

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Gregory B. Jaczko, Chairman  
Kristine L. Svinicki  
George Apostolakis  
William D. Magwood, IV  
William C. Ostendorff

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

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**CLI-12-02**

**MEMORANDUM AND ORDER**

Our decision today concludes the uncontested portion of this proceeding, conducted pursuant to § 189(a) of the Atomic Energy Act of 1954, as amended (AEA). We consider today the sufficiency of the NRC Staff's review of the application submitted by Southern Nuclear Operating Co. (Southern) for combined licenses (COLs) for two new nuclear generation facilities, Units 3 and 4, at the existing Vogtle Electric Generating Plant (Vogtle) site near Waynesboro, Georgia. We also consider the sufficiency of the Staff's review of Southern's October 2, 2009, request for limited work authorizations (LWAs) to engage in certain construction activities in connection with proposed Units 3 and 4.

As discussed below, we conclude that the Staff's review has been adequate to support the findings set forth in 10 C.F.R. §§ 52.97, 51.107(a) and (d), and 50.10. We also direct the NRC Staff to include in the Vogtle licenses the condition discussed below.

## I. BACKGROUND

On September 27 and 28, 2011, we presided over the uncontested hearing for this proceeding at our Rockville, Maryland headquarters. This evidentiary hearing represented one of the final steps in the NRC's comprehensive evaluation of Southern's proposed new Vogtle site units. Consistent with 10 C.F.R. § 52.73, Southern's COL application references the AP1000 standard design certification,<sup>1</sup> and the early site permit (ESP) granted in August 2009.<sup>2</sup> The agency held formal rulemaking proceedings in connection with the AP1000 standard design certification and its associated amendments. The Vogtle ESP application was the subject of both contested and uncontested adjudications, and the COL application also was the subject of a contested adjudication. Issues resolved in the AP1000 design certification rulemaking, the ESP proceeding, or the contested portion of this COL proceeding are closed and will not be revisited here; however, a brief discussion of these matters is included to provide context for today's decision. We also provide a brief history of this proceeding.

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<sup>1</sup> See 10 C.F.R. pt. 52, app. D.

<sup>2</sup> "Southern Nuclear Operating Company, Vogtle Electric Generating Plant ESP Site Docket No. 52-011 Early Site Permit and Limited Work Authorization," Aug. 26, 2009 (ADAMS accession no. ML092290157).

**A. Related Adjudications**

**1. ESP Proceeding**

Southern applied for an ESP for proposed Units 3 and 4 on August 15, 2006. In response to the NRC's notice of hearing,<sup>3</sup> a coalition of community action organizations filed a request for hearing and petition to intervene proffering a series of environmental contentions, portions of which the Board reformulated as two contentions and admitted.<sup>4</sup> After issuance of the final environmental impact statement (FEIS), the same petitioners submitted a new contention, which the Board admitted in modified form.<sup>5</sup> The Board ruled against the intervenors on the merits of all three contentions.<sup>6</sup> We denied the intervenors' appeal of the Board's merits ruling on two of these contentions (the ruling on the third was not appealed), ending the contested portion of the ESP proceeding.<sup>7</sup>

In the uncontested portion of the ESP proceeding, the Board asked questions and heard presentations on a number of specific topics. The Board issued its final initial decision in August 2009.<sup>8</sup> As the Board indicated in its decision, it considered the sufficiency of all of the elements of the Staff's review of the ESP, whether or not it asked

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<sup>3</sup> Southern Nuclear Operating Company; Notice of Hearing and Opportunity to Petition for Leave to Intervene on An Early Site Permit for the Vogtle ESP Site, 71 Fed. Reg. 60,195 (Oct. 12, 2006).

<sup>4</sup> See *Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), LBP-07-3, 65 NRC 237, 246, 279 (2007).

<sup>5</sup> See LBP-09-7, 69 NRC 613, 629 (2009) (referring to Licensing Board Memorandum and Order (Ruling on Motion to Admit New Contention) (Oct. 24, 2008), at 20 (unpublished)).

<sup>6</sup> LBP-09-7, 69 NRC 624, 733-35 (2009).

<sup>7</sup> See CLI-10-5, 71 NRC 90 (2010).

<sup>8</sup> See LBP-09-19, 70 NRC 433 (2009).

specific questions or heard a presentation at the hearing on a particular topic.<sup>9</sup> The Board also made summary findings of fact and conclusions of law, including safety and environmental findings on both the ESP application and the request for an LWA.<sup>10</sup> The COL application references this ESP, by which the NRC approved the suitability of the site.

## **2. Contested COL Proceeding**

In response to Southern's March 31, 2008, COL application, five organizations—the Center for a Sustainable Coast, Savannah Riverkeeper, the Southern Alliance for Clean Energy, Atlanta Women's Action for New Directions, and the Blue Ridge Environmental Defense League (BREDL)—petitioned for a hearing, proposing three contentions. The Board admitted one contention (SAFETY-1), and declined to admit the other two.<sup>11</sup> The intervenors later sought admission of a new environmental contention, which the Board declined to admit.<sup>12</sup> In October 2009, the intervenors sought to amend SAFETY-1; the Board admitted a revised version of the amended contention.<sup>13</sup> In May

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<sup>9</sup> *Id.* at 560.

<sup>10</sup> *Id.* at 560-63. Southern requested an LWA with its ESP, in order to conduct certain site-preparation activities at the Vogtle site. Southern later expanded its request to include additional activities, including placement of engineered backfill, mudmats, and retaining walls. This LWA, together with a second LWA requested as part of the COL application, are discussed *infra*.

<sup>11</sup> See *Southern Nuclear Operating Co.* (Vogtle Electric Generating Plant, Units 3 and 4), LBP-09-3, 69 NRC 139, 146, 167-68 (2009). The Board referred to us its rulings on the rejected contentions. *Id.* at 159, 167-68. We declined to review the Board's rulings. CLI-09-13, 69 NRC 575, 576, 579 (2009).

<sup>12</sup> Memorandum and Order (Ruling on Motion to Admit New Contention) (Sept. 24, 2009) (unpublished), at 2, 6-7.

<sup>13</sup> Memorandum and Order (Ruling on Motion to Amend Contention) (Jan. 8, 2010) (unpublished), at 2, app. A. A separate set of petitioners (Vince Drescher, Kenneth Ward, John C. Horn, Jr., William S. Bashlor, and James Eddie Partain) sought to (continued . . .)

2010, the Board granted Southern's motion for summary disposition of SAFETY-1.<sup>14</sup>

The contested portion of this proceeding ended in June 2010.

### **3. Second COL Licensing Board**

A second licensing board was established in August 2010 after three public interest groups—BREDL, Georgia Women's Action for New Directions (formerly known as Atlanta Women's Action for New Directions), and the Center for a Sustainable Coast—sought admission of a new contention related to Southern's containment coating inspection program.<sup>15</sup> The second board denied the request to admit this new contention.<sup>16</sup> We affirmed the Board's decision.<sup>17</sup>

### **4. Post-Fukushima Event Petitions**

Additional pleadings directed at the Vogtle COL application were filed in the aftermath of the Fukushima Dai-ichi events. The Vogtle COL proceeding was one of the captioned proceedings subject to petitions that requested the suspension of "all decisions" regarding the issuance of COLs, pending completion of several actions associated with the nuclear events in Japan. We granted that petition in part and denied

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intervene in October 2009, proposing an environmental contention, which the Board rejected. LBP-10-1, 71 NRC 165, 173-74, 185 (2010). The Board's decision was not appealed.

<sup>14</sup> LBP-10-8, 71 NRC 433, 436, 446-47 (2010).

<sup>15</sup> See *Proposed New Contention by Joint Intervenors Regarding the Inadequacy of Applicant's Containment/Coating Inspection Program* (Aug. 12, 2010) (Attachments amended Aug. 13, 2010), at 1, 4.

<sup>16</sup> LBP-10-21, 72 NRC \_\_\_ (Nov. 30, 2010) (slip op.).

<sup>17</sup> See CLI-11-8, 74 NRC \_\_\_ (Sept. 27, 2011) (slip op.).

it in part.<sup>18</sup> Later, in August 2011, BREDL and, separately, the Center for a Sustainable Coast, Georgia Women's Action for New Directions, and Southern Alliance for Clean Energy (collectively, CSC Petitioners), filed substantially similar motions to reopen the record and admit a new Fukushima-event-based contention in the *Vogtle* COL proceeding.<sup>19</sup> The Board denied these motions as premature.<sup>20</sup> The petitioners have appealed the Board's decision; the matter is pending before us.<sup>21</sup> We will address that petition as a separate matter from today's decision, which pertains only to the uncontested hearing.

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<sup>18</sup> See generally *Union Electric Co. d/b/a/ Ameren Missouri* (Callaway Plant, Unit 2), CLI-11-5, 74 NRC \_\_\_\_ (Sept. 9, 2011) (slip op.).

<sup>19</sup> See generally *Motion to Reopen the Record and Admit Contention Regarding the Safety and Environmental Implications of the Nuclear Regulatory Commission Task Force Report on the Fukushima Dai-ichi Accident* (Aug. 11, 2011), and *Contention Regarding NEPA Requirement to Address Safety and Environmental Implications of the Fukushima Task Force Report* (Aug. 11, 2011) (BREDL Petitioners); *Southern Nuclear Operating Co. (Vogtle Electric Generating Plant, Units 3 and 4): Motion to Reopen the Record and Admit Contention to Address the Safety and Environmental Implications of the Nuclear Regulatory Commission Task Force Report on the Fukushima Dai-ichi Accident* (Aug. 11, 2011), and *Contention Regarding NEPA Requirement to Address Safety and Environmental Implications of the Fukushima Task Force Report* (Aug. 11, 2011) (CSC Petitioners).

<sup>20</sup> See *PPL Bell Bend, L.L.C.* (Bell Bend Nuclear Power Plant), *Luminant Generation Company LLC* (Comanche Peak Nuclear Power Plant, Units 3 and 4), *Energy Northwest* (Columbia Generating Station), *Southern Nuclear Operating Co.* (Vogtle Electric Generating Plants, Units 3 and 4), *Duke Energy Carolinas LLC* (William States Lee III Nuclear Station, Units 1 and 2), LBP-11-27, 74 NRC \_\_\_\_ (Oct. 18, 2011) (slip op.).

<sup>21</sup> A single petition for review has been filed in this matter, as well as on the *Comanche Peak* and *W.S. Lee* COL dockets, and the *Columbia Generating Station* license renewal docket. See generally *Petition for Review of LBP-11-27* (Nov. 2, 2011), at 1 n.1 (naming BREDL and the CSC Petitioners as appellants in this proceeding).

The same two sets of petitioners filed motions to reinstate the contention and to supplement its basis.<sup>22</sup> The Board denied these motions.<sup>23</sup>

**B. AP1000 Design Certification Rulemaking**

The AP1000 is a standard design, certified in 10 C.F.R. Part 52, Appendix D. An amendment to the certified design recently was published in the *Federal Register*, and became final on December 30, 2011.<sup>24</sup> The currently approved version of the standard design is contained in Revision 19 to the design control document (DCD), which is incorporated by reference into Appendix D.

**C. Uncontested Proceeding**

The majority of the environmental issues associated with proposed Vogtle Units 3 and 4 were resolved during the Staff's ESP review. As part of its COL review, the Staff prepared a supplement to the early site permit final environmental impact statement (ESP FEIS)<sup>25</sup> to evaluate whether there is new and significant information that might affect the Staff's environmental conclusions. The NRC Staff issued this final

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<sup>22</sup> See *Motion to Reinstate and Supplement the Basis for Fukushima Task Force Report Contention* (Oct. 28, 2011) (BREDL Petitioners). See *Motion to Reinstate and Supplement the Basis for Fukushima Task Force Report Contention* (Oct. 28, 2011) (CSC Petitioners).

<sup>23</sup> Memorandum and Order (Denying Motions to Reinstate Contention), LBP-11-36, 74 NRC \_\_\_\_ (Nov. 30, 2011) (slip op.).

<sup>24</sup> Final Rule, AP1000 Design Certification Amendment, 76 Fed. Reg. 82,079, 82,079 (Dec. 30, 2011). The applicability date of the rule for those entities who receive actual notice of the rule is the date of receipt. *Id.*

<sup>25</sup> See generally "Final Environmental Impact Statement for an Early Site Permit (ESP) at the Vogtle Electric Generating Plant (VEGP) ESP Site," NUREG-1872 (Aug. 2008) (ML082260190).

supplemental environmental impact statement (FSEIS) on March 25, 2011.<sup>26</sup> Following review by the Advisory Committee on Reactor Safeguards (ACRS),<sup>27</sup> the Staff issued its final safety evaluation report (FSER) on August 9, 2011.<sup>28</sup> The Staff submitted its information paper on August 9, 2011.<sup>29</sup> As directed by the Commission, the Staff's information paper identified and discussed nonroutine matters, unique facility features, and novel issues related to the Vogtle application.<sup>30</sup> In terms of safety issues, the Staff discussed cyber security, loss of large areas (LOLA) of the plant due to explosions or fires, and licenses for byproduct, source, and special nuclear materials under 10 C.F.R.

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<sup>26</sup> See Southern Nuclear Operating Company, Inc.; Notice of Availability of the Final Supplemental Environmental Impact Statement for Vogtle Electric Generating Plant Units 3 and 4; Combined License Application Review, 76 Fed. Reg. 16,645 (Mar. 24, 2011) (COL FSEIS).

<sup>27</sup> See Armijo, J.S., ACRS Vice Chairman, letter to Gregory B. Jaczko, Chairman, NRC, "Report on the Safety Aspects of the Southern Nuclear Operating Company Combined License Application for Vogtle Electric Generating Plant, Units 3 and 4" (Jan. 24, 2011) (ML110170006) (ACRS Letter). As noted in the letter, the ACRS reviewed the Staff's Advanced Safety Evaluation Report (ASER) for Vogtle Units 3 and 4 during its meeting on January 13-15, 2011. The letter states that the ACRS's AP1000 subcommittee held meetings on June 24-25, July 21-22, September 20-21, and December 15-16, 2010, to review chapters of the COL application and of the Staff's ASER. *Id.* at 1. The Staff responded to the Vice Chairman's letter. See Borchardt, R.W., Executive Director for Operations, letter to Dr. J.S. Armijo, Vice Chairman, ACRS, "Report on the Safety Aspects of the Southern Nuclear Operating Company Combined License Application for Vogtle Electric Generating Plant, Units 3 and 4" (Mar. 3, 2011) (ML110480429).

<sup>28</sup> See Ex. NRC000004, "Final Safety Evaluation Report for Combined License for Vogtle Electric Generating Plant, Units 3 and 4" (Aug. 2011) (COL FSER).

<sup>29</sup> See Ex. NRC000003, "Staff Statement in Support of the Uncontested Hearing for Issuance of Combined Licenses and Limited Work Authorizations for Vogtle Electric Generating Plant, Units 3 and 4 (Docket Nos. 52-025 and 52-026)," Commission Paper SECY-11-0110, (Aug. 9, 2011) (Staff Testimony). See *also* Internal Commission Procedures at IV-13 (ICPs).

<sup>30</sup> See ICPs at IV-13; Staff Requirements - SECY-10-0082 - Mandatory Hearing Process for Combined License Application Proceedings Under 10 C.F.R. Part 52 (Dec. 23, 2010) (ML103570203).



Parts 30, 40, and 70.<sup>31</sup> For environmental issues, the Staff explained that the analysis conducted in connection with the ESP, together with Southern's decision to reference the AP1000 certified design instead of using the plant parameter envelope approach, limited the COL environmental analysis to "new and significant" information.<sup>32</sup> The Staff's paper briefly reviewed the process the Staff used in conducting its environmental analysis for the COL application and described the effects on its process of the ESP license amendment requests submitted after the ESP was issued.<sup>33</sup>

We issued a Notice of Hearing on August 16, 2011.<sup>34</sup> This notice was followed by an order of the Secretary transmitting the Commissioners' pre-hearing questions to the Staff and to Southern.<sup>35</sup> Southern and the Staff filed their responses to the Commissioners' pre-hearing questions on September 13, 2011.<sup>36</sup> Southern and the Staff also submitted their witness and exhibit lists for the September 27-28, 2011, hearing.<sup>37</sup>

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<sup>31</sup> See Ex. NRC000003, Staff Testimony, at 16-21.

<sup>32</sup> See *id.* at 21.

<sup>33</sup> See *id.* at 22-23.

<sup>34</sup> Southern Nuclear Operating Co., et al.; Combined Licenses for Vogtle Electric Generating Plant, Units 3 and 4, and Limited Work Authorizations; Notice of Hearing, 76 Fed. Reg. 50,767 (Aug. 16, 2011) (Notice of Hearing).

<sup>35</sup> Order (Transmitting Pre-Hearing Questions) (Aug. 31, 2011) (unpublished) (Pre-Hearing Order).

<sup>36</sup> Ex. SNC000005, *Southern Nuclear Operating Company's Response to the Commission's Order of August 31, 2011* (Sept. 13, 2011) (Southern Pre-Hearing Response); Ex. NRC00008A, *NRC Staff Responses to Commission Pre-Hearing Questions* (Sept. 13, 2011) (Staff Pre-Hearing Response); Ex. NRC00008B, *Corrected Page 15* (Sept. 20, 2011) (Staff Corrected Pre-Hearing Response).

<sup>37</sup> *Southern Nuclear Operating Company's Witness List for the Vogtle Units 3 & 4 COL Mandatory Hearing* (Sept. 12, 2011); *Southern Nuclear Operating Company's* (continued . . .)

Prior to the hearing, the Secretary issued a scheduling order detailing matters such as the identification and swearing-in of witnesses, the process that would be used for formally admitting evidence, and the format of presentations.<sup>38</sup> This was followed by a Scheduling Note prescribing the content and time allotment of the presentations to be provided at the hearing by Southern and by the Staff.<sup>39</sup>

At the outset of the hearing, after the Staff's and Southern's witnesses were sworn in,<sup>40</sup> the parties' pre-filed testimony and exhibits were admitted into the evidentiary record.<sup>41</sup> We heard opening statements, followed by testimony from Staff and Southern witness panels, and questioned the witnesses, in accordance with the order of presentations set out in the Scheduling Note. The hearing ended with closing statements.

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*Supplemented Witness List for the Vogtle Units 3 & 4 COL Mandatory Hearing* (Sept. 20, 2011); *NRC Staff Witness List* (Sept. 13, 2011); *Revised NRC Staff Witness List* (Sept. 22, 2011); *Southern Nuclear Operating Company's List of Proposed Exhibits* (Sept. 20, 2011); *Southern Nuclear Operating Company's Revised List of Proposed Exhibits* (Sept. 24, 2011); *Southern Nuclear Operating Company's Revised and Updated List of Proposed Exhibits* (Sept. 26, 2011); *NRC Staff Exhibit List* (Sept. 20, 2011); *Revised NRC Staff Exhibit List* (Sept. 23, 2011).

<sup>38</sup> Scheduling Order (Sept. 13, 2011) (unpublished).

<sup>39</sup> Vietti-Cook, Annette, Secretary of the Commission, Memorandum to Counsel for Applicant and Staff (Enclosure: Scheduling Note) (Sept. 20, 2011); Scheduling Note (Revised) (Sept. 23, 2011) (Revised Scheduling Note).

<sup>40</sup> There were eleven Southern witnesses and forty-nine Staff witnesses. See Tr. at 11-16.

<sup>41</sup> See Tr. at 17-18. Southern's Exhibits SNC000002 through SNC000007, SNC000009, SNCR20001, SNCR00008, and SNCR00010, and the Staff's Exhibits NRC000001 through NRC000006, NRC00007A-7D, NRC00008A-8B, NRC000009, NRCR00010-13, and NRC000014, were admitted into the record. *Id.*

After the hearing, the Secretary issued orders setting deadlines for proposed transcript corrections, and for responses to additional questions.<sup>42</sup> The Staff and Southern filed a joint motion proposing transcript corrections.<sup>43</sup> The parties timely submitted supplemental responses to the additional questions.<sup>44</sup> The Secretary subsequently issued an order admitting all additional exhibits into the record, adopting transcript corrections, and closing the evidentiary record.<sup>45</sup>

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<sup>42</sup> Order (Setting Deadline for Proposed Transcript Corrections) (Oct. 3, 2011) (unpublished); Order (Supplemental Responses and Post-Hearing Questions) (Oct. 6, 2011) (unpublished) (Post-Hearing Order) (providing for answers to questions posed during the hearing, and propounding additional post-hearing questions).

<sup>43</sup> *Joint Motion for Transcript Corrections* (Oct. 11, 2011).

<sup>44</sup> Ex. NRC000015, *NRC Staff Responses to Commission Post-Hearing Questions* (Oct. 17, 2011) (Staff Post-Hearing Response); Ex. SNC000011, *Southern Nuclear Operating Company's Response to the Commission's Order of October 6, 2011* (Oct. 17, 2011). Southern later filed a revised version of its post-hearing responses. See Ex. SNCR00011, *Southern Nuclear Operating Company's Request for Leave to File Revised Exhibit* (Oct. 21, 2011); *Southern Nuclear Operating Company's Response to the Commission's Order of October 6, 2011* (dated Oct. 17, 2011, served Oct. 21, 2011) (Southern Post-Hearing Response). In addition, the Staff filed a letter making revisions to the Final SER and to the draft combined license. Moulding, Patrick A., Counsel for the NRC Staff, letter to Chairman and Commissioners, U.S. Nuclear Regulatory Commission (Oct. 28, 2011) (Enclosure 1: *NRC Staff Clarifications to the Mandatory Hearing Record*). This letter (with its enclosure) was assigned Exhibit number NRC000016.

<sup>45</sup> Order (Adopting Proposed Transcript Corrections, Admitting Post-Hearing Responses, and Closing the Record of the Proceeding) (Nov. 1, 2011) (unpublished).

## II. DISCUSSION

### A. Review Standards

In this proceeding, we consider safety issues pursuant to AEA § 189(a), and environmental issues as required by §102(2)(A), (C), and (E) of the National Environmental Policy Act of 1969, as amended (NEPA).<sup>46</sup> The Notice of Hearing for this uncontested proceeding sets the parameters for our review. The determination we must make “is whether the review of the application by the Commission’s [S]taff has been adequate to support the findings found in 10 C.F.R. [§] 52.97 and 10 C.F.R. [§] 51.107(a), for each of the COLs to be issued, and in 10 C.F.R. [§] 50.10 and 10 C.F.R. [§] 51.107(d) with respect to the LWAs.”<sup>47</sup> We do not review Southern’s application *de novo*; we consider instead the sufficiency of the Staff’s review of that application.<sup>48</sup>

On the safety side, we examine whether the Staff’s review of the combined license application has been adequate to support its findings, including whether: (1) the applicable standards and requirements of the AEA and our regulations have been met; (2) any required notifications to other agencies or bodies have been made; (3) there is

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<sup>46</sup> AEA § 182(c) requires the publication of notice of the application in the *Federal Register* for four consecutive weeks. See also 10 C.F.R. § 50.43(a)(3). This requirement has been satisfied. See Southern Nuclear Operating Company; Notice of Availability of Application for a Combined License, 76 Fed. Reg. 11,822 (Mar. 3, 2011); Southern Nuclear Operating Company; Notice of Availability of Application for a Combined License, 76 Fed. Reg. 13,241 (Mar. 10, 2011); Southern Nuclear Operating Company; Notice of Availability of Application for a Combined License, 76 Fed. Reg. 14,699 (Mar. 17, 2011); Southern Nuclear Operating Company; Notice of Availability of Application for a Combined License, 76 Fed. Reg. 16,645 (Mar. 24, 2011).

<sup>47</sup> Notice of Hearing at 50,768.

<sup>48</sup> See generally *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-17, 62 NRC 5, 39 (2005); *Clinton ESP*, CLI-06-20, 64 NRC 15, 21-22 (2006).

reasonable assurance that the facility will be constructed and will operate in conformity with the license, the provisions of the AEA, and our regulations;

(4) the applicant is technically and financially qualified to engage in the activities authorized; and (5) issuance of the license will not be inimical to the common defense and security or the health and safety of the public.<sup>49</sup>

For the LWA application, we examine whether the Staff's review of the application has been adequate to support its findings, including whether: (1) the applicable standards and requirements of the AEA and our regulations applicable to the activities to be conducted under the LWA have been met; (2) the applicant is technically qualified to engage in the activities authorized; (3) issuance of the LWA will provide reasonable assurance of adequate protection to public health and safety and will not be inimical to the common defense and security; and (4) there are unresolved safety issues relating to the activities to be conducted under the LWA that would constitute good cause for withholding the authorization.<sup>50</sup>

On the environmental side, with respect to the COL application, we (1) determine whether the requirements of NEPA § 102(2)(A), (C), and (E), and the applicable regulations in 10 C.F.R. Part 51, have been met; (2) independently consider the final balance among conflicting factors contained in the record of the proceeding with a view to determining the appropriate action to be taken; (3) determine, after weighing the environmental, economic, technical, and other benefits against environmental and other costs, and considering reasonable alternatives, whether the combined license should be

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<sup>49</sup> 10 C.F.R. § 52.97(a)(1)(i)-(v).

<sup>50</sup> 10 C.F.R. § 50.10(e)(iii)-(iv).

issued, denied, or appropriately conditioned to protect environmental values; and (4) determine whether the NEPA review conducted by the NRC Staff has been adequate.<sup>51</sup>

Finally, with respect to an LWA, we (1) determine whether the requirements of NEPA § 102(2)(A), (C), and (E), and the regulations in 10 C.F.R. Part 51, Subpart A, have been met, with respect to the activities to be conducted under the LWA; (2) independently consider the balance among conflicting factors with respect to the LWA, which is contained in the record of the proceeding, with a view to determining the appropriate action to be taken; (3) determine whether the site redress plan will adequately redress the activities performed under the LWA, should LWA activities be terminated by the holder or the LWA revoked by the NRC, or upon effectiveness of our final decision denying the COL application; and (4) determine whether the NEPA review conducted by the NRC Staff for the LWA has been adequate.<sup>52</sup>

## **B. Analysis**

Our consideration of the evidentiary record in this uncontested proceeding is predicated on the review parameters discussed above, and is focused on determining whether the Staff's review of the COL application and LWA request was sufficient to support the Staff's safety and environmental findings. To satisfy NEPA requirements, we also independently consider the final balance among conflicting factors in the record. With these ends in mind, we review and analyze the information we received in this proceeding.

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<sup>51</sup> 10 C.F.R. § 51.107(a)(1)-(4).

<sup>52</sup> 10 C.F.R. § 51.107(d)(1)(i)-(iv).

We asked a series of pre-hearing questions to inform our consideration of the sufficiency of the Staff's review of the COL application,<sup>53</sup> and received detailed responses from the parties.<sup>54</sup> During the hearing, we heard panel presentations on a series of topics, which we consider in detail below. The panel presentation topics were selected to correspond to areas of the Staff's FSER or FSEIS where we sought additional information or clarifications as part of our evaluation of the sufficiency of the Staff's review. We asked detailed questions during the hearing to further inform our consideration of the issues, and followed up in areas of concern by asking post-hearing questions,<sup>55</sup> again receiving detailed responses from the parties.<sup>56</sup> All of this information, as well as the Staff's FSER and FSEIS, is part of the record on which we base today's decision.

The following witnesses testified for Southern during the hearing (in order of appearance): Joseph (Buzz) Miller, Charles (Chuck) Pierce, Wesley Sparkman, Amy Aughtman, Eddie Grant, Donald Moore, Theodore Amundson, Jerry Sims, and Dale Fulton. The following witnesses testified for the Staff during the hearing (also in order of appearance): Michael Johnson, Frank Akstulewicz, Robert Schaaf, Gregory Hatchett, Bret Tegeler, Barry Zalzman, Ravindra Joshi, Denise McGovern, Mohamed Shams, Sarah Tabatabai, Michael Dusaniwskyj, Barry Wray, Jill Caverly, Thomas Scarbrough, John McKirgan, Lynn Mrowca, Mark Caruso, Malcolm Patterson, Terry Jackson, Tania

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<sup>53</sup> See Pre-Hearing Order.

<sup>54</sup> See Ex. SNC000005, Southern Pre-Hearing Response; Ex. NRC00008A, Staff Pre-Hearing Response; Ex. NRC00008B, Staff Corrected Pre-Hearing Response.

<sup>55</sup> See Post-Hearing Order.

<sup>56</sup> See Ex. SNCR00011, Southern Post-Hearing Response; Ex. NRC000015, Staff Post-Hearing Response.

Martinez-Navedo, Om Chopra, Eric Lee, Michael Shinn, Bruce Musico, Juan Peralta, Craig Erlanger, and Mallecia Sutton. Other witnesses were available to respond to our questions on an as-needed basis.

To provide context for the application, the first panels provided an overview that included information on the status of the AP1000 design certification amendment, and on the ESP and LWA issued in 2009. In our decision today, we do not revisit the safety and environmental findings made by the Board in connection with the previously granted ESP and LWA. We also do not delve into AP1000 design issues, which are subject to formal rulemaking processes, except for areas of interface between the AP1000 design and Vogtle site-specific characteristics.

**1. Overview Panels**

*a. Southern*

Southern's witnesses provided a general overview of the Vogtle construction program. Southern began excavations for the foundations of the nuclear islands and the turbine buildings in 2009. After the NRC issued the ESP, which included the first LWA, Southern began the activities authorized under that LWA: placement of engineered backfill, construction of the nuclear island mudmats, construction of mechanically-stabilized earth retaining walls, and application of the waterproof membrane.<sup>57</sup> Southern described the development of the Vogtle COL application, and the application's role as the reference COL application for the AP1000 fleet,<sup>58</sup> and briefly previewed the

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<sup>57</sup> Tr. at 21.

<sup>58</sup> *Id.* at 23-26.



information it would provide in its other presentations.<sup>59</sup> Southern confirmed that it and its partner NuStart, together with contractors, “expended several hundred thousand man hours to develop the application and support its review by the NRC [S]taff since 2005.”<sup>60</sup>

We asked questions regarding the interface between the COL and the additional LWA application review processes, and Southern’s construction schedule. Southern explained its perspective that construction continuity, and thus “personnel safety and nuclear quality,” would benefit from prompt issuance of the LWAs.<sup>61</sup> We also asked about the linkage between the LWAs and the AP1000 design certification amendment. Southern explained that the activities included in the LWAs depend on approval of the AP1000 design certification amendment.<sup>62</sup>

In response to questions regarding its intentions for using the preliminary acceptability review (PAR) process for changes during construction that is under development,<sup>63</sup> Southern stated that it does not expect to use that process initially. Southern indicated that the specific changes it currently has under consideration fall instead within the guidance provided in COL Interim Staff Guidance document 11 (ISG-11).<sup>64</sup> On the other hand, Southern’s witness added, after construction starts, situations may arise where the PAR process will be appropriate.<sup>65</sup>

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<sup>59</sup> *Id.* at 26-28.

<sup>60</sup> *Id.* at 347 (Miller).

<sup>61</sup> *Id.* at 29 (Miller).

<sup>62</sup> *See id.* at 31.

<sup>63</sup> *See* “Interim Staff Guidance on Changes during Construction Under Part 52,” COL-ISG-025 (Draft) (ML111390385).

<sup>64</sup> Tr. at 36-37. *See* “Interim Staff Guidance, Finalizing Licensing-basis Information,” DC/COL-ISG-011 (Nov. 2, 2009) (ML092890623) (clarifying the Staff’s position on (continued . . .))

*b. Staff*

We asked the Staff panel to provide an overview specifically including:

[S]tatus of AP1000 design certification amendment, summary of key safety information associated with the AP1000 design certification, use of design centered review approach for the AP1000 COLs, relationship to the review for the [ESP] and LWA issued in 2009, status of the second LWA request, and summary of regulatory findings. The [S]taff should also discuss how it analyzed deviations and exemptions.<sup>66</sup>

The Staff opened its presentation by describing the scale of its review of the Vogtle COL application. The Staff's review began in the first half of 2008, when Southern submitted its application, and continued through August 2011. The Staff stated that it spent approximately 26,000 hours on its safety review and 5,000 hours on its environmental review, employing well over one hundred scientists, engineers, and technical specialists in the process. Technical support contractors, under Staff supervision, provided approximately 8,000 hours to the review effort. The Staff conducted more than sixty public meetings and conference calls in support of its review, and required Southern to respond to over 500 questions, including 460 safety-related questions and seventy questions on environmental issues. In addition, the Staff received and considered over 300 comments on its draft supplemental environmental impact statement (DSEIS).<sup>67</sup>

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applicants' "freeze point," that is, the point where licensing-basis information is considered final for review purposes, and the control of licensing-basis information during and after the initial review of applications for design certification or COLs).

<sup>65</sup> Tr. at 37.

<sup>66</sup> Revised Scheduling Note at 2 (unnumbered).

<sup>67</sup> Tr. at 41-42.

The Staff explained that the COL application incorporates by reference the AP1000 design certification rule, contained in 10 C.F.R. Part 52, Appendix D, as well as Revision 19 to the DCD. The COL application also incorporates by reference the ESP and the first LWA.<sup>68</sup> As a result, the Staff's review did not address issues resolved in connection with either the ESP or the AP1000 certified design. Instead, the Staff's safety review concentrated on site-specific issues like "[COL] information items, design information, replacing conceptual design information and programmatic elements that are the responsibility of the applicant."<sup>69</sup> The Staff's environmental review was limited to identifying new information, developed since preparation of the ESP FEIS, and evaluating its significance.<sup>70</sup>

Another area of importance for this particular COL application, as the Staff explained, is its status as the reference COL application, consistent with the NRC's design-centered review approach to the AP1000 COL reviews.<sup>71</sup> The Vogtle COL application contains standard content that future COL applicants using the AP1000 design may choose to incorporate by reference. Those future applicants will be able to

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<sup>68</sup> *Id.* at 43. The Staff explained that it granted three amendments to the ESP, related to the sources and categories of the backfill material used for the nuclear island foundation, during the course of its review of the COL application. See Ex. NRC000003, Staff Testimony, at 4; Tr. at 43-44.

<sup>69</sup> Tr. at 44-45 (Akstulewicz).

<sup>70</sup> *Id.* at 45.

<sup>71</sup> Under the "design-centered review approach," the NRC uses, to the maximum extent practical, a "one issue, one review, one position" strategy to promote effective use of resources for performing reviews, and to optimize application review schedules. In particular, "the [S]taff will conduct one technical review for each reactor design issue and use this one decision to support the decision on a [design certification] and on multiple COL applications." NRC Regulatory Issue Summary 2006-06, "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach" (May 31, 2006), at 1 (ML053540251).

rely on the review of these standard content items completed by the Staff for this reference COL application.<sup>72</sup>

The Vogtle COL application did not start out as the reference application for the AP1000 design. That distinction initially belonged to the Tennessee Valley Authority's Bellefonte COL application.<sup>73</sup> As a result, parts of the Staff's standard review were performed in connection with the Bellefonte application. The Staff transitioned this standard review from the Bellefonte application to the Vogtle application after it issued its Bellefonte safety evaluation with open items. Information in certain areas of the two applications was similar, in accordance with the level of standardization needed to support the design-centered review approach. The Staff determined that this information would be similar for all of the AP1000 applications, and that the evaluation of standard content performed for the Bellefonte application was directly applicable to the review of the Vogtle application.<sup>74</sup>

The Staff concluded the safety portion of its overview presentation by reviewing the required findings for COL and LWA issuance, and the findings it made, that led to its conclusion that the COL and the second LWA should be granted. The Staff summarized the support for its findings, which it previously documented in its testimony.<sup>75</sup>

The Staff explained that it initiated its environmental review of the COL application by publishing in the *Federal Register* a Notice of Intent to prepare a

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<sup>72</sup> Tr. at 45. Standard content material is specifically identified in both Ex. NRC000001, Vogtle Electric Generating Plant, Units 3 & 4, COL Application, Part 2, "Final Safety Analysis Report" (FSAR) and Ex. NRC000004, COL FSER. *Id.*

<sup>73</sup> Tr. at 45.

<sup>74</sup> *Id.* at 47.

<sup>75</sup> *Id.* at 48-51. See Ex. NRC000003, Staff Testimony, at 24-27, 30-31.

supplemental EIS; the notice explained that the analysis would be performed in the same manner as for the ESP EIS, except that a formal scoping process would not be conducted.<sup>76</sup> The Staff stated that it contacted federal, state, tribal, and local agencies, and conducted two detailed site audits, to obtain information on new and potentially significant information related to the proposed action.<sup>77</sup> The DSEIS was published in September 2010; a public meeting followed in October 2010.<sup>78</sup> Comments received, and the Staff's responses to these comments, were incorporated into Appendix E of the FSEIS, which was issued in March 2011.<sup>79</sup>

The Staff concluded in the FSEIS that the COL and LWA should be issued.<sup>80</sup> The Staff concluded its environmental overview presentation by summarizing the findings it made to reach this conclusion, as well as the support it relied on for making these findings.<sup>81</sup>

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<sup>76</sup> Tr. at 52. See Southern Nuclear Operating Company Vogtle Electric Generating Plant, Units 3 and 4 Combined License Application; Notice of Intent to Prepare a Supplemental Environmental Impact Statement, 74 Fed. Reg. 49,407 (Sept. 28, 2009).

<sup>77</sup> Tr. at 52.

<sup>78</sup> *Id.*

<sup>79</sup> *Id.* See Southern Nuclear Operating Company, Inc.; Notice of Availability of the Final Supplemental Environmental Impact Statement for Vogtle Electric Generating Plant Units 3 and 4; Combined License Application Review, 76 Fed. Reg. 16,645 (Mar. 24, 2011).

<sup>80</sup> Tr. at 53. See Ex. NRC000006, "Final Supplemental Environmental Impact Statement for Combined Licenses (COLs) for Vogtle Electric Generating Plant Units 3 and 4, Final Report," NUREG-1947 (Mar. 2011), § 11.7, at 11-6.

<sup>81</sup> Tr. at 53-56. See Ex. NRC000003, Staff Testimony, at 28-30, 31-32.

The Staff's overview presentation ended with a brief status update, provided solely for context, of AP1000 rulemaking activities.<sup>82</sup>

We asked whether the Staff considered the events at Fukushima Dai-ichi to be "new and significant" information for NEPA purposes.<sup>83</sup> In this respect, the Near-Term Task Force stated: "The current [U.S.] regulatory approach, and more importantly, the resultant plant capabilities, allow the Task Force to conclude that a sequence of events like the Fukushima accident is unlikely to occur in the United States and some appropriate mitigation measures have been implemented, reducing the likelihood of core damage and radiological releases. Therefore, continued operation and continued licensing activities do not pose an imminent risk to public health and safety."<sup>84</sup> Based on this assessment, the Staff stated that it did not consider the events in its supplemental NEPA review.<sup>85</sup> The Staff further stated that it was awaiting the conclusion of the agency's ongoing evaluations and would apply any new requirements developed from those evaluations, whether safety or environmental in nature.<sup>86</sup> The Staff emphasized that the AP1000 design certification and the Vogtle COL application satisfy current requirements, and that the agency has processes in place to apply final actions that the

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<sup>82</sup> Tr. at 56-57.

<sup>83</sup> *Id.* at 57-58.

<sup>84</sup> "Recommendations for Enhancing Reactor Safety in the 21<sup>st</sup> Century, The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident" (July 12, 2011), at vii (Near-Term Report) (transmitted to the Commission via Commission Paper SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan" (July 12, 2011) (ML11186A950) (package)

<sup>85</sup> Tr. at 58. *See generally* Near-Term Report at 71-72.

<sup>86</sup> Tr. at 58.

Commission might take with respect to long-term recommendations for reactor designs or COLs, as appropriate.<sup>87</sup>

We asked how COL information items are incorporated—whether as commitments or license conditions. The Staff indicated that the answer depended upon the specifics of the information item. We requested a follow-up response indicating the breakdown of how COL items were resolved.<sup>88</sup> As part of its follow up, the Staff provided a table indicating the status of each COL information item: either “resolved,” “FSAR commitment,” “license condition,” or “ITAAC [inspections, tests, analyses, and acceptance criteria].”<sup>89</sup> The Staff stated that none of these deferred the receipt of information necessary to the Staff’s findings supporting issuance of the COL.<sup>90</sup>

We also asked about the interface between changes during construction, including those done using the PAR process, and inspections, particularly with respect to how inspectors will know what changes are expected to occur or have occurred. The Staff indicated that one benefit of the PAR process is that it will know the things that the licensee wants to change ahead of time and will, therefore, have advance notice about things that would impact the inspection program. The Staff also explained that there is a regulatory requirement to update the FSAR so that the agency is aware of changes that are made that do not require prior NRC approval.<sup>91</sup>

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<sup>87</sup> *Id.* at 71.

<sup>88</sup> *Id.* at 58-60.

<sup>89</sup> Ex. NRC000015, Staff Post-Hearing Response, at 13 (Question 3); *id.* at 29-37, identified as Staff Table 1.

<sup>90</sup> *Id.* at 13 (Question 3).

<sup>91</sup> Tr. at 72-74. See generally 10 C.F.R. § 52.98(c); 10 C.F.R. pt. 52, app. D, § VIII B.5.b; 10 C.F.R. § 50.71(e).

## 2. **Safety Panel 1**

We directed Safety Panel 1 to discuss relevant sections of the COL application and the following chapters of the COL FSER:

- Chapter 1, “Introduction and Interfaces,” including novel issues associated with licenses for byproduct, source and special nuclear material.
- Chapter 2, “Site Characteristics,” including overview of information incorporated by reference from the ESP.
- Chapter 3, “Design of Structures, Components, Equipment and Systems,” including waterproofing membrane departure and key safety information incorporated by reference from the AP1000 design certification (e.g., shield building redesign and containment pressure relief system).<sup>92</sup>

### a. *Introduction and Interfaces*

Southern explained that the COL application included a request for licenses, pursuant to 10 C.F.R. Parts 30, 40, and 70, to allow the “receipt, possession, and use of by-product, source, and special nuclear material,” but that Part 52 did not include specific guidance identifying the information that should be provided.<sup>93</sup> During the course of the Staff’s review, Southern responded to a series of requests for additional information related to the materials licenses. For some of these requests, Southern stated that it was able to direct the Staff to other portions of the application. For others, Southern supplied new information. For example, Southern supplied descriptions of programs to satisfy the requirements for: control and accounting of special nuclear material; new fuel receipt and storage before an operational storage area is established;

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<sup>92</sup> Revised Scheduling Note at 2 (unnumbered).

<sup>93</sup> Tr. at 84 (Sparkman).



and transfer of control of new fuel to a qualified shipper in the event of a return to the manufacturer.<sup>94</sup>

As part of its discussion of Chapter 1, the Staff stated that it evaluated and approved three exemptions from the NRC's regulations: 10 C.F.R. Part 52, Appendix D, § IV.A.2 (COL application organization and numbering); 10 C.F.R. § 52.93(a)(1) (exemption criteria); and 10 C.F.R. §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 (special nuclear material control and accounting (MC&A) program description).<sup>95</sup> The Staff evaluated six proposed departures from AP1000 DCD Revision 19: an administrative departure for organization and numbering of the FSAR; mudmat thickness; waterproofing membrane material; class 1E voltage regulating transformer current limiting features; potable water system filtration; and emergency response facility locations.<sup>96</sup>

The Staff also evaluated six requested variances from the ESP: three variances corresponding to areas where the COL application incorporates AP1000 DCD Revision 19 rather than Revision 15 (as in the ESP); a variance that provides for updated site layout information, including relocation of the technical support center; a variance that provides for updated information regarding hazardous chemicals in the site vicinity; and a variance that provides for updated climatological data.<sup>97</sup>

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<sup>94</sup> *Id.* at 85.

<sup>95</sup> *Id.* at 93, referring to Ex. NRCR00010, Safety Panel 1, Staff Slide 7. *See also* Ex. NRC000003, Staff Testimony, at 12.

<sup>96</sup> Tr. at 93, referring to Ex. NRCR00010, Safety Panel 1, Staff Slide 8. *See also* Ex. NRC000003, Staff Testimony, at 13-15.

<sup>97</sup> Tr. at 93, referring to Ex. NRCR00010, Safety Panel 1, Staff Slide 9. *See also* Ex. NRC000003, Staff Testimony, at 16.

The Staff next summarized its review of Southern's financial and technical qualifications.<sup>98</sup> In response to questions, the Staff explained that Southern is required to select its decommissioning funding assurance mechanism—e.g., sinking fund, prepayment, parent company guarantee—and provide the proper certification for that mechanism prior to fuel load.<sup>99</sup> The Staff later confirmed and amplified this answer. Southern is required to submit a report after the COLs are issued and no later than thirty days after the NRC publishes notice of intended operation in the *Federal Register*.<sup>100</sup> The Staff explained that this report will certify the amount of financial assurance for decommissioning that is provided and will include a copy of the financial instrument that will be used.<sup>101</sup>

In connection with its evaluation of Southern's technical qualifications to hold a Part 52 license,<sup>102</sup> the Staff explained that an applicant's status as a current power reactor licensee generally provides the necessary support for the Staff's finding that the applicant is technically qualified for a new license.<sup>103</sup> The Staff explained that if it found problems material to an applicant's qualifications during the course of its review of the application, then it might conduct further review before reaching its conclusion on the

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<sup>98</sup> Tr. at 94-95.

<sup>99</sup> *Id.* at 120-21.

<sup>100</sup> Ex. NRC000015, Staff Post-Hearing Response, at 2 (Item C) (referencing 10 C.F.R. §§ 50.75(e)(3) and 52.103(a)).

<sup>101</sup> Ex. NRC000015, Staff Post-Hearing Response, at 2 (Item C).

<sup>102</sup> See Ex. NRC000004, COL FSER, § 1.5; 10 C.F.R. § 52.97(a)(1)(iv).

<sup>103</sup> Ex. NRC000015, Staff Post-Hearing Response, at 2 (Item D).

technical qualification issue.<sup>104</sup> The Staff explained further that this approach is consistent with past treatment of the adequacy or “integrity” of an entity’s corporate organization or management, “confirming that issues such as past violations of NRC regulations would indicate a deficiency in an application only if they are directly germane to the licensing action, rather than being of simply historical interest.”<sup>105</sup>

The Staff discussed in detail its evaluation of the special nuclear MC&A program description exemption identified above as the third requested exemption from NRC regulations.<sup>106</sup> In response to a question, the Staff confirmed that this exemption was in essence an administrative exemption intended to treat Part 52 applicants and licensees in the same manner as Part 50 applicants and licensees, and that the affected program activities do not relate to operation of the nuclear power plant itself.<sup>107</sup>

The Staff also discussed details of Southern’s physical security plan.<sup>108</sup> Southern provided extensive details on the security measures it is implementing to ensure physical security at the site during construction.<sup>109</sup> Each new unit will transition to 10 C.F.R. § 73.55 security standards before fuel load.<sup>110</sup>

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<sup>104</sup> *Id.*

<sup>105</sup> *Id.* at 2-3 (Item D) (citing *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 365 (2001); *Georgia Institute of Technology* (Georgia Tech Research Reactor), CLI-95-12, 42 NRC 111, 120 (1995); *USEC, Inc.* (American Centrifuge Plant), LBP-05-28, 62 NRC 585, 618-19 (2005)).

<sup>106</sup> Tr. at 95-102.

<sup>107</sup> *Id.* at 124.

<sup>108</sup> *Id.* at 102-03.

<sup>109</sup> See Ex. SNCR00011, Southern Post-Hearing Response, at 8-11 (Question 8).

<sup>110</sup> *Id.* at 10 (Question 8).

*b. Site Characteristics*

In connection with Chapter 2, Southern explained that three site characteristics were not fully resolved at the ESP stage: maximum and minimal normal air temperatures; atmospheric dispersion values; and local intense precipitation.<sup>111</sup> In addition, one seismic parameter was supplemented at the COL stage “to provide a more detailed evaluation demonstrating [that] the in-structure response spectra [are] bounded by the DCD’s certified seismic design response spectra . . . .”<sup>112</sup>

In connection with the “local intense precipitation” issue, the Staff explained that the point of this analysis is to verify that drainage ditches can handle potential rainfall and move the water away from site structures.<sup>113</sup> In terms of methodology, the Staff indicated that it made “an independent determination of the depth of rainfall and . . . used the applicant’s hydraulic model . . . as [a] baseline.”<sup>114</sup> The Staff checked and verified the model, applied different parameters to the model, and tested the sensitivity of the model to assess the validity of the applicant’s conclusions.<sup>115</sup>

The Staff summarized its evaluation of Chapter 2, highlighting the distinction between standard content information applicable to all AP1000 COL applicants and plant-specific information.<sup>116</sup> The Staff explained that it “reviewed and compared the Vogtle site-specific characteristic values presented in [the] Vogtle FSAR against the

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<sup>111</sup> Tr. at 87-89.

<sup>112</sup> *Id.* at 89.

<sup>113</sup> *Id.* at 129.

<sup>114</sup> *Id.* at 129-30 (Caverly).

<sup>115</sup> *Id.* at 130.

<sup>116</sup> *Id.* at 105.

AP1000 site parameters presented in the AP1000 DCD,” and “confirmed that the AP1000 site parameters were enveloped by [the] corresponding Vogtle site characteristic values.”<sup>117</sup> The Staff discussed its review of Southern’s evaluation of AP1000 standard chemicals, including potential hazards to control room habitability.<sup>118</sup> The Staff explained that clarifications to the AP1000 normal temperature site parameter values made after the Vogtle ESP was issued led Southern to propose a variance from the ESP normal air temperature site values.<sup>119</sup> The Staff found the variance acceptable because of the prior evaluation during the ESP review and because “the revised site values remain[ed] bounded by the AP1000 normal temperature site parameter values.”<sup>120</sup>

c. *Chapter 3: Design of Structures, Components, Equipment and Systems*

Southern identified key DCD information incorporated by reference into the COL application. Southern noted particularly the shield building redesign and several ITAAC related to the nuclear island structures.<sup>121</sup>

The Staff provided a detailed overview of the AP1000 shield building design and its evaluation of that design. The shield building is a safety-related Seismic Category I<sup>122</sup>

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<sup>117</sup> *Id.* at 106 (Joshi). The Staff noted one exception related to the Vogtle site’s ground motion response spectra, and indicated that this would be discussed in connection with Chapter 3. *Id.*

<sup>118</sup> *Id.* at 106-07.

<sup>119</sup> *Id.* at 107-08.

<sup>120</sup> *Id.* at 108 (Joshi).

<sup>121</sup> *Id.* at 90.

<sup>122</sup> A “Seismic Category I” structure must be designed to remain functional if the safe shutdown earthquake occurs. See Regulatory Guide 1.29, Rev. 4, “Seismic Design Classification” (Mar. 2007) (ML070310052), at 2.

structure that: provides structural and radiological shielding and protection from external events for the containment vessel; radiation shielding; support for “the passive containment cooling water storage tank”; and “natural air circulation cooling for the containment vessel.”<sup>123</sup> The shield building design was revised by Westinghouse to use steel concrete composite modules; this resulted in extensive re-analysis and testing of the building’s structural capacity, factoring in the effect of water load on the roof of the building, to resist aircraft impacts and to cope with seismic, tornado, and wind loads.<sup>124</sup> After comprehensive Staff review, confirmed by independent expert consultants and by the ACRS, the Staff “concluded that the AP1000 shield building design is safe and provides . . . reasonable assurance that the building will remain functional under design basis loads.”<sup>125</sup>

The Staff explained that, to prevent a damaging external pressure load on the containment vessel, a “containment vacuum relief system was added to an existing vent line penetration.”<sup>126</sup> This added system “consists of redundant vacuum relief devices sized to prevent differential pressure between [the] containment and the shield building from exceeding the design value.”<sup>127</sup> The Staff stated that this ensures that a single failure of any relief devices would not prevent the relief flow path.<sup>128</sup>

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<sup>123</sup> Tr. at 109 (Shams).

<sup>124</sup> *Id.* at 109-10.

<sup>125</sup> *Id.* at 111-12 (Shams). *See generally* Ex. NRC000004, COL FSER, § 3.8.4.

<sup>126</sup> *Id.* at 112 (McGovern).

<sup>127</sup> *Id.* (McGovern).

<sup>128</sup> *Id.*

Southern briefly discussed the departure from the AP1000 DCD for the waterproofing membrane installed under the first LWA. Southern stated that the selected waterproofing option is consistent with the DCD design, although not specifically described in the DCD. Southern pointed out that the membrane is governed by “a site-specific ITAAC, which will confirm the specified coefficient of friction of 0.7.”<sup>129</sup> In response to a question regarding the timing and process for verifying compliance with this ITAAC, the Staff explained that Southern would produce a report documenting compliance of the waterproofing membrane with the acceptance criteria, including the 0.7 coefficient of friction. The Staff stated that inspectors visited the site to observe the actual installation, and that the documentation provided in the report was examined to verify that the waterproofing membrane satisfied the requirement.<sup>130</sup>

The Staff also discussed this departure, noting that AP1000 DCD Revision 15 did not specify a material for the membrane and that the material selected was approved in the ESP. Revision 18, issued later, did specify a particular material that differed from that approved for the ESP. Because this is classified as “Tier 2” information, the use of a different material required a departure from the DCD.<sup>131</sup> In response to questions, the

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<sup>129</sup> *Id.* at 89 (Aughtman). See Ex. NRC000004, COL FSER, § 3.8.5.4, at 3-59 (the ESP ITAAC will be included as an ITAAC in the COL).

<sup>130</sup> Tr. at 122.

<sup>131</sup> *Id.* at 113. “Tier 2” information is defined as:

[T]he portion of the design-related information contained in the generic DCD that is approved but not certified by this appendix (Tier 2 information). Compliance with Tier 2 information is required, but generic changes to and plant-specific departures from Tier 2 are governed by Section VIII of [Appendix D].

Staff explained that while some chemical and physical properties of the two materials differ, the differences are not substantive.<sup>132</sup> The Staff also explained that while the applicant stated in its application that this Tier 2 departure from the DCD did not require prior approval, the Staff reviewed this departure because it was part of the COL application.<sup>133</sup>

In connection with piping, we asked the Staff to identify any commitments, programs, or license conditions that are in place to ensure that as-installed piping will match as-designed piping, so that the Staff's safety conclusions remain valid. The Staff identified two site-specific ITAAC intended to verify that the design complies with the AP1000 DCD. These two ITAAC, and two license conditions related to timing, address the piping design acceptance criteria.<sup>134</sup> The Staff identified two additional ITAAC, also incorporated by reference, that reconcile the as-built piping to ensure that it complies with the American Society of Mechanical Engineers (ASME) code and the NRC's regulations.<sup>135</sup>

### **3. Safety Panel 2**

We asked Safety Panel 2 to discuss relevant sections of the COL application and the following chapters of the COL FSER:

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<sup>132</sup> Tr. at 114.

<sup>133</sup> *Id.* at 114-15.

<sup>134</sup> Ex. NRC000015, Staff Post-Hearing Response, at 23 (Question 10). See Ex. NRC000004, COL FSER, at 3-99, Table 3.6.2-1 (Pipe Rupture Hazards Analysis ITAAC) (also at A-16); Ex. NRC000004, COL FSER, at 3-100, Table 3.12-1 (Piping Design ITAAC) (also at A-17); Ex. NRC000004, COL FSER, at A-3, License Condition 3-1; and Ex. NRC000004, COL FSER, at A-5, License Condition 3-9.

<sup>135</sup> Ex. NRC000015, Staff Post-Hearing Response, at 23-24 (Question 10). See *also* Ex. NRC000001, Part 2, FSAR, § 14.3.3.3 at 14.3-4.



- Chapter 3 continuation, including the following COL review topics: Analysis of soil structure interaction, the second LWA request, and the [ACRS's] recommendation regarding inservice testing and inservice inspection for squib valves from the ACRS letter report on the Vogtle COL application.
- Chapter 6, "Engineered Safety Features," an overview of the contents of the license application and the [S]taff's review and regulatory conclusions, including key safety information incorporated by reference from the AP1000 design certification. This discussion will also address the ACRS recommendations on the Vogtle COL with respect to the containment cleanliness program, and control room habitability from a toxic gas perspective.<sup>136</sup>

a. *Chapter 3 Continuation: Soil Structure, Second LWA Request, Squib Valves*

Southern described the site-specific soil structure interaction (SSI) analyses performed during the ESP and COL stages.<sup>137</sup> For the COL application, Southern performed a 3-D analysis, including lower-bound, upper-bound, and best estimate site-specific soil profiles, to provide a direct comparison to the AP1000 design envelope and in-structure response spectra.<sup>138</sup> Southern concluded that the Vogtle site-specific seismic demand "is enveloped by the AP1000 standard seismic demand used for the design and therefore satisfied the [T]ier [1] requirement for seismic ground motion."<sup>139</sup>

The Staff performed a detailed review of Southern's modeling approach and its input parameters and determined that Southern's analysis conformed to the Standard Review Plan guidance.<sup>140</sup> The Staff's comparisons of Southern's in-structure response

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<sup>136</sup> Revised Scheduling Note at 3 (unnumbered).

<sup>137</sup> Tr. at 134-35.

<sup>138</sup> *Id.* at 135.

<sup>139</sup> *Id.* at 135-36 (Moore).

<sup>140</sup> See generally "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (NUREG-0800, formerly issued as NUREG-75/087), § 3.8.5 (June 1996) (May 2010 for this section of NUREG-0800).

spectra at the key locations “showed that above one [h]ertz [(Hz)] there were no exceedances [from] the standard design.”<sup>141</sup> The Staff found that “below one [Hz] there were exceedances in the 0.55 [Hz] range” but “found that these exceedances were not significant because there were no AP1000 structure[s,] systems or components with resonant frequencies in this range.”<sup>142</sup> The Staff also described its methodology for evaluating the justification Southern provided to ensure that the AP1000 design was not compromised by the exceedances.<sup>143</sup>

The Staff explained that even though the Vogtle ground motion response spectra exceeded the AP1000 certified seismic design response spectra above the 10 Hz point, this was not a concern. The AP1000 DCD provides a process for site-specific analysis of identified exceedances. This exceedance was in the free field—at Vogtle, the nuclear island functions as a massive vibration absorber with the result that very little energy is released into the structures, systems, and components at frequencies above 10 Hz.<sup>144</sup> When the response spectra are compared, the site-specific results are “clearly enveloped by [the] standard design by a factor of almost two to three in most locations.”<sup>145</sup> The standard design also has margin over the AP1000’s certified seismic design response spectra, and if the Vogtle site is compared to a site with no exceedances, the relative reduction in margin would be very small.<sup>146</sup>

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<sup>141</sup> Tr. at 142 (Tegeler).

<sup>142</sup> *Id.* (Tegeler).

<sup>143</sup> See Ex. NRC000015, Staff Post-Hearing Response, at 24-25 (Question 11).

<sup>144</sup> Tr. at 172-73.

<sup>145</sup> *Id.* at 173 (Tegeler).

<sup>146</sup> *Id.*

The Staff explained that it also reviewed Southern's decision to use four percent, instead of five percent, for structural damping in the model, and confirmed that four percent "was representative of the predicted levels of stress and strain."<sup>147</sup> Additionally, four percent is more conservative than five percent because four percent "credit[s] less energy dissipation in the structural mechanical system . . . [and] using lower values of damping [yields] . . . a slightly higher response."<sup>148</sup> The Staff verified that changes to the AP1000 design, including changes to the shield building design, were reflected in the modeling. The Staff concluded that the AP1000 design was adequate, from a structural perspective, for use at the Vogtle site.<sup>149</sup>

In response to a question about the Staff's process for validating a 3-D model like the model Southern used to perform its 3-D SSI analysis, the Staff explained that it made a direct comparison between Southern's model and the model used for the AP1000 standard design. The Staff directed Southern to perform additional evaluations using its model with the same base motion input values used for the AP1000 standard design model. The results generated by Southern's model using these input values closely matched the results of the AP1000 standard design at six key locations. As a result, the Staff concluded that Southern's model adequately represented the AP1000 design. The Staff explained that as part of its evaluation of Southern's model, it also looked at other metrics as part of its validation process, such as "total model mass,

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<sup>147</sup> *Id.* at 142 (Tegeler).

<sup>148</sup> *Id.* at 168 (Tegeler).

<sup>149</sup> *Id.* at 143.

frequency response, element properties with respect to material properties and element types.”<sup>150</sup>

Southern stated that the second LWA seeks authorization to perform safety-related work, specifically, the “installation of reinforcing steel, sumps[,] and drain lines and other embedded items in the nuclear island foundation base mat and placement of concrete for the nuclear island foundation base slab.”<sup>151</sup> The Staff explained that it assessed the LWA using NUREG-0800 § 3.85.<sup>152</sup> The Staff accepted Southern’s “proposal based on the DCD commitment to use [American Concrete Institute standard] ACI 349 for the design of the base slab and the finding that the standard plant design is acceptable for Vogtle.”<sup>153</sup> Based on Southern’s commitment, and on the site-specific seismic analysis, the Staff found “that there is reasonable assurance that the base slabs will have adequate strength, stiffness[,] and ductility under the Vogtle seismic demands.”<sup>154</sup>

Both the Staff and Southern provided an extensive discussion of “squib valves.” Squib valves are “explosive actuated valves . . . [used] in the [AP1000] automatic

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<sup>150</sup> *Id.* at 165 (Tegeler). The Staff also explained why certain technical and software quality assurance concerns raised by the Defense Nuclear Facilities Safety Board (DNFSB) in connection with DOE construction projects have no safety significance here. See Ex. NRC000015, Staff Post-Hearing Response, at 22-23 (Question 9). Among other evidence, the Staff noted that “[s]purious results indicated by abrupt changes in the response spectra, indicative of the behavior cited in the DNFSB letter, were not observed” in the Vogtle seismic demand modeling. *Id.* at 23. See also Ex. SNC000011, Southern Post-Hearing Response, at 11-13 (Question 9).

<sup>151</sup> Tr. at 136 (Sparkman).

<sup>152</sup> *Id.* at 144.

<sup>153</sup> *Id.* (Tegeler).

<sup>154</sup> *Id.* (Tegeler).

depressurization system to reduce reactor pressure . . . in the event of a loss of [coolant] accident.”<sup>155</sup> Squib valves also are used as part of the passive core cooling system for the purpose of injecting cooling water into the reactor vessel, “for natural recirculation [from] the containment sump to the reactor cooling system, and to increase the containment water level if necessary in the event of a severe accident.”<sup>156</sup> Southern stated that the design and qualification of the squib valves is an AP1000 DCD element incorporated by reference into the COL application.<sup>157</sup> The squib valves are subject to ITAAC specified in Tier 1 of the AP1000 DCD. The ITAAC require testing of squib valves to demonstrate operational capability under design conditions.<sup>158</sup>

The ACRS expressed concerns about the inspection and testing program for these squib valves and recommended that “a regulatory requirement be established[,] focused on the development of the [inservice inspection/inservice testing] program, including a review of the lessons-learned from the valve design and qualification process.”<sup>159</sup> The ACRS stated that “[p]eriodic removal and firing of the explosive charge that initiates operation of the valve may not be sufficient for these critical components.”<sup>160</sup> To address concerns raised by the ACRS, Southern stated that the inservice testing (IST) program for the squib valves will integrate lessons-learned from the design and qualification process to maintain reasonable assurance that the squib

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<sup>155</sup> *Id.* (Scarborough).

<sup>156</sup> *Id.* at 144-45 (Scarborough).

<sup>157</sup> *Id.* at 137.

<sup>158</sup> *Id.* at 145.

<sup>159</sup> ACRS Letter at 3.

<sup>160</sup> *Id.*

valves are operationally ready to perform their safety functions.<sup>161</sup> The Staff is monitoring the squib valve design and qualification process, has observed the valve vendor's prototype testing, and is scrutinizing the development of surveillance provisions, including inservice testing and internal inspections.<sup>162</sup> The Staff explained that it will conduct pre-start-up inspections to verify that the squib valves can perform their safety functions, as part of the closure process for the ITAAC.<sup>163</sup>

We questioned this explanation because the squib valve inspection program has not been finalized. The inspection program is contingent on an ASME code provision that is still under development.<sup>164</sup> Although the Staff conceded that the current version of the code is insufficient,<sup>165</sup> the Staff reached its 10 C.F.R. § 52.97 reasonable assurance finding based on the following.

The Staff explained that specific testing, inservice inspection, and surveillance plans could be developed now, but it would be more effective and practical to wait until after the ASME code development effort, the industry's ongoing development of surveillance requirements, and the testing program scheduled for 2012, are complete.<sup>166</sup> We asked two post-hearing questions related to squib valves. First, we asked the Staff to explain the relevance of the findings that will be made pursuant to the inspection of the operational testing program that will be conducted prior to fuel load, and any NRC

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<sup>161</sup> Tr. at 137-38.

<sup>162</sup> *Id.* at 145-46.

<sup>163</sup> *Id.* at 146.

<sup>164</sup> *Id.* at 161-62.

<sup>165</sup> *Id.* at 162.

<sup>166</sup> *Id.* at 175-76.

decision regarding operation of the plant, including the regulatory basis for actions under 10 C.F.R. § 52.103. Second, we asked the Staff to provide reasons for not including a finalized testing process now, as well as the basis for nonetheless concluding that the Staff's approach complies with 10 C.F.R. § 52.97.<sup>167</sup>

In its response to the post-hearing questions, the Staff cited several references, including Commission papers, Staff requirements memoranda, and NRC Inspection Manual Chapter 2504 that, according to the Staff, require it to perform inspections of operational programs before fuel load.<sup>168</sup> The Staff stated that its evaluation of Southern's squib valve inservice testing program is "consistent with [the] approach" in these references "for the review, implementation, and inspection of operational programs."<sup>169</sup> The Staff also explained the bases for its present conclusion "that there is reasonable assurance of the operational readiness of [the] squib valves to perform their safety functions."<sup>170</sup> First, the Staff observed that 10 C.F.R. § 50.55a requires applicants to implement the edition and addendum of the ASME *Code for Operation and Maintenance of Nuclear Plants* (OM Code) that is incorporated by reference in 10 C.F.R.

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<sup>167</sup> See Post-Hearing Order at 3 (Questions 5a and 5b).

<sup>168</sup> Ex. NRC000015, Staff Post-Hearing Response, at 16 (Question 5a) (citing "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," Commission Paper SECY-05-0197 (Oct. 28, 2005); Staff Requirements – SECY-02-0067 – Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) for Operational Programs (Programmatic ITAAC) (Sept. 11, 2002); Inspection Manual Chapter 2504, "Construction Inspection Program—Inspection of Construction and Operational Programs," especially § 08.02.e, "Confirmation of Operational Programs" (Oct. 15, 2009); and Staff Requirements – SECY-04-0032 – Programmatic Information Needed for Approval of a Combined License Without Inspections, Tests, Analyses[,] and Acceptance Criteria (May 14, 2004)).

<sup>169</sup> Ex. NRC000015, Staff Post-Hearing Response, at 16 (Question 5a).

<sup>170</sup> *Id.* at 17 (Question 5a).

§ 50.55a twelve months before fuel loading.<sup>171</sup> The Staff explained that the IST operational program described in the Vogtle FSAR is based on the currently-incorporated ASME OM Code (2001 Edition through the 2003 Addenda, which includes provisions for IST surveillance of explosive-actuated valves for current operating plants).<sup>172</sup> The Staff is also working on a proposed rule to incorporate by reference into § 50.55a the 2011 addenda to the ASME OM Code. The proposed rule also would specify additional squib valve surveillance requirements—not otherwise included in the 2011 addenda—based on lessons learned at that time from the squib valve design and qualification process.<sup>173</sup> In parallel, the ASME is working on additional OM Code updates; the Staff is participating in that effort, which could lead to additional rulemakings in the future.<sup>174</sup>

Second, the Staff noted that the FSAR description of the inservice testing program states that the program will incorporate lessons learned during the design and qualification process for these valves.<sup>175</sup> Therefore, according to the Staff, while it has confidence at this time that the relevant requirements will be prescribed by rulemaking, the Vogtle FSAR commitment provides sufficient regulatory control to ensure that the

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<sup>171</sup> *Id.* at 16-17 (Question 5a).

<sup>172</sup> *Id.* at 17 (Question 5b).

<sup>173</sup> *Id.* at 18 (Question 5b).

<sup>174</sup> *Id.* at 18-19 (Question 5b). Such rules, if implemented, might remove some of the additional squib valve surveillance requirements that will be part of the Staff's proposed rule now, provided the ASME OM Code is revised to cover these requirements. *Id.* at 19.

<sup>175</sup> *Id.* at 16-17 (Question 5a).



IST program for squib valves will provide reasonable assurance even if the rulemaking is still in progress.<sup>176</sup>

Further, other factors led the Staff to have reasonable assurance that the squib valves will be operationally ready to perform their intended function. First, any change to the IST program for squib valves as described in the FSAR would likely require a license amendment.<sup>177</sup> In that case, the NRC Staff would have an opportunity to review the changes to the IST requirements for squib valves. Second, if the IST program for the squib valves ultimately is found to be insufficient, the Staff indicated that it can take enforcement action to prohibit or delay fuel load.<sup>178</sup> Alternatively, the NRC could require modifications to the inservice testing program pursuant to the compliance backfit provisions of 10 C.F.R. § 50.109(a)(4)(i).<sup>179</sup> Third, the Staff stated that it is planning to conduct a vendor inspection to evaluate the design and qualification process.<sup>180</sup> Finally, the Staff reiterated that it will conduct ITAAC inspections of squib valves as part of its ITAAC closure process before the Commission confirms that all ITAAC are completed and issues its 10 C.F.R. § 52.103(g) finding prior to fuel load and operation.<sup>181</sup> Therefore, based upon the totality of the reasons explained above, including the FSAR commitment that the inservice test and inspection program for the squib valves will

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<sup>176</sup> *Id.* at 19 (Question 5b).

<sup>177</sup> *Id.* at 18 (Question 5b).

<sup>178</sup> *Id.* at 17 (Question 5a).

<sup>179</sup> *Id.* (Question 5a).

<sup>180</sup> *Id.* (Question 5b).

<sup>181</sup> *Id.* (Question 5b).

incorporate the lessons learned during the design and qualification process, the Staff was able to reach its 10 C.F.R. § 52.97 reasonable assurance finding on this issue.<sup>182</sup>

Although we find that the Staff's review of the squib valve issues was rigorous, we have a concern similar to that initially raised by the ACRS regarding the status of the inservice inspection/inservice testing program for this component. As such, we find that including a license condition directing the implementation of a surveillance program, with the requirements described below, prior to fuel load, is appropriate.<sup>183</sup> We therefore impose the following condition on the licenses for Units 3 and 4:

Before initial fuel load, the licensee shall implement a surveillance program for explosively actuated valves (squib valves) that includes the following provisions in addition to the requirements specified in the edition of the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) as incorporated by reference in 10 CFR 50.55a.

a. Preservice Testing

All explosively actuated valves shall be preservice tested by verifying the operational readiness of the actuation logic and associated electrical circuits for each explosively actuated valve with its pyrotechnic charge removed from the valve. This must include confirmation that sufficient electrical parameters (voltage, current, resistance) are available at the explosively actuated valve from each circuit that is relied upon to actuate the valve. In addition, a sample of at least 20% of the pyrotechnic charges in all explosively actuated valves shall be tested in the valve or a qualified test fixture to confirm the capability of each sampled pyrotechnic charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping. The sampling must select at least one explosively actuated valve from each redundant safety train. Corrective action shall be taken to resolve any deficiencies identified in the operational readiness of the actuation logic or associated electrical circuits, or the capability of a pyrotechnic charge. If a charge fails to fire or its capability is not confirmed, all charges with the same batch number shall be removed, discarded, and replaced with charges from a different batch number that has demonstrated successful 20% sampling of the charges.

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<sup>182</sup> *Id.* at 19-20 (Question 5b).

<sup>183</sup> See *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-00-13, 52 NRC 23, 29-31 (2000).

b. Operational Surveillance

Explosively actuated valves shall be subject to the following surveillance activities after commencing plant operation:

- (1) At least once every 2 years, each explosively actuated valve shall undergo visual external examination and remote internal examination (including evaluation and removal of fluids or contaminants that may interfere with operation of the valve) to verify the operational readiness of the valve and its actuator. This examination shall also verify the appropriate position of the internal actuating mechanism and proper operation of remote position indicators. Corrective action shall be taken to resolve any deficiencies identified during the examination with post-maintenance testing conducted that satisfies the preservice testing requirements.
- (2) At least once every 10 years, each explosively actuated valve shall be disassembled for internal examination of the valve and actuator to verify the operational readiness of the valve assembly and the integrity of individual components and to remove any foreign material, fluid, or corrosion. The examination schedule shall provide for both of the two valve designs used for explosively actuated valves at the facility to be included among the explosively actuated valves to be disassembled and examined every 2 years. Corrective action shall be taken to resolve any deficiencies identified during the examination with post-maintenance testing conducted that satisfies the preservice testing requirements.
- (3) For explosively actuated valves selected for test sampling every 2 years in accordance with the ASME OM Code, the operational readiness of the actuation logic and associated electrical circuits shall be verified for each sampled explosively actuated valve following removal of its charge. This must include confirmation that sufficient electrical parameters (voltage, current, resistance) are available for each valve actuation circuit. Corrective action shall be taken to resolve any deficiencies identified in the actuation logic or associated electrical circuits.
- (4) For explosively actuated valves selected for test sampling every 2 years in accordance with the ASME OM Code, the sampling must select at least one explosively actuated valve from each redundant safety train. Each sampled pyrotechnic charge shall be tested in the valve or a qualified test fixture to confirm the capability of the charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping. Corrective action shall be taken to resolve any deficiencies identified in the capability of a pyrotechnic charge in accordance with the preservice testing requirements.

This license condition shall expire upon (1) incorporation of the above surveillance provisions for explosively actuated valves into the facility's inservice testing program, or (2) incorporation of inservice testing requirements for explosively actuated valves in new reactors (i.e., plants receiving a construction permit, or combined license for construction and operation, after January 1, 2000) to be specified in a future edition of the ASME OM

Code as incorporated by reference in 10 CFR 50.55a, including any conditions imposed by the NRC, into the facility's inservice testing program.

This license condition supplements the current requirements in the ASME OM code for explosively actuated valves, and sets forth requirements for both pre-service testing and operational surveillance, as well as any necessary corrective action. The license condition will expire when either (1) the license condition is incorporated into the Vogtle IST program; or (2) the updated ASME OM Code requirements for squib valves in new reactors, as accepted by the NRC in 10 C.F.R. § 50.55a, are incorporated into the Vogtle IST program.<sup>184</sup> For the purpose of satisfying the license condition, the licensee retains the option of including in its IST program either the requirements stated in this condition, or including updated ASME Code requirements.

We note, however, that regardless of the option chosen to satisfy the license condition, the relevant provisions of the OM Code may be subject to further revision in the future, and IST requirements for the squib valve component may change. We do not expect the IST program for squib valves necessarily to be a static one. As with any facility, the Vogtle units will be subject to our rules providing for the application of future Code revisions to operating plants; Southern ultimately may be required to comply with a later version of the OM Code, as accepted by the NRC and incorporated by reference into 10 C.F.R. §50.55a. In particular, section 50.55a(f)(4) requires that, throughout the service life of the plant, valves such as squib valves must, to the extent practical, meet the IST requirements set forth in the ASME OM Code and addenda that become effective during that time. Even in the case where Southern chooses to satisfy the

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<sup>184</sup> While the proposed condition is based on a revision to the ASME OM Code currently under consideration, the Code requirements ultimately might differ from the license condition when the full ASME review process is complete.

license condition by incorporating the condition into his IST program, Southern will still be required to comply with section 50.55a(f)(4) throughout the life of the plant.

*b. Engineered Safety Features*

By way of background, the Staff described the AP1000 engineered safety features that are incorporated by reference in the COL application. The Staff provided details regarding the passive core cooling system, including the in-containment refueling water storage tank, passive heat exchangers, the automated depressurization system, and core make-up tanks, among other features.<sup>185</sup> The Staff discussed AP1000 design features that address Generic Issue 191 (Assessment of Debris Accumulation on PWR Sump Performance); these were part of the DCD amendment rulemaking proceeding.<sup>186</sup> The Staff reviewed the ACRS's assessment of the AP1000 design's long-term core cooling performance, including the effects of debris.<sup>187</sup> The Staff also presented details about the passive main control room emergency habitability system.<sup>188</sup>

The Staff then reviewed its evaluation of two items: the containment cleanliness program and risks to control room habitability associated with the applicant's toxic gas inventory.<sup>189</sup> With respect to the first of these, the Staff explained that it found the containment cleanliness program to be consistent with applicable guidance documents. The Staff also explained that, while it agreed with the ACRS that the NRC's stringent

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<sup>185</sup> Tr. at 148-52.

<sup>186</sup> *Id.* at 152-54.

<sup>187</sup> *Id.* at 153-54. See Abdel-Khalik, S., ACRS Chairman, letter to Gregory B. Jaczko, Chairman, NRC, "Long-Term Core Cooling for the Westinghouse AP1000 Pressurized Water Reactor" (Dec. 20, 2010).

<sup>188</sup> Tr. at 155-56.

<sup>189</sup> *Id.* at 156-58.

latent fiber limits should not be changed by the licensee without NRC approval, it was more appropriate to resolve this “by designating the information as Tier 2[\*] in the AP1000 [DCD], rather than including [it] in the [technical specifications section] of the COL.”<sup>190</sup>

We asked a series of questions about the differences, in terms of monitoring and repercussions/corrective actions, between handling this as a Tier 2\* rather than a technical specification issue.<sup>191</sup> Southern stated that if the containment debris limit is exceeded, the plant will be outside its design basis and would have to remain shut down until restoration of the design basis, whether the limit is treated as a technical specification, or identified as Tier 2 or Tier 2\* information.<sup>192</sup> The Staff provided a more detailed answer in its post-hearing response.<sup>193</sup> According to the Staff, there is no practical advantage in using a technical specification instead of the Tier 2\* designation in this situation. Technical specifications and Tier 2\* items are both requirements imposed on licensees, and both are subject to regulatory oversight. The timing of detecting out-of-tolerance conditions would be the same, the corrective action imposed would be basically the same, and changes to the requirement would use the same change provisions.<sup>194</sup> The Staff explained that the limit on debris “is not a process variable that

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<sup>190</sup> *Id.* at 157 (McKirgan). “Tier 2\*” means “the portion of the Tier 2 information, designated as such in the generic DCD, which is subject to the change process in [10 C.F.R. pt. 52, app. D, §] VIII.B.6.” 10 C.F.R. pt. 52, app. D, § II.F.

<sup>191</sup> Tr. at 158-60.

<sup>192</sup> *Id.* at 348.

<sup>193</sup> See Ex. NRC000015, Staff Post-Hearing Response, at 14 (Question 4). See *also id.* at 25-26 (Question 12).

<sup>194</sup> *Id.* at 14 (Question 4).

is continuously monitored and thus [it] would not benefit from additional control room attention,” which a technical specification generally would receive.<sup>195</sup> Instead, “[t]he general housekeeping or maintenance activities associated with the [containment] cleanliness program are better controlled by maintenance personnel through maintenance programs.”<sup>196</sup> The Staff also pointed out that the AP1000 design has eliminated most sources of debris, and the containment cleanliness program is directed at controlling and tracking the removal of debris inadvertently brought into the containment during maintenance.<sup>197</sup> In any event, whether debris limits are set in a technical specification or are designated as Tier 2\* items, any corrective action program that might be needed down the road will be subject to inspection under the reactor oversight program.<sup>198</sup>

With respect to control room habitability, the Staff evaluated Southern’s toxic chemical inventory, reviewed Southern’s analysis, and performed independent confirmatory calculations. The Staff concluded that the design of the control room ventilation system precluded excessive concentrations of these chemicals in the control room, and that the control room would remain habitable.<sup>199</sup>

#### **4. Safety Panel 3**

Safety Panel 3 focused on relevant sections of the COL application and the following chapters from the COL FSER:

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<sup>195</sup> *Id.* (Question 4).

<sup>196</sup> *Id.* (Question 4).

<sup>197</sup> *Id.* (Question 4).

<sup>198</sup> *Id.* at 14-15 (Question 4).

<sup>199</sup> Tr. at 157-58.

- Chapter 19, “Probabilistic Risk Assessment,” seismic margin analysis and external event frequencies within the scope of the COL and the novel issue within the scope of the COL review associated with Appendix 19.A, “Loss of Large Areas of the Plant Due to Explosions or Fires.”
- Chapter 15, “Accident Analysis,” including the ACRS’[s] recommendation associated with reactor power uncertainty measurement.
- Chapter 7, “Instrumentation and Controls,” including key safety information incorporated by reference from the AP1000 design certification.
- Chapter 8, “Electric Power,” including an overview of offsite power, underground cable review, and departures from the [DCD].<sup>200</sup>

a. *Probabilistic Risk Assessment (PRA), Seismic Margin Analysis, External Events, LOLA, Severe Accident Analysis*

The Staff explained that severe accidents, aircraft impact assessment, and probabilistic risk assessment are issues covered in the AP1000 DCD; this information is incorporated by reference into the COL.<sup>201</sup> On the other hand, external event risks are site dependent, and therefore must be re-evaluated in the COL application.<sup>202</sup> The Staff reviewed the Vogtle-specific risk assessments of seismic, high wind, flooding, and fire events; transportation accidents; and potential hazards from nearby facilities.<sup>203</sup> Southern also discussed these topics.<sup>204</sup>

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<sup>200</sup> Revised Scheduling Note at 4 (unnumbered). We also asked this Staff panel to be prepared to answer questions on the following:

- Chapter 5, “Reactor Coolant System and Connected Systems.”
- Chapter 16, “Technical Specifications.”
- Chapter 17, “Quality Assurance.”
- Chapter 18, “Human Factors Engineering.”

*Id.*

<sup>201</sup> Tr. at 192-93.

<sup>202</sup> *Id.* at 194.

<sup>203</sup> *Id.* at 194-200.

<sup>204</sup> *Id.* at 183-90.



In connection with seismic risk, this panel continued the seismic margin discussion begun by the previous panel. Southern presented an overview of its process for assessing the seismic margin at the Vogtle site. Southern compared the seismic margins at the Vogtle site to the assessed standard margins for the AP1000 design, and determined that the site-specific seismic demand is enveloped by the AP1000 standard seismic demand, and that the site-specific safety margins applicable to potential sliding and overturning were larger than the calculated limiting safety factors for the AP1000 design cases. Southern stated that, for purposes of seismic margin assessment, the review-level earthquake “is defined as 1.67 times the Vogtle” ground motion response spectra.<sup>205</sup> Southern’s engineering evaluations “demonstrated that the seismic margins against soil failure due to soil liquefaction and soil bearing were well above the review-level earthquake.”<sup>206</sup>

The Staff explained that “certified design response spectra” refers to “the shaking that results from a safe shutdown earthquake, or SSE. . . . [T]he SSE is a 0.3[ g] earthquake.”<sup>207</sup> The Staff explained that the review-level earthquake, required to be 1.67 times the SSE (as Southern indicated), is a 0.5 g earthquake, “during which the equipment [that is] needed to shut down safely must function [successfully].”<sup>208</sup>

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<sup>205</sup> *Id.* at 184 (Moore).

<sup>206</sup> *Id.* (Moore).

<sup>207</sup> *Id.* at 194-95 (McGovern).

<sup>208</sup> *Id.* at 195 (McGovern) (citing SECY–93–087 – Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs, (Jul. 21, 1993) (staff requirements memorandum)). The cited staff requirements memorandum provides that “[a] PRA-based seismic margins analysis will consider sequence-level High Confidence, Low Probability of Failures . . . and fragilities for all (continued . . . )

Southern determined that site-specific susceptibilities to external events, including high winds and floods, were bounded by the corresponding analyses conducted for the AP1000 design, as documented in the DCD.<sup>209</sup> The AP1000 design basis for safety-related structures assumes the load from a 300-mph tornado; winds greater than 230 mph occur at a frequency of  $1 \times 10^{-7}$  per year in the United States.<sup>210</sup> In addition, Vogtle's plant grade is 220 feet above sea level.<sup>211</sup> The design basis flood, which assumes "cascading upstream dam failures coincident with wind setup and wave run-up," is over 40 feet below plant grade.<sup>212</sup> The Staff confirmed that, while the probable maximum precipitation event approaches the plant grade, Southern's calculation was sufficiently conservative to justify the conclusion that the analysis was bounding.<sup>213</sup>

The Staff also examined Southern's analysis of nearby transportation accidents, on-site hazardous chemicals, external and off-site fires, and radiological hazards from the other two nuclear facilities located at the Vogtle site. The Staff confirmed that all of these potential external events either were bounded by the DCD, were not applicable, or had negligible consequences.<sup>214</sup>

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sequences leading to core damage or containment failures up to approximately [1.67 times] the ground motion acceleration of the Design Basis SSE." *Id.* at 9-10.

<sup>209</sup> Tr. at 185.

<sup>210</sup> *Id.* at 198.

<sup>211</sup> *Id.* at 198-99.

<sup>212</sup> *Id.* at 199 (McGovern).

<sup>213</sup> *Id.*

<sup>214</sup> *Id.* at 199-200; Ex. NRCR00012, Safety Panel 3, Staff Slide 8.

As the Staff stated in its presentation, 10 C.F.R. § 50.54(hh)(2) requires licensees to “develop and implement guidance and strategies . . . to maintain or restore core cooling, containment[,] and spent-fuel pool cooling capabilities” to address LOLA from fires or explosions that arise from a beyond-design-basis event.<sup>215</sup> A COL application must include a description and plan for implementing these requirements.<sup>216</sup> The Staff’s review of these issues currently is governed by an interim Staff guidance document.<sup>217</sup> The Staff issued over ninety requests for additional information to Southern related to the Staff’s LOLA review; these questions resulted in clarifications, comments, and significant changes to Southern’s mitigation strategies.<sup>218</sup>

To provide context for its mitigation strategy commitments, Southern reviewed relevant AP1000 design features, including: the “permanent hard-piped spent-fuel pool spray system” and “ground-level external hard-piped connections to the spent fuel pool spray and makeup piping” designed for direct connection to fire department pumper trucks or portable pumps; the “passive containment cooling water storage tank located above the containment structure”; and the elimination of the need for emergency power sources during the initial 72-hour period after a LOLA event.<sup>219</sup> Southern explained its commitments for mitigation strategies related to LOLA of the plant due to explosions or

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<sup>215</sup> Tr. at 201 (Caruso). See 10 C.F.R. § 50.54(hh)(2).

<sup>216</sup> Tr. at 201. See 10 C.F.R. § 52.80(d).

<sup>217</sup> Tr. at 202. See “[Final] Interim Staff Guidance, Compliance with 10 CFR 50.54(hh)(2) and 10 CFR 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 (June 9, 2010) (ML101940484).

<sup>218</sup> Tr. at 205-07.

<sup>219</sup> *Id.* at 188 (Sparkman).

fire, and provided a description of each of its commitments.<sup>220</sup> The Staff confirmed that, at the Staff's request, Southern provided a draft license condition, to be incorporated into the Vogtle COLs, that "establishes a schedule for completing . . . full implementation of the operational and programmatic elements of responding to a LOLA event" prior to initial fuel load.<sup>221</sup>

*b. Instrumentation and Controls*

The Staff explained that the AP1000 DCD "assumes a [one] percent power uncertainty for the initial reactor power for the large break [loss-of-coolant accident]."<sup>222</sup> Southern explained that the AP1000 DCD Chapter 15 contains COL Information Item 15.0-1, which requires verification that the installed instruments conform to the DCD and are consistent with the assumptions underlying it.<sup>223</sup> Southern stated that it addressed the DCD COL Information Item requiring verification that installed instruments will provide reactor power calorimetric uncertainty at one percent by calibrating the instrumentation in the laboratory prior to installation and testing it in-place after installation.<sup>224</sup> Southern noted that plant-specific ITAAC on the instrumentation, installation, and analysis are in place, and that the Staff has proposed a COL license condition related to schedule information on documentation for the analysis of the

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<sup>220</sup> See Ex. SNC000005, Southern Pre-Hearing Response, at 6-9, Attachment 1 (Question 31).

<sup>221</sup> Tr. at 208-09 (Caruso).

<sup>222</sup> *Id.* at 211 (Joshi).

<sup>223</sup> *Id.* at 189.

<sup>224</sup> *Id.*

instrumentation and for maintenance procedures.<sup>225</sup> The Staff “confirmed that appropriate license conditions, and ITAAC, were established for verifying the installation and ensuring proper administrative controls.”<sup>226</sup> The Staff also explained that the draft license “includes a license condition that requires the availability of administrative controls to implement maintenance and contingency activities related to the power calorimetric uncertainty instrumentation, prior to fuel load.”<sup>227</sup>

*c. Electric Power*

Southern described the offsite power system, noting that a standard plant-specific ITAAC was established for offsite power.<sup>228</sup> The Staff explained that this ITAAC, included in response to a request for additional information, “provides that the as-built offsite portion of the power supply, from the transmission network, that interfaces with plant onsite power, will be verified to perform as designed.”<sup>229</sup>

Southern noted the one departure from the DCD taken in Chapter 8. This departure is related to class 1E voltage regulating transformers, where the isolation and protection function is provided by circuit breakers.<sup>230</sup> The Staff examined Southern’s justification for the departure, finding “it acceptable because the isolation function

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<sup>225</sup> *Id.* at 190.

<sup>226</sup> *Id.* at 211-12 (Joshi).

<sup>227</sup> Ex. NRC000015, Staff Post-Hearing Response, at 27 (Question 13).

<sup>228</sup> Tr. at 191.

<sup>229</sup> *Id.* at 219 (Joshi). The ITAAC, which will be included in the license, are described in Ex. NRC000004, COL FSER, Table 8.2A-1.

<sup>230</sup> Tr. at 191.

provided by use of breakers/fuses for regulating transformers is consistent with criteria for independence of electrical safety systems.”<sup>231</sup>

The Staff’s presentation included additional details about the Vogtle site’s switchyard configuration.<sup>232</sup> The Staff also reviewed Southern’s grid stability analysis, and confirmed that, “as specified in the DCD, the grid will remain stable to maintain reactor coolant pump operation for three seconds following a turbine trip.”<sup>233</sup>

In connection with underground cables, Southern explained that it based its inspection, test, and monitoring criteria on lessons-learned from industry operating experience, regulatory guidance, including the information in Generic Letter 2007-01, and AP1000 design information.<sup>234</sup> The Staff also explained that, as part of its response to a series of requests for additional information, Southern “revised its FSAR to include condition monitoring of underground or inaccessible cables in its Maintenance Rule program.”<sup>235</sup>

#### **5. Safety Panel 4**

Safety Panel 4 discussed relevant sections of the COL application and the following chapters of the COL FSER:

- Chapter 13, “Conduct of Operations,” including, with respect to Section 13.3, “Emergency Planning,” an overview of the information incorporated by reference from the ESP and COL information related to the relocation

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<sup>231</sup> *Id.* at 220 (Joshi).

<sup>232</sup> *Id.* at 217.

<sup>233</sup> *Id.* at 218 (Joshi).

<sup>234</sup> *Id.* at 192. See generally NRC Generic Letter 2007-01: “Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients” (Feb. 7, 2007) (ML070360665).

<sup>235</sup> Tr. at 219 (Joshi).

of the technical support center. In addition, the [S]taff [] discuss[ed] the novel issue associated with cyber security as evaluated in FSER Section 13.8.

- Chapter 9, “Auxiliary Systems,” including key safety information incorporated by reference from the AP1000 design certification associated with redesign of the spent fuel pool, and COL information associated with the raw water system.
- Chapter 12, “Radiation Protection,” including As Low As is Reasonably Achievable (ALARA) program for construction workers and minimization of contamination.
- Chapter 14, “Initial Test Programs,” including [first] plant-only tests and first three plant-only tests.<sup>236</sup>

a. *Conduct of Operations, Emergency Planning, Technical Support Center, Cyber Security*

The Staff provided an overview of emergency planning for the Vogtle site; emergency planning issues were resolved in the AP1000 DCD and the ESP.<sup>237</sup> The Staff explained that seven ESP permit conditions relate to emergency planning, namely, the development of emergency action levels (EALs). Permit Conditions 2 and 3 require the development of an EAL scheme that reflects industry guidance; Southern offered a license condition, to be incorporated into the Vogtle COLs, to ensure that these permit conditions are satisfied.<sup>238</sup> Permit Conditions 4 and 5 require the EAL scheme to be

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<sup>236</sup> Revised Scheduling Note at 4-5 (unnumbered). We also asked this Staff panel to be prepared to answer questions related to:

- Chapter 4, “Reactor.”
- Chapter 10, “Steam and Power Conversion.”
- Chapter 11, “Radioactive Waste Management.”

*Id.* at 5 (unnumbered).

<sup>237</sup> Tr. at 257-59. An ESP applicant may, at its option, propose “complete and integrated emergency plans” for review and approval in conjunction with its application, although it is not required to do so. See 10 C.F.R. § 52.17(b)(2), (3). Southern submitted a “complete and integrated emergency plan” as part of its ESP application. See Tr. at 258.

<sup>238</sup> Tr. at 259-60.

consistent with completed AP1000 design details, while Conditions 6 and 7 relate “to as[-]built plant conditions and interfaces with offsite governmental agencies.”<sup>239</sup> The Staff explained that Southern will provide the EALs, detailed procedures for implementing the emergency plan, including an implementation schedule, after the COL issues. Southern must conduct successful onsite and full participation exercises, and must close all of the emergency planning ITAAC before initial fuel load can occur.<sup>240</sup> Southern indicated that Vogtle Unit 3’s exercises are tentatively scheduled for January 2015.<sup>241</sup> In response to post-hearing questions, the Staff confirmed that no exemption was required for the Vogtle EAL program because Vogtle’s EAL scheme—its standard emergency classification and action level scheme—was sufficiently detailed to support a finding that the requirements of 10 C.F.R. § 50.47(b)(4) and Part 50, Appendix E are satisfied.<sup>242</sup> The Staff explained that the ITAAC process will provide additional verification of the EAL scheme: ITAAC 1.1.2 requires analysis of the EAL technical bases to confirm the as-built, site-specific implementation of the EAL scheme; and ITAAC 8.1 “requires a full participation exercise prior to fuel load that will demonstrate the use and adequacy of the EAL scheme for both the licensee and State and local officials.”<sup>243</sup> The Staff also clarified that it did not accept any plan “in lieu of” the

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<sup>239</sup> *Id.* at 259.

<sup>240</sup> *Id.* at 262.

<sup>241</sup> *Id.* at 291.

<sup>242</sup> Ex. NRC000015, Staff Post-Hearing Response, at 20-21 (Question 6).

<sup>243</sup> *Id.* at 21 (Question 6).



requirements of 10 C.F.R. § 52.79(a)(21) and confirmed that the fully-developed EALs will be reviewed by the Staff.<sup>244</sup>

Southern explained that regulatory action on the location of the technical support center (TSC) was deferred from the ESP to the COL, even though the Staff found the location to be acceptable during the ESP review, because of differences in information between DCD Revisions 15 and 19.<sup>245</sup> The Staff explained that Permit Condition 8 was directed to the resolution of these differences.<sup>246</sup> The location of the TSC became a departure that the Staff approved in the COL FSER.<sup>247</sup> Radiological and non-radiological control room habitability issues also were resolved in the COL phase, with the result that an ITAAC was added to verify that the habitability issues would be addressed in the TSC design.<sup>248</sup> Southern explained that the control room will have separate staffing, with two specific sets of positions dedicated to Units 1 and 2, and to Units 3 and 4.<sup>249</sup> The Staff also explained that it approved a variance from the ESP that moved the location of the TSC by 150 feet.<sup>250</sup> In response to questioning, Southern explained that just as the TSC is designed to handle all four units, the emergency

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<sup>244</sup> *Id.* (Question 6).

<sup>245</sup> Tr. at 250.

<sup>246</sup> *Id.* at 260.

<sup>247</sup> *Id.* at 250.

<sup>248</sup> *Id.* at 251.

<sup>249</sup> *Id.* at 251-52.

<sup>250</sup> *Id.* at 261-62.

operations facility and the emergency plan will be able to handle events at multiple sites.<sup>251</sup>

The Staff next presented a short history of the NRC's cyber security regulations.<sup>252</sup> The agency's overarching requirements for the protection of digital computer and communication systems and networks are found at 10 C.F.R. § 73.54.<sup>253</sup> The cyber security plan must take into account site-specific conditions.<sup>254</sup> The plan must be submitted for NRC approval,<sup>255</sup> and the written "[p]olicies, implementing procedures, site-specific analysis, and other supporting technical information" developed to implement the plan are subject to periodic inspection by NRC Staff.<sup>256</sup> The Staff explained that, after NRC review and acceptance, an applicant's or licensee's cyber security plan becomes a condition of the plant's license. In other words, "the cyber security plan becomes a part of the plant's licensing basis, just like the physical security plan."<sup>257</sup>

In its presentation, Southern described its cyber security plan for Vogtle, which is a modified version of a standard AP1000 cyber security plan. The modifications, or

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<sup>251</sup> *Id.* at 297. In response to a post-hearing question, Southern provided a detailed description of emergency plan coordination between the Vogtle and DOE Savannah River sites. See Ex. SNC000011, Southern Post-Hearing Response, at 5-7 (Question 7).

<sup>252</sup> Tr. at 264-68.

<sup>253</sup> See *id.* at 265-67 (discussion of the rule's requirements).

<sup>254</sup> See, e.g., 10 C.F.R. § 73.54(e)(1).

<sup>255</sup> 10 C.F.R. § 73.54 (initial paragraph).

<sup>256</sup> 10 C.F.R. § 73.54(f).

<sup>257</sup> Tr. at 266 (Lee).

deviations, from the AP1000 standard reflect the objectives of Regulatory Guide 5.71, and the template provided in Appendix A of the guide.<sup>258</sup> Southern indicated that it provided a justification for each deviation as part of its cyber security plan, and that it proposed a license condition that will require regular updates to the cyber security program implementation schedule to assist with the scheduling of pre-implementation inspections.<sup>259</sup> The Staff evaluated each deviation and confirmed that the deviations did not reduce the level of protection for critical digital assets.<sup>260</sup>

We asked a series of questions regarding cyber security controls as they relate to the TSC. The Staff explained that the TSC must communicate bilaterally with state and local agencies, and that this factor drove Southern's decision to place the TSC at level 2 in the cyber security plan. (The term "level" refers to the placement of a digital system within the applicant's cyber security architecture. It does not refer to the amount of protection the system will receive.) The Staff explained that all critical digital assets, regardless of their placement within the cyber security architecture, must receive adequate protection from cyber attacks, up to and including the design basis threat.<sup>261</sup>

The Staff next addressed spent fuel pool design issues. The Staff observed that the spent fuel storage pool design is incorporated by reference from the AP1000 DCD into the COL application, and described the basics of the AP1000 spent fuel pool

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<sup>258</sup> *Id.* at 252. See Regulatory Guide 5.71, "Cyber Security Programs for Nuclear Facilities" (Jan. 2010) (ML090340159).

<sup>259</sup> Tr. at 252-53.

<sup>260</sup> *Id.* at 270.

<sup>261</sup> Ex. NRC000015, Staff Post-Hearing Response, at 4 (Item J).

design.<sup>262</sup> The Staff explained that COL applicants no longer have to provide a confirmatory structural analysis of the spent fuel pool storage racks. Westinghouse, as part of the AP1000 amendment rulemaking, redesigned the racks, and the Staff performed a comprehensive evaluation of the new design as part of the rulemaking.<sup>263</sup> Southern explained that some site-specific COL information items remain. COL Information Item 3.7-2 describes the procedures for verification of spent fuel pool “rack to wall gap dimensions following a seismic event.”<sup>264</sup> Supplemental Information Item 9.1-3 “addresses safe load paths for heavy loads near the spent fuel pool.”<sup>265</sup> Finally, standard COL Information Item 9.1-7 “addresses Metamic coupon monitoring to check for swelling and boron depletion.”<sup>266</sup>

The Staff noted that Southern’s Metamic coupon monitoring program incorporates tests to watch for bubbling, blistering, cracking, or flaking on the neutron-absorbing materials, in addition to a test to catch corrosion of the neutron absorbers in the spent fuel pool.<sup>267</sup> The Staff explained that the requirement for a Metamic coupon monitoring program derives from operating plant experience, where similar neutron-absorbing materials were discovered to have degraded.<sup>268</sup> A proposed license condition, which would be incorporated into the Vogtle COLs, would require Southern to

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<sup>262</sup> Tr. at 271-72.

<sup>263</sup> *Id.* at 271.

<sup>264</sup> *Id.* at 253 (Sparkman).

<sup>265</sup> *Id.* (Sparkman).

<sup>266</sup> *Id.* (Sparkman).

<sup>267</sup> *Id.* at 273.

<sup>268</sup> *Id.*

implement its Metamic coupon monitoring program prior to initial fuel load.<sup>269</sup> In response to questioning, Southern confirmed that its Metamic coupon monitoring program serves to provide an early warning system to catch degradation if it occurs, rather than simply providing proof that degradation has been prevented.<sup>270</sup>

*b. Auxiliary Systems*

Southern first discussed the raw water system.<sup>271</sup> The system has two sub-systems, a river water sub-system and a well water sub-system. The river water sub-system provides “water for make[-]up to the circulating water system, natural draft cooling tower basins[,] and fill water for the circulating water system,” as well as “dilution water for the Units 3 and 4 blow[-]down sump, [and] for [radioactive] waste discharge when the circulating water system is not available.”<sup>272</sup> The well water sub-system “provides make-up for the service water system, mechanical draft cooling tower basins, the potable water system, fire protection system, yard fire water systems, and de-mineralized water treatment system,” as well as “lubrication cooling water to the circulating water system pumps and . . . for miscellaneous plant uses.”<sup>273</sup>

The Staff provided a similar description, noting in addition that the design of the raw water system is outside the scope of the AP1000 DCD.<sup>274</sup> The Staff explained that

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<sup>269</sup> *Id.* See Ex. NRC000004, COL FSER, Proposed License Condition 9.1, app. A at A-6.

<sup>270</sup> Tr. at 282.

<sup>271</sup> *Id.* at 253.

<sup>272</sup> *Id.* at 254 (Sparkman).

<sup>273</sup> *Id.* (Sparkman).

<sup>274</sup> *Id.* at 273-74.

its review focused on ensuring that the raw water system, which is not a safety-related system, will not have an adverse effect on systems that perform safety-significant functions.<sup>275</sup> To this end, the Staff issued a series of requests for additional information; the Staff represented that Southern's responses led the Staff to conclude that failure of the raw water system would not affect the ability of safety-related structures, systems, and components to perform their safety-related functions. The Staff noted particularly that the raw water system is not situated close to any safety-related structures, systems, or components, and therefore water from a postulated break in the system would not affect them.<sup>276</sup>

The Staff also determined that the design of the raw water system is adequate to prevent contamination of the facility and the environment. To explain the bases for this determination, the Staff indicated, first, that the raw water system operates at a higher system pressure than the systems with which it has direct interface; because of this pressure differential, flow of contamination into the raw water system is not feasible.<sup>277</sup> Second, the Staff pointed out that there is no direct interconnection between this system and any potential sources of contamination.<sup>278</sup>

*c. Radiation Protection*

Regarding the "as low as is reasonably achievable," or ALARA program,<sup>279</sup> which is part of the Radiation Protection Program, Southern explained that the COL application

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<sup>275</sup> *Id.*

<sup>276</sup> *Id.* at 274.

<sup>277</sup> *Id.* See, e.g., Ex. NRC000004, COL FSER, § 9.2.11.4, at 9-37.

<sup>278</sup> Tr. at 274-75.

<sup>279</sup> ALARA:  
(continued . . .)

incorporates the DCD by reference, but supplements it “to address radiation exposure to construction workers.”<sup>280</sup> The Staff explained that exposure to construction workers assigned to Unit 4 is the most conservative or bounding (between Units 3 and 4) and thus formed the basis for its analysis.<sup>281</sup> The annual whole body dose to these workers, of 23.8 millirem, is well below the annual 100 millirem limit for members of the public (defined to include these workers).<sup>282</sup> The Staff confirmed that the information included in the FSAR demonstrated compliance with dose requirements as well as radiation survey requirements.<sup>283</sup>

Southern stated that the COL application includes operational procedures to “minimize contamination of the facility and environment, facilitate eventual decommissioning[,] and minimize generation of radioactive waste.”<sup>284</sup> The Staff confirmed that it is a COL applicant’s responsibility to demonstrate how procedures for operation will comply with the regulatory requirements for minimizing contamination, set

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means making every reasonable effort to maintain exposures to radiation as far below the dose limits . . . as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

10 C.F.R. § 20.1003.

<sup>280</sup> Tr. at 254 (Sparkman). See Ex. NRC000001 at Part 2, COL FSAR, at 12.4-7, Table 12.4-201.

<sup>281</sup> Tr. at 276.

<sup>282</sup> *Id.* See 10 C.F.R. §§ 20.1003 and 20.1301.

<sup>283</sup> Tr. at 276. See 10 C.F.R. §§ 20.3101 and 20.1302.

<sup>284</sup> Tr. at 255 (Sparkman). See 10 C.F.R. § 20.1406.

out in 10 C.F.R. § 20.1406. In finding that Southern meets these requirements, the Staff noted that Southern developed a groundwater monitoring program that extends beyond typical programs used in operating plants. The Staff evaluated and accepted this program as part of its evaluation of the COL application.<sup>285</sup> The Staff also noted that Southern's site-specific exterior radioactive waste discharge piping design includes features that will control the unplanned or undetected release of radioactivity into the environment.<sup>286</sup>

*d. Initial Test Programs*

The Staff explained that there are seven first-plant-only tests and two first-three-plant-only tests.<sup>287</sup> All of these tests will be mandated by license conditions.<sup>288</sup> Three of the first-plant-only tests are preoperational: (1) In-Containment Refueling Water Storage Tank Heatup; (2) Pressurizer Surge Line Stratification Evaluation; and (3) Reactor Vessel Internals Vibration Testing. Two apply during initial criticality and low power testing: (1) Natural Circulation Tests; and (2) Passive Residual Heat Removal Heat Exchanger. The final two first-plant-only tests occur during power ascension testing: (1) Rod Cluster Control Assembly Out of Bank Measurements; and (2) Load Follow Demonstration.<sup>289</sup> The two first-three-plant-only tests are conducted prior to fuel load:

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<sup>285</sup> Ex. NRC000004, COL FSER, §§ 12.3.4 to 12.3.5, at 12-19 to 12-23.

<sup>286</sup> Tr. at 275.

<sup>287</sup> *Id.* at 277 (discussing Ex. NRCR00013, Safety Panel 4, Staff Slides 39 and 40). Southern reviewed testing incorporated by reference from the DCD; the testing reviewed includes some testing required only for the first plant, and some required for the first three plants to be constructed using the AP1000 design. Tr. at 255-57.

<sup>288</sup> Tr. at 277.

<sup>289</sup> Ex. NRC000013, Safety Panel 4, Staff Slide 39.



(1) Core Makeup Tank Heated Recirculation Tests; and (2) Automatic Depressurization System Blow-Down Test.<sup>290</sup>

In response to a question about the relationship between the “Natural Circulation Test” and the station blackout rule, 10 C.F.R. § 50.63, the Staff explained that the “Natural Circulation Test” is specific to the AP1000 design, and that other tests demonstrate that the AP1000 design features will perform as required to mitigate the effects of a station blackout.<sup>291</sup> The Staff identified the following DCD-mandated tests related to station blackout: (1) Plant Trip from 100 Percent Power; (2) Passive Core Cooling System Testing; (3) Passive Containment Cooling System Testing; (4) Class 1E DC Power and Uninterruptible Power Supply Testing; (5) Loss of Offsite Power; and (6) Main Control Room Emergency Habitability System Testing.<sup>292</sup> The Staff explained that the AP1000 does not rely on AC power sources during design-basis events. The AP1000 passive systems automatically establish safe-shutdown conditions, and can maintain safe shutdown for 72 hours after a loss of onsite and offsite power sources, without operator action.<sup>293</sup> As additional background information, the Staff listed a number of features of the AP1000 design that mitigate the consequences of a station blackout.<sup>294</sup>

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<sup>290</sup> *Id.*, Staff Slide 40.

<sup>291</sup> Tr. at 293-94.

<sup>292</sup> Ex. NRC000015, Staff Post-Hearing Response, at 5-6 (Item K).

<sup>293</sup> *Id.* at 5 (Item K).

<sup>294</sup> *Id.* (Item K).

## 6. *Environmental Overview Panel*

We asked this panel to describe the process used to develop the Vogtle COL SEIS given the referenced ESP, and to summarize the Staff's SEIS analysis and conclusions with respect to certain resource areas, as follows:

- Overview of the [S]taff's conclusions in the SEIS, including a general explanation of the role of the Vogtle ESP FEIS;
- Description of the [S]taff's evaluation process, including:
  - Staff guidance
  - Assessment of the applicant's process for identifying new and significant information
  - How the [S]taff's analysis was informed by interactions with the public and with local governmental agencies at the Federal, State, and local level;
- Summary of the [S]taff's analysis and conclusions in the SEIS with respect to novel or non-routine environmental areas encompassed by the review.
  - The [] novel issue of how the COL environmental review accounted for ESP amendment requests that the applicant submitted during the COL review, with a focus on the resulting change in the [S]taff's conclusion from the ESP FEIS regarding impacts to terrestrial ecology.<sup>295</sup>

### a. *Overview*

The EIS prepared in connection with the ESP evaluated the impacts at the Vogtle site of building and operating two new units of the AP1000 reactor design. Because Southern addressed additional topics that are optional for ESP applicants, including analyses of the economic, technical, and other costs and benefits of the project, and the evaluation of alternative energy sources, the Staff reviewed those issues at the ESP stage, leaving no unresolved environmental issues.<sup>296</sup> As a result, Southern limited its environmental review for the COL application to conducting a comprehensive review of

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<sup>295</sup> Revised Scheduling Note at 5 (unnumbered).

<sup>296</sup> See Ex. NRC000003, Staff Testimony, at 21.

the ESP EIS to identify any new and significant information with the potential to alter the conclusions reached in the ESP EIS.<sup>297</sup> For context, Southern and the Staff both provided an overview of the issues considered in the ESP EIS.<sup>298</sup>

*b. The Staff's Evaluation Process*

The Staff described its COL application review process, performed in accordance with 10 C.F.R. § 51.92 and the Environmental Standard Review Plan.<sup>299</sup> The COL environmental review was conducted by a twenty-five member multidisciplinary team drawn from the Staff and from contractors at the Pacific Northwest National Laboratory.<sup>300</sup> The Staff audited Southern's process for identifying new and significant information in August 2008, and conducted a second audit in September 2009 to verify Southern's adherence to this process.<sup>301</sup> The Staff's site audits included tours of potential transmission rights-of-way, the Savannah River intake structure location, and cultural and historic resource sites.<sup>302</sup>

The Staff also searched independently for new and significant information. The Staff stated that it contacted the State of Georgia Historic Preservation Officer, the Georgia Department of Natural Resources, the South Carolina Department of Natural Resources, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the

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<sup>297</sup> Tr. at 299.

<sup>298</sup> *Id.* at 299-304, 305-12.

<sup>299</sup> *Id.* at 305-06. See generally "Environmental Standard Review Plan: Standard Review Plans for Environmental Reviews for Nuclear Power Plants" NUREG-1555, Vols. 1 and 2 (Oct. 1999) (ML003702134, ML003701937) (Environmental SRP).

<sup>300</sup> Tr. at 312.

<sup>301</sup> *Id.* at 314.

<sup>302</sup> *Id.* at 314-15.

National Marine Fisheries Service (NMFS), and roughly thirty federally-recognized Indian Tribes, to collect pertinent information.<sup>303</sup>

The Staff explained that the Vogtle ESP application was the first to reference a certified reactor design instead of using the “plant parameter envelope” approach, where the specific reactor design will not be identified until later. This, as well as the close timing of the ESP and COL application submissions, reduced the likelihood of significant new information at the COL stage.<sup>304</sup> The Staff also confirmed that its analysis considered potential changes resulting from all revisions, through Revision 19, of the AP1000 DCD.<sup>305</sup>

*c. Summary of the Staff's Analysis and Conclusions*

The Staff identified new information requiring additional analysis in connection with land use; this included additional acreage required for the fire training facility and the simulator building, and acreage designated as backfill sources, which would be disrupted temporarily.<sup>306</sup> The Staff determined that this new information did not alter the impact level conclusion reached in the ESP EIS because the new acreage is located within the Vogtle site boundaries and the intended uses for the acreage are consistent with its commercial zoning and with the Burke County comprehensive plan.<sup>307</sup>

The Staff evaluated information from an updated traffic study together with a new Environmental Protection Agency (EPA) ozone standard in the National Ambient Air

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<sup>303</sup> *Id.* at 315-16.

<sup>304</sup> *Id.* at 308-09.

<sup>305</sup> *Id.* at 332.

<sup>306</sup> *Id.* at 317.

<sup>307</sup> *Id.*

Quality Standards (NAAQS). Here again, the Staff's conclusions were unchanged from the ESP EIS: the meteorology and air quality results from the Staff's analysis of the new traffic study were consistent with the ESP EIS results, and Burke County retains its NAAQS attainment status, despite the revised ozone standard.<sup>308</sup>

The COL application contains a slight modification of the intake structure design relative to the design presented in the ESP application.<sup>309</sup> The Staff determined that changes to the intake structure design did not significantly alter the width or the length of the intake canal, meaning that surface water and groundwater impacts during construction would remain localized and temporary, as determined in the ESP EIS.<sup>310</sup> The Staff concluded that the ESP EIS determinations for water-related impacts deriving from backfill material excavations remained valid for the new backfill source areas for two reasons: the new areas are included in Southern's national pollutant discharge elimination system permit, and the excavations will not intersect the water table or require de-watering.<sup>311</sup> Also on the topic of water quality impacts, the Staff identified a three percent increase in total effluent discharge to the Savannah River. The Staff re-ran its thermal plume analysis model using this increase, and found no significant change in the size of the thermal plume, so the ESP EIS conclusion remained valid.<sup>312</sup>

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<sup>308</sup> *Id.*

<sup>309</sup> See Ex. NRC000001, Part 3, Applicant's Environmental Report, § 3.2.2, at 3-17; 3-19, Figure 3.1-1; and 3-20, Figure 3.2-1. See *also* Ex. NRC000006, COL SEIS, § 3.2.2, at 3-4.

<sup>310</sup> Tr. at 318.

<sup>311</sup> *Id.*

<sup>312</sup> *Id.*

Since the preparation of the ESP EIS, the NMFS proposed listing the Carolina and South Atlantic distinct population segment of the Atlantic sturgeon as an endangered species under the Endangered Species Act.<sup>313</sup> The Staff consulted with the NMFS and concluded that its previous analysis of impacts on the sturgeon remained valid.<sup>314</sup> Also related to aquatic impacts, the Staff noted that Southern confirmed its receipt of the required Clean Water Act § 401 certification from the Georgia Department of Natural Resources. Southern also confirmed receipt of the required Clean Water Act § 404, and Rivers and Harbors Act § 10 permits from the Army Corps of Engineers (Corps).<sup>315</sup> The Staff explained that receipt of these permits from the Corps confirmed its ESP EIS conclusion that the impacts on aquatic resources from construction and operation of the new units would be small.<sup>316</sup>

The Staff stated that Southern signed a memorandum of understanding with the Georgia State Historic Preservation Officer to properly preserve a newly-fenced historic cemetery, demonstrating the company's commitment to protecting cultural and historic resources and mitigating impacts on those resources. As a result, the Staff found that its ESP EIS conclusion that impacts on cultural and historic resources would be moderate remained valid.<sup>317</sup>

The Staff also reviewed new information related to energy alternatives, such as projected electricity demand reductions due to demand side management, and changes

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<sup>313</sup> *Id.* at 319.

<sup>314</sup> *Id.*

<sup>315</sup> *Id.*

<sup>316</sup> *Id.* at 319-20.

<sup>317</sup> *Id.* at 320.

to the EPA's rules on new source pollutants under the Clean Air Act.<sup>318</sup> In connection with the former, the Staff explained that the demand reductions already were accounted for in Georgia Power Company's Integrated Resource Plan, so they were not available to offset the need for additional power.<sup>319</sup> With respect to the second, the Staff found that the EPA's rule change would not alter the comparative relationship between alternative energy sources in a meaningful way "because [greenhouse gas] emissions from the other energy source alternatives would not be sufficiently reduced to make them environmentally preferable to the proposed project."<sup>320</sup> The Staff therefore concluded that the new information would not alter its analysis.<sup>321</sup>

The Staff explained that because the work encompassed in the second LWA request was originally part of the first LWA request, the ESP EIS evaluated the environmental impacts of the second request. The COL FSEIS referenced this analysis, and verified the adequacy of the site redress plan for the second LWA.<sup>322</sup> The ESP EIS also evaluated three license amendment requests to obtain additional backfill from previously identified onsite borrow areas and to change the classification of the backfill. However, at the ESP stage the Staff did not evaluate the license amendment request to add new backfill borrow sources located onsite in previously undisturbed areas; this

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<sup>318</sup> *Id.* at 320-21.

<sup>319</sup> *Id.* See also Ex. NRC000006, COL FSEIS, § 9.2, at 9-2 to 9-3.

<sup>320</sup> Ex. NRC000006, COL FSEIS, § 9.2, at 9-3.

<sup>321</sup> Tr. at 321.

<sup>322</sup> *Id.* at 322. The site redress plan applies in the event that construction is terminated, that the COL application is denied or withdrawn, or that the LWA is revoked. *Id.* As part of its supplemental environmental analysis, the Staff "verified that the site redress plan discussed in the ESP EIS would adequately address the impacts of the activities requested under the second LWA." Ex. NRC000006, COL FSEIS, § 4.11, at 4-32.

request was evaluated as part of the COL environmental review.<sup>323</sup> Here, the Staff found that the impacts on terrestrial ecology would change from small to moderate because of impacts on the sandhills milkvetch (a Georgia state-listed threatened plant species) and the Southeastern pocket gopher (a Georgia state-listed threatened mammal).<sup>324</sup> The Staff indicated that Southern voluntarily mitigated the impacts on both of these species via onsite relocation efforts, and also committed to re-plant longleaf pine in disturbed areas where possible.<sup>325</sup> In response to questions, the Staff confirmed that its site audits were not just paper audits: “We actually walked the site, we were able to see the relocation efforts . . . for the [p]ocket [g]opher and . . . the sandhills milkvetch.”<sup>326</sup>

*d. Severe Accident Concerns*

We asked a series of questions about whether the severe accident analysis conducted as part of the ESP EIS considered accidents involving multiple units at the site in disaster scenarios analogous to the multi-layer disaster that occurred at Fukushima, Japan.<sup>327</sup> Southern indicated that its ESP environmental report considered the overall risk that two or more reactors could experience concurrent accidents; however, the assumption is that these events are independent.<sup>328</sup> Southern stated that given the limited external hazards, it is reasonable to expect that the risk would be

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<sup>323</sup> Tr. at 323. See Ex. NRC000006, COL FSEIS, § 4.1.1, at 4-2.

<sup>324</sup> Tr. at 323; Ex. NRC000006, COL FSEIS, § 2.7.1, at 2-6.

<sup>325</sup> *Id.* at 324.

<sup>326</sup> *Id.* at 332 (Sutton).

<sup>327</sup> *Id.* at 326-30, 334-38.

<sup>328</sup> Ex. SNCR00011, Southern Post-Hearing Response, at 17 (Question 14).



dominated by an accident at a single unit.<sup>329</sup> The Staff also provided additional detailed answers in its post-hearing response.<sup>330</sup>

Consistent with current review guidance,<sup>331</sup> the Staff's severe accident analysis did not consider concurrent accidents at more than one unit at the Vogtle site. For the COL, the Staff's environmental analysis of severe accidents tiered off the analysis in the ESP EIS—the COL FSEIS was, in essence, an update to the ESP EIS, created for the purpose of identifying and analyzing new and significant information. In the ESP EIS, the Staff compared the severe accident risks of the proposed reactors to the risks faced by other reactors, onsite and offsite, and to the safety goals in our Safety Goal Policy Statement.<sup>332</sup> Based on the Staff's calculations, the risks for the Westinghouse AP1000 reactor design at the Vogtle site are expected to be lower than those for current generation plants.<sup>333</sup> This supports the Staff's conclusion "that the probability-weighted consequences of severe accidents at the Vogtle site would be [small]."<sup>334</sup>

The ESP EIS also evaluated cumulative impacts. For example, "the combined population dose risk for the two existing units plus the two new AP1000 reactors is about  $3.8 \times 10^{-2}$  person-Sv/Ryr. . . . [This] did not constitute a significant increase in the

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<sup>329</sup> *Id.*

<sup>330</sup> See Ex. NRC000015, Staff Post-Hearing Response, at 7-9 (M, N, and O).

<sup>331</sup> See *generally* Environmental SRP, § 7.2, "Severe Accidents."

<sup>332</sup> See Safety Goals for the Operations of Nuclear Power Plants; Policy Statement; Republication, 51 Fed. Reg. 30,028 (Aug. 21, 1986).

<sup>333</sup> Ex. NRC000015, Staff Post-Hearing Response, at 8 (Item N).

<sup>334</sup> *Id.* at 7 (Item M). See also *id.* at 8 (Item N).

population dose risk.”<sup>335</sup> The Staff reached similar conclusions for risks like “cost risk, early fatalities, and decontamination areas,” and ultimately determined that the cumulative severe accident impact of adding the new units would be small.<sup>336</sup> In the COL FSEIS, the Staff found no new and significant information to change either its severe accident, or its cumulative severe accident, conclusions.<sup>337</sup>

The Staff explained that its severe accident analysis includes scenarios involving radiological releases into the environment. Consistent with Commission policy and NEPA requirements, this analysis looks at probability-weighted consequences. Severe accidents, like the accident at Fukushima Dai-ichi, are potentially high consequence but extremely low probability accidents, so considering their consequences without simultaneously accounting for risk “would distort the purpose of disclosing the reasonably anticipated impacts of the project.”<sup>338</sup> The Staff explained that it evaluates the impacts of severe accidents in terms of health effects, economic costs, and land contamination—all in the context of risk.<sup>339</sup> Moreover, the focus of the risk analysis is “on the probability and consequences of the postulated accident, not on independent damage attributable to the external event that may have initiated that accident.”<sup>340</sup> Importantly, while the Staff has not conducted a formal probabilistic risk assessment or

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<sup>335</sup> *Id.* (Item M).

<sup>336</sup> *Id.* (Item M).

<sup>337</sup> *Id.* (Item M).

<sup>338</sup> *Id.* at 8 (Item N).

<sup>339</sup> *Id.* (Item N).

<sup>340</sup> *Id.* at 9 (Item O).

any other quantitative evaluation as part of the AP1000 DCD, it has considered a range of postulated severe accidents and consequences of these accidents.<sup>341</sup>

**C. Sufficiency of the Staff's Safety Review**

We have conducted an independent review of the sufficiency of the Staff's safety findings, with particular attention to the topics discussed above in the Staff and Southern panel presentations. For each of the topics discussed in these presentations, we determine that the Staff's review was reasonably supported in logic and fact and sufficient to support its findings. We make the same determination for topics not explicitly discussed at the hearing or in today's decision, including topics addressed in the FSER, and topics on which we asked pre- or post-hearing questions.

In accordance with the notice of hearing for this uncontested proceeding,<sup>342</sup> based on our review of the rationale underlying the Staff's conclusions, we determine that the Staff's review of the combined license application was adequate to support the Staff's findings that: (1) the applicable standards and requirements of the Atomic Energy Act and our regulations have been met; (2) all required notifications to other agencies or bodies have been made; (3) there is reasonable assurance that the facilities will be constructed and will operate in conformity with the license, the provisions of the AEA, and our regulations; (4) the applicant is technically and financially qualified to engage in the activities authorized; and (5) issuance of the license will not be inimical to the common defense and security or the health and safety of the public.

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<sup>341</sup> *Id.* at 8 (Item N).

<sup>342</sup> See Notice of Hearing at 50,768.

We also find that the Staff's review of the application for the limited work authorizations was adequate to support the Staff's findings that: (1) the applicable standards and requirements of the Atomic Energy Act and our regulations pertinent to the activities to be conducted under the limited work authorizations were met; (2) the applicant is technically qualified to engage in the activities authorized; (3) issuance of the limited work authorizations will provide reasonable assurance of adequate protection to public health and safety and will not be inimical to the common defense and security; and (4) there are no unresolved safety issues relating to the activities to be conducted under the limited work authorizations that would constitute good cause for withholding the authorizations.

**D. Sufficiency of the Staff's Environmental Review**

We also conducted an independent review of the Staff's supplemental environmental analysis. Our determination on the Staff's environmental analysis—including with respect to those topics not expressly addressed at the hearing—takes into account the particular requirements of NEPA, discussed briefly below.

As a general matter, NEPA Section 102(2)(A) requires that the NRC use “a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts” in decisionmaking that may impact the environment.<sup>343</sup> Here, given that an EIS was prepared at the ESP stage, the Staff's review was framed by the requirements of 10 C.F.R. § 51.92. Under that provision, the Staff prepared a supplemental EIS, focusing on issues related to the impacts of construction and operation for which new and significant information had

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<sup>343</sup> NEPA § 102(2)(A), 42 U.S.C. § 4332(2)(A).

been identified. Our particular focus was to ensure that this as well as all other applicable NEPA requirements were met.

In the area of impacts of the proposed action<sup>344</sup>—here, issuance of COLs and LWAs—the Staff, in its review of new and significant information, identified a change in impacts associated with terrestrial ecology, as discussed in today’s decision. Other than in the area of terrestrial ecology, however, no new and significant information was identified that would change the conclusions made in the ESP FEIS.<sup>345</sup> The Staff did identify new, unavoidable adverse environmental impacts that would occur during construction and operation of the new units.<sup>346</sup> In particular, the Staff determined that there would be an increase in the permanently disturbed land area, as well as additional land disturbance resulting from the development of additional onsite borrow areas.<sup>347</sup> As discussed in its COL FSEIS, the Staff identified actions to mitigate these impacts, and concluded that no other information was identified that would change its conclusions regarding these impacts.<sup>348</sup>

An assessment of alternatives to the proposed action was prepared at the ESP stage.<sup>349</sup> The Staff identified no new information in the areas of energy alternatives or

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<sup>344</sup> NEPA §§ 102(2)(C)(i); (2)(E); 42 U.S.C. §§ 4332(2)(C)(i), 4332(2)(E).

<sup>345</sup> Ex. NRC000006, COL FSEIS, § 11.1.

<sup>346</sup> NEPA § 102(2)(C)(ii), 42 U.S.C. § 4332(2)(C)(ii).

<sup>347</sup> Ex. NRC000006, COL FSEIS, § 11.2. Development of the new borrow areas resulted in impacts of two State-listed species, the southeastern pocket gopher and the sandhills milkvetch (discussed above).

<sup>348</sup> *Id.* See *id.* §§ 4.4.1 (discussing onsite relocation of these species, as well as Southern’s efforts to replant the disturbed area with longleaf pine).

<sup>349</sup> NEPA § 102(2)(C)(iii), 42 U.S.C. § 4332(2)(C)(iii).

system design alternatives; the Staff therefore determined that its conclusions in this area made at the ESP stage remained valid.<sup>350</sup> Under the no-action alternative, the NRC would not issue the COLs or the LWAs. The Staff concluded that, while there would be no environmental impacts associated with not issuing the COLs (save those associated with activities not within the definition of construction,<sup>351</sup> and any activities performed under an LWA prior to denial of the COLs), the power still would be needed. Environmental impacts would be associated with any alternative option at the site of implementation; as discussed above, the Staff determined that the alternative options evaluated would not be reasonable alternatives to providing new baseload power generation capacity.<sup>352</sup>

The NRC also is required to assess the relationship between local short-term uses of the environment and the long-term productivity of the environment.<sup>353</sup> This review was performed as part of the cost-benefit analysis discussed in the ESP EIS.<sup>354</sup> The Staff identified no information that would change the conclusions in the ESP FEIS.

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<sup>350</sup> *Id.* § 11.3. *See id.* §§ 9.2, 9.3.

<sup>351</sup> *See* 10 C.F.R. §§ 50.10(a); 51.4.

<sup>352</sup> Ex. NRC000006, COL FSEIS, §§ 11.3, 9.1. Pursuant to 10 C.F.R. § 51.92(c)(3), the FSEIS did not contain a separate discussion of alternative sites; these also were assessed at the ESP stage.

<sup>353</sup> NEPA, § 102(2)(C)(iv), 42 U.S.C. § 4332(2)(C)(iv).

<sup>354</sup> Ex. NRC000006, COL FSEIS, §§ 11.4, 11.6. *See generally* ESP FEIS § 11.6. Overall, the Staff determined that the benefits of the action (including societal and regional benefits) generally outweighed the costs (including internal costs (costs accruing to the applicant) and external costs (such as loss of regional productivity, environmental degradation, or loss of wildlife habitat). The Staff concluded at that time that the accrued benefits most likely would outweigh the economic, environmental, and social costs of building and operating the new units.

Finally, NEPA section 102 requires us to consider the irreversible and irretrievable commitments of resources associated with the proposed action.<sup>355</sup> This review also was performed at the ESP stage. The Staff concluded at that time that the irretrievable commitments of resources during construction generally would be similar to that of any major construction project. During operation, uranium is the principal resource that would be irretrievably committed. Given the sufficient availability of uranium, the Staff concluded that the commitment would be of small consequence.<sup>356</sup> The Staff, in its review, identified no new and significant information in this area.

We find that the relevant NEPA requirements have been met. To support this determination, we have assessed the Staff's (and the applicant's) process for identifying new and significant information, and find that the process was sufficient to identify new information that might be potentially significant concerning environmental issues addressed in the ESP EIS. We paid special attention to the topics discussed at the hearing. For each of the topics discussed at hearing, we find that the Staff's review was reasonably supported in logic and fact and sufficient to support the Staff's conclusions. We also reviewed the COL FSEIS, and, based on the assessments performed in that document, together with the balance of the information in the adjudicatory record, we make the same determination for topics not directly addressed at the hearing or in today's decision. Finally, in carrying out our review, we have considered particularly each of the requirements of NEPA section 102(2)(C), and find nothing in the record that would lead us to disturb the Staff's conclusions on those requirements. Overall, nothing

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<sup>355</sup> NEPA § 102(2)(C)(v), 42 U.S.C. § 4332(2)(C)(v).

<sup>356</sup> Ex. NRC000006, COL FSEIS, § 11.5. *See generally* ESP FEIS, § 11.5.

in the adjudicatory record of this proceeding (including the contested proceeding) leads us to believe that the Staff's environmental findings are unreasonable. Therefore, as a result of our review of the Staff's supplemental environmental analysis, and in accordance with the notice of hearing for this uncontested proceeding,<sup>357</sup> we find that the requirements of NEPA, § 102(2)(A), (C), and (E), and the applicable regulations in 10 C.F.R. Part 51, have been satisfied with respect to the combined license application. We independently considered the final balance among conflicting factors contained in the record of this proceeding and find that the proposed action, issuance of the combined licenses, should be taken. We also find, after weighing the environmental, economic, technical, and other benefits against environmental and other costs, and considering reasonable alternatives, that the combined licenses should be issued. Finally, we determine that the NEPA review conducted by the NRC Staff has been adequate.

For the application for the limited work authorizations, based on our review of the Staff's supplemental environmental analysis, and with respect to the activities to be conducted under the limited work authorizations, we find that the requirements of NEPA § 102(2)(A), (C), and (E), and the regulations in 10 C.F.R. Part 51, Subpart A, have been satisfied. We independently considered the balance among conflicting factors with respect to the limited work authorizations, contained in the record of the proceeding, and find that the proposed action, issuance of the limited work authorizations, should be taken. We also find that the site redress plan will adequately redress the activities performed under the limited work authorizations, if the limited work authorization

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<sup>357</sup> *Id.*



activities are terminated by the holder or the limited work authorizations are revoked by the NRC. Finally, based on our review of the Staff's consideration of new and significant information, we find that the NEPA review conducted by the NRC Staff for the limited work authorizations has been adequate.

#### **E. Fukushima Dai-ichi**

As a general matter, our review of recommended actions associated with lessons learned from the Fukushima Dai-ichi events is ongoing. The agency's Near-Term Report included twelve overarching recommendations for improving the safety of both new and operating nuclear reactors.<sup>358</sup> As previously stated, it also determined that "continued operation and continued licensing activities do not pose an imminent risk to public health and safety."<sup>359</sup> We approved and provided direction on certain near-term actions identified by the Near-Term Task Force to be initiated without delay and shortly thereafter approved the prioritization of all of the recommendations and supported the Staff's proposed actions on the top two tiers of recommendations.<sup>360</sup>

As we stated in CLI-11-5, we have in place well-established regulatory processes by which to impose any new requirements or other enhancements that may be

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<sup>358</sup> See, e.g., Near-Term Report at 69-70.

<sup>359</sup> *Id.* at vii. See also *supra* at 22.

<sup>360</sup> See Staff Requirements—SECY-11-0124—Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report (Oct. 18, 2011) (ML112911571) (Staff Requirements—SECY-11-0124). Among other things, we directed that the agency "should strive to complete and implement the lessons learned from the Fukushima accident within five years—by 2016." *Id.* at 1. See also Staff Requirements—SECY-11-0137—Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned (Dec. 15, 2011) (ML113490055).

needed.<sup>361</sup> The applicability of any new requirement will be determined when the justification is fully developed and we evaluate the Staff's bases. While these processes are well under way, it takes time to complete the steps necessary to ensure that any new requirements are technically justified and implemented appropriately. All affected nuclear plants will be required to comply with NRC direction resulting from lessons learned from the Fukushima accident, regardless of the timing of issuance of the affected licenses.<sup>362</sup> We therefore expect that the new Vogtle units will comply with all applicable "post-Fukushima" requirements.

Our paramount focus, always, is protecting public health and safety. We therefore agree fully with Chairman Jaczko that our responsibility is to make the best decisions for nuclear safety. The Fukushima events were significant, warranting enhancements in nuclear safety measures and we share the Chairman's commitment to implementing Fukushima-related enhancements and to nuclear safety generally. Nonetheless, we find ourselves in disagreement with the specific approach he offers in his dissent—namely, an across-the-board license condition requiring implementation of "all" Fukushima-related requirements prior to operation of the Vogtle plant. Such a license condition, in our view, cannot now be framed in meaningful terms. The Chairman's license-condition approach also is unnecessary, given the myriad of regulatory tools available to the NRC to implement Fukushima-related requirements as they emerge, including requirements applicable to new plants like Vogtle.

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<sup>361</sup> See *generally Callaway*, CLI-11-5, 74 NRC at \_\_\_ (slip op. at 24-25).

<sup>362</sup> As the Staff has stated, using our established regulatory processes for implementation of any post-Fukushima requirements on already-issued COLs would be comparable to the process used with operating reactors. See Ex. NRC000003, Staff Testimony, at 10.

We are confident that the Commission's approach—using rigorous, well-established processes rather than a loosely-defined license condition—will assure timely implementation of new requirements based on Fukushima lessons learned. As described above, we have already provided direction on certain Near-Term Task Force recommendations,<sup>363</sup> and substantial future actions are imminent. For example, we expect to receive this month the Staff's proposal to issue orders imposing new requirements, and will take action on them shortly thereafter. These orders would apply not only to currently-operating plants, but to COL holders as well.

To date, our Fukushima lessons-learned effort has proved fruitful by virtue of thoughtful Staff analysis, stakeholder input, and continuing Commission attention. Just as we have committed to undertaking a systematic and methodical review of the events at Fukushima, a review that inevitably takes time, so must we be vigilant in following a stable, predictable licensing process. Imposing the license condition suggested by Chairman Jaczko would neither improve this effort nor make a difference in the operational safety of new reactors. Indeed, Chairman Jaczko's approach may unintentionally impact the Staff's disciplined work. The proposed license condition might in the end limit the flexibility necessary to ensure that any new requirements are implemented on carefully-considered schedules.

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<sup>363</sup> The Task Force recommended that design certifications and COL applications under active Staff review address Recommendation 4 (regarding prolonged station blackout mitigation) and Recommendation 7 (regarding spent fuel pool makeup capability and instrumentation) before licensing. Near-Term Report at 71. To the extent that these recommendations are not already addressed in the AP1000 certified design, we expect that any applicable site-specific requirements arising from these recommendations—whether imposed by order or by rule—will be applied to the Vogtle licenses, as necessary, prior to the commencement of plant operations.

Furthermore, because the agency continues to develop the technical basis for Fukushima-related requirements, the proposed license condition would lack sufficient details necessary to impose meaningful requirements.<sup>364</sup> As we see the situation, a general license condition, without specific directives, that says (in effect) that the NRC is committed to applying and enforcing future, but yet-to-be-developed, safety requirements amounts largely to symbolism. Nuclear safety is not advanced by imposing overly-broad, ill-defined requirements.

We therefore see no compelling reason to depart from our existing regulatory processes and, for these reasons, we respectfully decline to impose the license condition suggested in Chairman Jaczko's dissent.

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<sup>364</sup> Such a broad-styled license condition would be unacceptably vague. See *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-00-13, 52 NRC 23, 34 (2000) ("sufficient details should be provided in the license so that the Staff's review is not subject to meaningful debate.").

### III. CONCLUSION

We find that the Staff's review of the safety and environmental issues related to Southern's combined license and limited work authorization applications was sufficient to support the findings, identified in 10 C.F.R. §§ 52.97 and 51.107(a), for each of the combined licenses to be issued, and the findings identified in 10 C.F.R. §§ 50.10 and 51.107(d), with respect to the limited work authorizations. In addition, we direct the NRC Staff to include in the Vogtle COLs the condition described in today's decision, relative to the implementation of a surveillance program for squib valves. The Director of the Office of New Reactors therefore is authorized to issue the limited work authorizations and appropriate licenses authorizing construction and operation of Vogtle, Units 3 and 4.

IT IS SO ORDERED.

For the Commission

**[NRC Seal]**

**/RA/**

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Annette L. Vietti-Cook  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 9<sup>th</sup> day of February, 2012.

## **Chairman Gregory B. Jaczko, Dissenting**

### **I. INTRODUCTION**

It is with great disappointment that I offer this dissent on the order for the uncontested portion of the hearing related to Southern Nuclear Operating Co. Vogtle Nuclear Power Plant, Units 3 and 4. This action represents years of hard work by the staff of the NRC, and I would like nothing more than to celebrate the completion of their efforts and this historic license. But, ultimately, my responsibility is to make what I believe is the best decision for nuclear safety. I simply cannot authorize issuance of these licenses without any binding obligation that these plants will have implemented the lessons learned from the Fukushima accident before they operate.

### **II. DISCUSSION**

My analysis begins with the significance of the Fukushima accident. On March 11, 2011, a magnitude 9.0 earthquake, known as the Great East Japan Earthquake, occurred approximately 80 miles east of the coast of Japan and precipitated a large tsunami. These events caused widespread devastation, including extensive damage to the Fukushima Dai-ichi nuclear reactor facilities and a complete, sustained loss of electrical power to five reactors. These events had serious and unacceptable consequences, causing reactor core damage and uncontrolled releases of radioactive materials into the environment. These unprecedented and catastrophic events and their aftermath have provided real world experience that we are applying in comprehensive review of our regulatory requirements, programs and processes and their implementation.

That review is well under way and has already identified significant safety improvements. Most importantly, the review has identified safety improvements applicable to these new Vogtle reactor units that I believe must be implemented before operation to ensure adequate protection

of public health and safety. I do not support authorizing the issuance of COLs that will allow both construction and *operation*, without binding assurance that these issues will be addressed before the plant operates. Only by imposing a license condition can we ensure that all the lessons we learn from Fukushima are implemented before operation. I describe my reasoning in more detail below.

**1. Nuclear Reactor Safety Enhancements Have Been Identified Based on New Information and Insights From the Fukushima Accident**

The Fukushima accident was precipitated by natural disasters of historic proportions. For reasons not yet definitively established, the Fukushima reactor design and mitigation measures did not prevent serious consequences from these events. These events prompted us to take immediate action to address the safety of our nation's nuclear fleet. Within weeks of the Fukushima accident, the Commission established a task force responsible for making recommendations to the Commission on potential improvements to our regulatory system.<sup>1</sup> The Task Force's efforts represent an important first step in applying new insights from the Fukushima accident in our regulatory oversight of the nation's nuclear fleet.

The Task Force identified twelve overarching recommendations for improving safety of operating and new nuclear reactors.<sup>2</sup> These included measures to ensure protection against earthquakes and flooding, measures to minimize potential hazards from those events and measures to improve emergency preparedness and response.<sup>3</sup> More broadly, the Task Force recommended strengthening our regulatory framework by making it more logical, systematic

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<sup>1</sup> See "NRC Actions Following the Events in Japan," Staff Requirement—Tasking Memorandum COMGBJ-11-0002 (Mar. 23, 2011) (ML110800456).

<sup>2</sup> See *generally* Near-Term Report.

<sup>3</sup> *Id.* at 69-70.

and coherent.<sup>4</sup> Taken together, the recommendations were intended to clarify and strengthen our regulatory framework to protect against and mitigate the consequences of natural disaster, enhance emergency preparedness, and improve the effectiveness of our regulatory programs.<sup>5</sup>

We remain focused on completing a comprehensive review of the events at Fukushima and ensuring that the lessons from that review are incorporated as safety enhancements without delay. To accomplish this, we have taken steps to accelerate our review and currently expect to issue orders requiring initial actions by March 2012.<sup>6</sup> Our goal is to complete and implement the lessons learned from the Fukushima accident by 2016.<sup>7</sup>

**2. Commission Approved Safety Enhancements Must be Implemented to Ensure Reasonable Assurance of Safe Operation of New Vogtle Reactors**

In considering whether to authorize issuance of these COLs, I am mindful of the regulatory findings underlying our decision. They require us to determine, among other things, that: (1) the applicable regulations have been met, (2) there is reasonable assurance that these new reactors will be constructed and will operate in conformity with our regulations, and (3) issuance of these licenses will not be inimical to the health and safety of the public.<sup>8</sup> Based on the evidence presented during this hearing, I am convinced that the Staff's review was adequate to support those findings based on our regulatory requirements in place prior to the Fukushima accident. But that accident has fundamentally altered our understanding and appreciation of the

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<sup>4</sup> *Id.* at 69.

<sup>5</sup> *Id.* at viii.

<sup>6</sup> See Slides from Public Meeting, Status Update on Implementation of the NTF Recommendations (Jan. 13, 2012) at 9 (ML120120491).

<sup>7</sup> Staff Requirements—SECY-11-0124 at 1.

<sup>8</sup> 10 C.F.R. § 52.97.



impacts of a catastrophic natural disaster. Therefore, I consider this licensing decision in light of those events.

We have already identified Fukushima recommendations that must be taken without delay.<sup>9</sup> Our decision was premised on the Staff's assessment of which recommendations have the greatest potential for safety improvement in the near term.<sup>10</sup> The Staff then took a broader look at the recommendations in the context of our regulatory framework and formed recommendations to prioritize them based on its judgment of relative safety enhancement.<sup>11</sup> Based on its analysis of those recommendations, the Staff has proposed moving forward under the presumption that they will be implemented as adequate protection measures.<sup>12</sup> Of particular relevance here, the Staff has recommended that two be implemented before issuance of a COL.<sup>365</sup> Further, the ACRS has determined that the need for these safety improvements will not be negated or rendered inappropriate by the acquisition of new information as the Staff completes ongoing reviews and analyses.<sup>13</sup> I agree with the Staff's conclusions and path forward, but the Commission has not yet determined whether implementation will be based on adequate protection.

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<sup>9</sup> See Staff Requirements--SECY-11-0124.

<sup>10</sup> See *generally* SECY-11-0124.

<sup>11</sup> See *generally* SECY-11-0137.

<sup>12</sup> SECY-11-0124 at 6.

<sup>365</sup> Near-Term Report at 71-72.

<sup>13</sup> Abdel-Khalik, Said, Chairman, ACRS, letter to Chairman Gregory Jaczko, "Initial ACRS Review of (1) the NRC Near-Term Task Force Report on Fukushima and (2) Staff's Recommended Actions to be Taken Without Delay" (Oct. 13, 2011) (ML1129A006).

The expectation that newly licensed reactors would incorporate new, Fukushima-related safety enhancements was an implicit underpinning of our decision not to halt new reactor licensing proceedings in response to multiple petitions asking, among other things, that we stay this proceeding.<sup>14</sup> We found no imminent safety reason to halt our new reactor licensing process because there was sufficient time to implement applicable new requirements before operation, saying:

[L]icensing decisions for pending COL applications are months and, in many cases, years away and fuel loading into completed reactors is still further away; continuation of these reviews poses no immediate threat to public health and safety. Our regulatory processes provide sufficient time and avenues to ensure that design certifications and COLs satisfy any Commission-directed changes before any new power plant commences operations. This is demonstrated by the implementation strategy for new reactor licensing outlined in the Near-Term Report. When we adopt the Task Force recommendations or require more, or different, actions associated with certified design or COL applications, we have the authority to ensure that certified designs and combined licenses include appropriate Commission-directed changes before operation. We therefore find no imminent risk to public health and safety or to the common defense and security that necessitates a stay of new reactor licensing actions or adjudications.<sup>15</sup>

Now that the decision to license the first COLs is before us, we have an obligation to exercise this authority and require that all new safety enhancements be implemented before these new reactors begin operation. Knowing that new safety enhancements are under development, some of which I consider necessary for adequate protection, I cannot support authorizing operation with no more than an expectation that they will be timely implemented.

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<sup>14</sup> *Callaway*, CLI-11-5, 74 NRC at \_\_\_\_.

<sup>15</sup> *Id.* at \_\_\_\_ (slip op. at 23–25) (footnotes omitted).

### **3. The Vogtle COLs Must Require Implementation of Fukushima Safety Enhancements Before Operation**

We must include a binding requirement that all Fukushima-related safety enhancements be implemented before operation of the COLs. Unless we impose this requirement now, when the licenses are issued, we cannot be certain that they will be implemented before operation or, indeed, at all for two reasons. The first is our so-called “backfit” regulations that allow licensed reactors to avoid compliance with new safety enhancements based on considerations like implementation costs. The second is the difficulty of requiring timely compliance with new safety requirements that are not tied down in the license.

First, I will address the backfit regulations. These came about because of the evolving nature of our regulatory framework and the perception that it was causing unjustified regulatory instability and unpredictability. Over time, advances in our technical capabilities and knowledge have led to regulatory refinements that have significantly enhanced the safety of our nuclear fleet. But these improvements are not applied to every nuclear reactor. For example, when we impose new regulatory requirements that are important safety enhancements but not deemed necessary to ensure adequate protection of public health and safety, the NRC often does not require existing licensees to implement them based on considerations such as whether they are cost beneficial.<sup>16</sup> As a consequence, the design and level of protection from natural phenomena differ among existing operating reactors depending on when the plant was constructed and licensed for operation.

While I can appreciate reasons for using this approach for reactors that were designed and constructed long before the new requirements could have been anticipated, I see no reason to relieve new reactor licensees from compliance with safety enhancements that arise from our

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<sup>16</sup> See 10 C.F.R. §§ 52.98(a) and 50.109(a)(3).

Fukushima review. Only limited, safety-related construction activities have been started at Vogtle units 3 and 4.<sup>17</sup> Construction is expected to be completed in 2016,<sup>18</sup> the same year we expect to have implemented all of the Fukushima recommendations. The process of completing and implementing Fukushima-related safety enhancements is proceeding expeditiously and transparently. We expect to issue a number of orders imposing new requirements relating to flooding, seismic events and station blackouts as well as information requests<sup>19</sup> in March 2012. While the content of these orders and letters has already been discussed with licensees<sup>20</sup> they are only the initial phase of our post-Fukushima regulatory actions. As we move forward, we will continue to engage stakeholders and share our findings and initiatives. The accelerated pace of our work and the transparency of our regulatory processes will help minimize any disruptions or delays in the operation of the new reactors.

Secondly, I address the difficulty of requiring timely resolution of significant safety issues and prompt implementation of new requirements intended to address those safety issues. Our experience has shown that even when we identify serious safety concerns, licensee resolution of those concerns and implementation of necessary changes can be subject to lengthy delays. The starkest examples of these long standing safety issues are fire protection and emergency core cooling system sump performance (i.e., GSI-191). In both cases, we have longstanding compliance issues. For fire protection, compliance with our rules is necessary to ensure that a

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<sup>17</sup> The activities under way are site-preparation activities permitted by the first LWA.

<sup>18</sup> <http://www.southerncompany.com/nuclearenergy/plan.aspx>

<sup>19</sup> See generally 10 C.F.R. § 50.54(f).

<sup>20</sup> The draft 50.54(f) letters have been made available to the public. See Miller, G. Edward Project Manager, Office of New Reactor Regulation, to Robert J. Pascarelli (Jan. 13, 2012) (making publicly available the draft letter section 50.54(f) letter and enclosures) (ML12013A224) (package).

fire cannot disable or impede the function of equipment needed to safely shutdown a reactor. For sump performance, resolution of the issues is necessary to ensure that accident generated debris cannot impede the cooling of the reactor core following an accident. These long-standing safety issues have not been completely resolved for decades.

This history demonstrates the importance of using our regulatory tools to require compliance with our expectations. On the day before the Fukushima accident, any nuclear professional or regulator would likely have told you that a natural disaster causing a loss of containment at three reactors simultaneously anywhere in the world was not a credible event we need be concerned about. If nothing else, the Fukushima accident has demonstrated the potential consequences of that type of complacency. I believe one of the primary lessons we should take from the accident is the need to take proactive and decisive regulatory action. As I explain below, we have the regulatory tools to require that all Fukushima enhancements are implemented before operation in this license. We should not simply hope for the best. Any risk of incomplete implementation, delayed implementation or both is not acceptable when we have the regulatory tools to require timely and complete implementation.

**4. A License Condition is The Appropriate Regulatory Vehicle to Require Implementation of Fukushima Safety Enhancements Before Operation**

For the reasons discussed above, I am convinced we must include a condition requiring implementation of all Fukushima-related safety enhancements before operation into the COL. Anticipating the need to impose this license condition, I asked the Staff to recommend language for such a condition in my post-hearing questions. My questions followed submission of the Staff's information paper stating that the Commission could choose to adopt some or all of the Near-Term Task Force recommendations and implement them in the COLs through license

conditions or, alternatively, issue the COLs and later modify, add, or delete any terms or conditions of the COLs to reflect any new Commission requirements.<sup>21</sup>

In its response, the Staff declined to provide the requested language, citing two reasons. First, the Staff objected that the license condition would have to be drafted “such that it could not be interpreted as evidence that the staff does not have reasonable assurance of adequate protection of the public health and safety at the time the COL is issued.”<sup>22</sup> But this is not the Staff’s decision to make in a mandatory hearing—it is a decision for the Commission. And, for the reasons discussed above, I cannot find reasonable assurance without the license condition.

The Staff also said that it did not have sufficient information to draft a viable license condition. But the Staff has performed an extensive assessment of the Tier 1 Task Force recommendations to determine the regulatory activities that will be necessary to implement them along with an estimated schedule and resource impacts.<sup>23</sup> To take one example, the Staff recommended issuing orders requiring licensees to reevaluate and upgrade seismic and flooding protection of structures systems and components for each operating reactor.<sup>24</sup> The Staff concluded that current regulatory guidance is sufficient to permit licensee reevaluations,<sup>25</sup> and suggested continued stakeholder interactions to discuss and define how compliance can be

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<sup>21</sup> See Ex. NRC00003, Staff Testimony, at 9.

<sup>22</sup> See Ex. NRC000015, Staff Post-Hearing Response, at 12.

<sup>23</sup> SECY-11-0137.

<sup>24</sup> Enclosure to SECY-11-0137, “Staff Assessment and Prioritization of NTTF Recommendations,” at 4.

<sup>25</sup> *Id.* at 5.

achieved.<sup>26</sup> This regulatory recommendation, like those for the remaining Tier 1 recommendations, is sufficiently concrete and specific to include in a license condition.

While we do not yet know the precise details of all new safety requirements, this does not—as the Staff suggests—mean that this license condition would be invalid. All Fukushima-related requirements are subject to review and approval by the Commission and will be implemented through our normal regulatory processes. By the time verification is necessary, we will know the precise details of those requirements. This satisfies the test set forth by the Commission in *Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, CLI-00-13, 52 NRC 23, 34 (2000), that the Staff verification be a straightforward matter of applying a defined set of requirements, i.e., a ministerial action. I do not consider the fact we do not yet know the precise details of all those requirements to be an obstacle from requiring this or any other new licensee from coming into compliance before initiating operations. Most importantly, the timing of when those details are developed does not diminish the ability of a license condition to ensure compliance. All licensees must comply—at all times—with the conditions of their licenses. In contrast, as I discuss above, regulations issued after the license can be subject to “backfit” exceptions and, in practice, lengthy delays in licensee compliance. Therefore, a license condition is the strongest regulatory tool for ensuring that all Fukushima-related safety enhancements are imposed before operation.

My judgment is informed by the Commission’s actions following the most serious accident at a reactor in the United States, the Three Mile Island (TMI) accident that occurred on March 28, 1979. Like Fukushima, the TMI accident prompted us to undertake a comprehensive reassessment of the safety of the operations of our nation’s nuclear reactors. While that was

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<sup>26</sup> *Id.* at 6.

under way, the Commission implemented a “licensing pause” to ensure that lessons learned from the accident were appropriately accounted for with respect to operating reactors and new reactor applications that were under review.

The comprehensive review following the TMI accident, like our review of the Fukushima accident, resulted in recommendations for significant safety enhancements. Following TMI, the Commission expressly considered the applicability of those recommendations to pending license applications for operation of new nuclear reactors. The Commission identified near term recommendations that new operating licensees would be required to implement before operation. License conditions were imposed requiring compliance with those recommendations, called “near term operating license requirements,” before fuel load. One such license<sup>27</sup> included conditions requiring completion of actions from the TMI Action Plan, Near Term Operating License (NTOL) Requirements, dated February 6, 1980.

While the license conditions described requirements generally, precise details were missing because they had not yet been developed. Notably, for all of the conditions, the license said they “shall be completed to the satisfaction of the Commission.”<sup>28</sup> The precise details concerning implementation were developed and documented later, in NUREG-0737 “Clarification of TMI Action Plan Requirements” issued in November 1980, and 10 C.F.R. § 50.34(f), “Additional TMI-related requirements,” promulgated in January 1982.<sup>29</sup>

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<sup>27</sup> Ross, D.F., Office of Nuclear Reactor Regulation, NRC, letter to J.H. Ferguson, Virginia Electric and Power Co. “North Anna Power Station, Unit No. 2 – Issuance of License NPF-7” (Apr. 11, 1980) (ML013520351).

<sup>28</sup> *Id.* at 5.

<sup>29</sup> See Final Rule, Licensing Requirements for Pending Construction Permit and Manufacturing License Applications, 47 Fed. Reg. 2301 (Jan.15, 1982).



Thus, within one year of the TMI accident, the Commission had not only identified the actions that needed to be implemented to improve safety, but had taken decisive regulatory actions to ensure those actions would be implemented prior to the operation of new reactors. Then, as now, we had identified actions to enhance safety but had not yet developed all of the implementing details. I believe we should follow that example by imposing a license condition requiring that all Fukushima recommendations are implemented before these new reactor units are allowed to operate.

Imposing this license condition should not place an undue burden on this or any future COL holder. We are working to have all Fukushima recommendations implemented by 2016, the same year that construction of these new reactors is expected to be complete. We have already shared detailed information regarding our expectations in the draft 50.54(f) letters and will continue to apprise COL applicants and licensees as our work proceeds. In this critical time, when the public is naturally rethinking the future of nuclear energy, it is essential that our actions support public confidence in the safety of our nation's nuclear reactors.

I am confident that we can authorize the issuance of these COLs now with a license condition requiring compliance with Fukushima safety enhancements before operation. If, as the Staff suggests, our regulatory processes have not proceeded to a point where we can impose this license condition, then we cannot be ready to issue these COLs. Ultimately, I cannot find reasonable assurance that these reactors will be operated safely without that requirement in the license, whether it is issued now or in the future.

### **III. CONCLUSION**

I agree with my colleagues that the Staff's review was sufficient to support issuance of these licenses under the regulatory requirements in effect before the Fukushima accident. But, unlike my colleagues, I do not believe we should authorize the operation of these new reactors without imposing a license condition that requires the implementation of all Fukushima-related

safety enhancements before operation. The recent accident at Fukushima already has, and will continue to, provide valuable information and insights that will improve our regulatory requirements, programs and processes and, with their implementation, improve the safety of our nuclear reactors. Fortunately, catastrophic accidents like these happen extremely rarely. But when they do, they provide invaluable real world experience and information about events we can normally only hypothesize and consequences we can normally only project in mathematical models. In the aftermath of the catastrophic events at Fukushima, I cannot authorize the operation of these new reactors until we fully synthesize and analyze that information and ensure that all the lessons we learn are fully implemented. If our regulatory processes have not proceeded to a point where we can require implementation before operation as a license condition, then we are not yet ready to issue these licenses.