accepts a nominal 6 inch thickness for the mudmat, while the AP1000 DCD specifies a 6 inch minimum thickness. What is the difference between nominal and minimum in this case?

Staff Response:

Nominal tolerances allow small variations from the specified dimensions, whereas minimum implies that the dimension would not be permitted to be less than specified. As explained below, this difference has no negative impact on the ability of the plant design to perform safely.

AP1000 DCD, Section 2.5.4.1.3, states:

> The mudmat provides a working surface prior to initiating the placement of reinforcement for the foundation mat structural concrete. The lower and upper mudmats are as follows:
>
> • Lower mudmat – (minimum 6 inches thick) of un-reinforced concrete, with a minimum compressive strength of 2,500 psi. The lower mudmat will be used as the final dental concrete layer on the underlying foundation media.
>
> • Upper mudmat – (minimum 6 inches thick) of un-reinforced concrete with a minimum compressive strength of 2,500 psi. This upper mudmat will support the chairs that, in turn, support the reinforcing steel.

VEGP FSAR Chapter 2, Subsection 2.5.4.1.3 states:

> • Lower mudmat – (6-inch layer) of un-reinforced concrete, with a minimum compressive strength of 2,500 psi. The lower mudmat will be used as the final dental concrete layer on the underlying foundation media.
>
> • Upper mudmat – (6-inch layer) of un-reinforced concrete with a minimum compressive strength of 2,500 psi. This upper mudmat will support the chairs that, in turn, support the reinforcing steel.

Staff notes that the only difference between the DCD and FSAR descriptions of the mudmat is the specification of a minimum thickness of 6 inches, in the case of the DCD, and a nominal design thickness in the case of the FSAR.

The standard engineering practice in concrete construction is to specify nominal dimensions (or design values) for elements such as columns, beams, and slabs as a practical means of addressing anticipated deviations during construction. Construction specifications prescribe as-built tolerances for defining a permitted variation from the nominal dimensions. The range of acceptable tolerance is defined such that the as-built element, if constructed within the permissible tolerance, would satisfactorily perform its function under design loads. Industry standards provide recommendations for these permissible tolerances. For example, the American Concrete Institute (ACI) Standard ACI 117, “Standard Specifications for Tolerance for Concrete Construction and Materials,” recommends tolerances in cross-sectional dimensions of foundations and suggest a tolerance of minus 5-percent of the nominal slab thickness for a slab cast against soil. Due to acceptable tolerances in civil engineering practice, as referenced in ACI 117, the as-built thickness of the mudmat could potentially be slightly less than 6 inches, which will not satisfy the DCD requirement. Consequently, this issue necessitated that SNC request a DCD departure.

The Staff found the 2.5-1 departure to be acceptable on the basis that the purpose of the mudmat is to provide a working surface prior to initiating the placement of reinforcement for the foundation basemat structural concrete. The lower mudmat layer will be used as the final dental concrete layer on the underlying foundation media and the upper mudmat layer will support the chairs that, in turn, support the reinforcing steel. Based on review of the VEGP site-specific seismic analysis, the Staff finds that the nominal mudmat thickness of 6 inches, which accounts for standard practice construction deviations, will provide adequate transfer of horizontal shear forces from the nuclear island to the seismic Category I backfill. A nominal 6-inch slab

constructed within acceptable engineering tolerance will not be less effective than the minimum 6-inch slab required in the DCD. Therefore, the departure will have no negative impact on the ability of the standard plant design to perform safely under design basis loads.

34. The first sentence of the first full paragraph on this page states that, in "some cases, the Staff's reasonable assurance finding required the imposition of license conditions or ITAAC as part of the licenses." Please identify three to five representative examples of ITAACs and license conditions imposed by the Staff, including a summary of the rationale for their imposition.

Staff Response:

Below are several ITAAC and license conditions that the Staff is proposing to impose to support issuance of a combined license. The ITAAC appear in Part 10 of the COL application and the license conditions appear in Section 2.B of the draft license:

Offsite Power (Part 10, Table 2.6.12-1): This ITAAC, which the Staff evaluated in Section 8.2.A of the FSER, allows the Staff to verify that the as-built offsite portion of the power supply from the transmission network to the interface with the onsite ac power satisfies the provisions of General Design Criterion (GDC) 17 and GDC 18;

Feedwater Flow Measurement Instrumentation (Part 10, pages LC-B1 and LC-B2): This ITAAC, which the Staff evaluated in Section 15.0 of the FSER, allows the Staff to verify that the specific (Caldon CheckPlus™ LEFM) instrumentation has been installed, the applicant's power uncertainty calculation is based on an acceptable methodology, and the calculated power uncertainty value is below the 1 percent limit established in the DCD;

Metamic Coupon Monitoring Program (Draft COL license condition (12)(f)(2)): This license condition requires that the COL licensee for Vogtle implement a Metamic coupon monitoring program prior to initial fuel load. The Staff evaluated Vogtle's Metamic coupon monitoring program in Section 9.1.2 of the FSER. This program includes tests to monitor for blistering, bubbling, cracking or flaking as well as a test to monitor for corrosion of the spent fuel pool neutron absorbers. The need for this coupon monitoring program arose from experience in operating plants in which similar neutron-absorbing materials were found to have degraded over years of operation. The COL licensee will have a monitoring program in place during plant operation to detect any potential degradation of the neutron-absorbing material;

Pipe Rupture Hazards Analysis (Part 10, page LC-B8, Table 3.8-1): This ITAAC and related license condition, which the Staff evaluated in Sections 3.6 of the FSER, allows the Staff to verify that the applicant completed an as-designed pipe rupture hazards analysis. This will allow the Staff to verify that the methodology evaluated and approved in the DCD to address pipe rupture hazards in the piping and room design was followed, that the resulting SSCs have been designed in compliance with GDC 4; it also allows concerns to be identified and addressed early in the construction process;

Special nuclear material physical protection program (Draft COL license conditions (9)(o) and (12)(e)): These license conditions, which the Staff evaluated in Section 1.5.5 of the FSER, require the applicant to implement an appropriate program and establish a controlled access area in accordance with 10 C.F.R. § 73.67 prior to receiving new fuel onsite. The license conditions ensure that the applicant maintains appropriate physical security for new fuel under a

scenario where the applicant receives fuel onsite prior to establishing an operational protected area and implementing a comprehensive physical security program under 10 C.F.R. § 73.55;

Limitation on Part 40 Source Material (Draft COL, license conditions (4)(a) and (5)(a)): These license conditions, which the Staff evaluated in Section 1.5.5 of the FSER, limit the applicant's possession of source material prior to a Commission finding under 10 C.F.R. § 52.103(g). The applicant provided a commitment in the FSAR Section 12.2.1.1.10, Page 12.2-2, that no 10 C.F.R. Part 40 specifically licensed source material, including natural uranium, depleted uranium, and uranium hexafluoride, would be received, possessed, or used during the period between issuance of the COL and the Commission's 10 C.F.R. § 52.103(g) finding. The Staff incorporated this limitation into the above license conditions. Additionally, for the period after a 10 C.F.R. § 52.103(g) finding, the Staff imposed a license condition that the licensee could not receive, possess, or use uranium hexafluoride." This condition was added based on the applicant's commitment in a letter dated March 16, 2011 (ML110770137).

35. a) Is there a review plan or other guidance document to help the Staff determine whether information is new or significant? If so, please identify.

<u>Staff Response:</u>

Yes. The Staff's principal guidance document for conducting environmental reviews is NUREG-1555, the Environmental Standard Review Plan (ESRP). The Introduction of the ESRP (ML071860393) was revised and issued for use and comment in 2007 to be consistent with the 2007 amendments to the rules for Licenses, Certifications, and Approvals for Nuclear Power Plants (72 FR 49352). Guidance for the Staff to aid in determining whether or not information is new, and, if so, whether new information is significant, is enumerated starting on page 10 of the Introduction; in particular, starting on page 12, the specific guidance for a combined license (COL) application referencing an early site permit (ESP) is provided.

b) Please describe the site audit conducted by Staff to review environmental information, potentially new and significant information, etc. Is that akin to any other routine Staff site audit?

The Staff routinely conducts environmental site audits early in the review of new reactor applications. The site audits are tailored to the type of application, such as an ESP, a COL referencing an ESP, or a COL not referencing an ESP. While the proponent of the action is required to submit an Environmental Report (ER), the responsibility for the reliability of all of the information used in its Environmental Impact Statement (EIS) falls to the Staff. The routine Staff environmental site audit is an important element of the Staff's independent evaluation. The Staff conducted two audits on this project to consider whether or not potentially new and significant information was present. This is discussed in Section 1.6.2 of the Final Supplemental Environmental Impact Statement (FSEIS), NUREG-1947.

As required by 10 C.F.R. § 51.50(c)(1)(iv), a COL applicant referencing an early site permit is to establish a process to identify new and significant information. Because the Vogtle applicant tendered its COL application while the ESP application was still pending (the first Part 52 applicant to take such an approach), the Staff site audit conducted early in its COL environmental review process was focused on determining whether the COL applicant's process used a reasonable methodology to reveal new and significant information. The audit on the process was conducted in August 2008 (documented in an audit report at ML082620184).

Subsequent to the issuance of the ESP and the accompanying Limited Work Authorization (LWA), the Staff conducted another audit in September 2009 (documented in an audit report at ML093631157) to consider whether there was new and potentially significant information that could affect the evaluations performed in the ESP review and that were resolved (i.e., adjudicated) as part of issuing the ESP.

The Staff also conducted a separate environmental audit associated with SNC's requests to amend its ESP and LWA, which included use of additional fill material and borrow areas that were not considered in ESP FEIS (documented in an audit report at ML101550095). These requests were ultimately addressed in licensing actions separate from the COL (i.e., via three amendments to the ESP and LWA) and for which the Staff prepared Environmental Assessments. However, the Staff appropriately accounted for those developments, including information obtained through the site audit, in its FSEIS for the COL environmental review.

c) Describe the Applicant's methodology for identifying and evaluating potentially new and significant information.

This question was directed solely to the Applicant. Accordingly, the Staff has not provided a response.

36. What process was used to determine whether there was new and significant information subsequent to the issuance of the EIS for the ESP that should be included in the ER for the COL application or in the SEIS?

<u>Staff Response:</u>

As outlined in the Staff's response to Q35 (a) and (b), the Staff follows the guidance in the ESRP Introduction to ensure that the COL applicant (1) established and effectively used its process to determine whether there is new and potentially significant information subsequent to the issuance of the ESP, (2) includes such information that is both new and significant in its ER, and (3) makes its records available to the Staff for audit.

The Staff is ultimately responsible for determining the significance of new information. In addition to the information provided by or made available by the Applicant, the Staff may develop independent sources to inform its conclusions. The ESRP guides the Staff on methods to become aware of new information and provides the following examples that could be considered by the Staff as well as the Applicant:

• reviewing environmental monitoring results
• reviewing related scientific literature
• surveying environmental professionals familiar with the site environs
• exchanging information within the industry through peer groups and industry organizations
• consultations with academicians knowledgeable of the local environment
• consultations with Federal, State, Tribal, and local environmental, natural resource, permitting, and land use agencies
• verifying that the assumptions and representations made in the ESP ER are still valid
• verifying that the Staff's assumptions in the ESP EIS are still valid
• reviewing information needs in the Environmental Standard Review Plan

Section 1.6 of the FSEIS provides the discussion of the Applicant's and Staff's processes, and the Staff's conclusions regarding the Applicant's process.

37. How will the Staff and Applicant account for revisions to the plant layout that occur between issuance of the license and construction of the plant that may impact the Staff's original environmental or safety analyses? For example, the transmission line route has not yet been determined. How will the Staff ensure that environmental impacts are fully addressed?

Staff Response:

With respect to revisions to plant layout between issuance of the license and construction of the plant, only those revisions that require prior NRC approval in the form of a license amendments will trigger an environmental review. That environmental review would result in a categorical exclusion, an environmental assessment, or an environmental impact statement, as appropriate. Certain revisions to plant layout do not require prior NRC approval, whether because they are not within NRC's regulatory authority (i.e., they have no nexus to radiological safety or security) or because they meet criteria that permit changes without a license amendment (e.g., certain changes pursuant to 10 C.F.R. § 50.59). Because such actions involve no licensing action, no environmental review is required. However, such revisions may require a permit or permit revision by another regulatory agency. In such a case, that agency would perform an environmental review in accordance with its implementing regulations.

Under the Commission's regulations in 10 C.F.R. § 50.10, the building of transmission lines is not within the scope of the NRC's Federal action; however, for the purpose of the National Environmental Policy Act (NEPA) analysis, impacts associated with the routing of new transmission lines were considered in the cumulative impacts evaluation in the ESP FEIS and encompassed by the evaluation of new and significant information during the development of the SEIS. In the ESP FEIS, the Staff conservatively evaluated impacts associated with a Representative Delineated Corridor, a representative transmission line route of sufficient width to contain the expected eventual right of way. Accordingly, while the delineation of the final transmission line route following issuance of the COL would not involve an NRC licensing action and thus would not trigger another environmental review by the Staff, the Staff expects the impacts of the actual route would remain consistent with those described in the ESP FEIS and FSEIS.

38. The final sentence in the last full paragraph on this page states that, in performing its environmental review, the Staff found new information that warranted further analysis but determined that it was not significant within the meaning of 10 C.F.R. § 51.92. Please elaborate on the criteria for determining significance in this context.

Staff Response:

As outlined in the Staff's response to Q36, the Staff relies on the guidance in the ESRP Introduction to evaluate the significance of new information that it discovers as part of its COL application environmental review. When the Staff becomes aware of new information that is potentially significant, it analyzes the information to determine whether the conclusions reached in the ESP FEIS are affected by the new information.

The Staff's review concerning significant new information is limited in scope to the assessment of the relevant new information and its potential effects on the ESP-stage conclusions. The scope of the assessment does not otherwise involve re-review of aspects of the ESP conclusion that would not be affected by the new information. The focus is on the potential for affecting the ESP-stage conclusions, which were reached using the significance level definitions of SMALL, MODERATE, or LARGE impacts. These definitions are based on guidance developed by the Council on Environmental Quality (40 C.F.R. § 1508.27); they consider whether environmental effects are detectable, and if so, whether they are sufficient to noticeably alter, or to destabilize, important attributes of the resource. These definitions are found in 10 C.F.R. Part 51, Subpart B, Table B-1 and are summarized in Section 1.1.1 of the COL FSEIS. In the COL review, the Staff considered whether, in the Staff's professional judgment, any of the identified new information had the potential to alter the analysis or rationale for the Staff's ESP stage conclusion. If it did, then the Staff determined that the information warranted further analysis in the SEIS to assess whether the new information would ultimately change the ESP conclusion.

39. Please describe any new information regarding alternatives since the identification of those that were examined during the ESP review.

Staff Response:

Chapter 9 of the ESP FEIS and of the COL FSEIS presented the Staff's evaluation of alternatives. As required by 10 C.F.R. § 51.92(e), further consideration of alternative sites is precluded at the COL stage. However, other alternatives considerations such as energy alternatives and system design alternatives, although resolved during the ESP proceeding, remains subject to consideration of new and potentially significant information during the COL review.

During the audit held in September 2009 (documented in ML093631157), the Staff examined all new information made available by the applicant in addition to any information that was documented in the COL environmental report. Further, the Staff independently interacted with other agency officials to determine whether or not they were aware of new information that could affect the Staff's earlier evaluation.

With respect to those alternatives that were considered in the COL FSEIS, the Staff distilled the new information and focused on the significant issues. The Staff identified new and potentially significant information regarding alternatives related to energy technologies and identified three issues that warranted further evaluation: (i) a change in Georgia Power's demand-side management profile, (ii) affirmation that none of SNC's retired power plants would be returned to service, and (iii) maturation of the consideration of greenhouse gas emission from stationary sources. As explained in the FSEIS, after examining this new information, the Staff determined that it did not ultimately change the Staff's conclusions in the ESP FEIS.

40. The FSEIS states that the cost-benefit assessment is the same for the COL as it was for the ESP, with mitigation measures. Please describe those mitigation measures.

Staff Response:

The Staff, in implementing the process identified in 10 C.F.R. § 51.92(e) of the agency's regulations for developing its supplemental EIS, relied, in part, on the ESP FEIS in determining what would constitute new and potentially significant information. The cost-benefit statement in

Chapter 11 of the FSEIS is a summary from the ESP FEIS concerning the subject. The summary of benefits and costs takes into consideration the specific measures and controls proposed by Southern to limit adverse impacts during construction and operations, and the details of these measures are identified in Tables 4-6 and 5-18, respectively, of the ESP FEIS.

The Staff, as part of its environmental review for the COL application, found that the summary statement concerning cost-benefit in Chapter 11 of the ESP FEIS remained valid with one exception. Specifically, the Staff, during its new and significant review of the COL application did identify a memorandum of agreement between Southern and the Georgia State Historic Preservation Officer (SHPO) concerning protection of archaeological site 9BK416. The Staff determined that the activities described in the MOU constituted a new measure and control that Southern would rely upon to limit adverse impacts to historic and cultural resources.

41. Please highlight major themes from the comments on the DSEIS, and generally describe the Staff's responses to those comments.

Staff Response:

The Staff issued the Vogtle draft supplemental environmental impact statement on September 3, 2010, for public comment. The Staff held a public meeting in Waynesboro, GA, on October 7, 2010, which was transcribed, to collect comments from interested stakeholders in the area of the proposed project. During the 75 day comment period the Staff received 37 letters and e-mail messages with comments and, of the 80 attendees at the public meeting, 22 provided oral comments.

Some comments addressed topics and issues that are not part of the environmental review for this proposed action. These comments included questions about the NRC safety review, general comments of support or opposition to nuclear power, observations regarding national nuclear waste management policies, comments on the NRC regulatory process in general and comments on NRC regulations. With respect to these comments, the Staff generally either acknowledged the commenter's general support for or opposition to the application or explained why the matter raised was not within the scope of the Staff's environmental review. With respect to those comments on topics within the scope of the Staff's environmental review, the themes identified by the Staff related primarily to the areas of energy alternatives, environmental justice, benefit-cost balance, severe accidents, hydrology-surface water, and meteorology and air quality. These comments were primarily received as part of a form letter from several commenters. Because the Staff determined that the information provided in these comments either was not new or did not have the potential to change the Staff's conclusion, the Staff response generally directed the commenter to the section of the ESP FEIS where the issue had previously been evaluated and resolved.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	
	)	
SOUTHERN NUCLEAR OPERATING CO.	)	Docket Nos. 52-025-COL and 52-026-COL
	)	
(Vogtle Electric Generating Plant	)	
Units 3 and 4)	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC Staff Responses to Commission Pre-Hearing Questions" have been served upon the following persons by Electronic Information Exchange this 13th day of September, 2011:

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Dated at Rockville, Maryland
this 13th day of September, 2011

UNITED STATES OF AMERICA
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Units 3 and 4)	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "Exhibit NRC00008A" have been served upon the following persons by Electronic Information Exchange this 20th day of September, 2011:

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