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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Voluntary Response to Request for Additional Information to
Request for License Amendment and Exemption Regarding:
Annex and Radwaste Building Changes (LAR-13-019R1)

Ladies and Gentlemen:

In accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC), the licensee for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, requested an amendment to the Combined Licenses (COLs) for VEGP Units 3 and 4, COL Numbers NPF-91 and NPF-92, respectively, by SNC Letter ND-14-0562, dated April 18, 2014 [ADAMS Accession No. ML14108A096]. The SNC proposed departures consisted of changes to various plant-specific Tier 1 (and COL Appendix C) information and Tier 2 material contained within the Updated Final Safety Analysis Report (UFSAR) to modify the annex and radwaste buildings. Pursuant to the provisions of 10 CFR 52.63(b)(1), an exemption from elements of the design as certified in the 10 CFR Part 52, Appendix D, design certification rule was also requested for the plant-specific Tier 1 material departures. As noted in the April 18, 2014 letter, the changes proposed in that License Amendment Request (SNC LAR-13-019) are consistent in technical content with License Amendment Request (LAR) 13-09, submitted by South Carolina Electric & Gas Company (SCE&G) on February 27, 2014 [ML14065A022], and accepted by the NRC for review on April 3, 2014 [ML14090A162].

On May 5, 2014, the Nuclear Regulatory Commission (NRC) issued Request for Additional Information (RAI) Letter No. 1 [ML14125A297] to SCE&G regarding their LAR 13-09. SCE&G responded to RAI Letter No. 1 by letter dated July 09, 2014 [ML14192A036]. On August 1, 2014, SCE&G received follow-up questions from the NRC staff regarding the July 9, 2014 response. These questions were discussed in NRC Public Meetings on August 14, 2014 and August 21, 2014. As a result of these discussions, SCE&G provided updates to the RAI response in letters dated September 25, 2014 [ML14268A544] and August 20, 2015 [ML15236A100]. On October 13, 2015, SCE&G received a follow-up to Question 6 from the NRC staff regarding the August 20, 2015 RAI response. SCE&G responded to the follow-up to Question 6 in their letter dated December 17, 2015 [ML15351A428]. The NRC provided four

additional questions to SCE&G via email on February 1, 2016 and February 3, 2016 regarding the December 17, 2015 response; these four additional questions were discussed in a public meeting with the NRC on February 3, 2016. SCE&G responded to these additional questions by letter dated June 1, 2016 [ML16154A048]. The NRC issued RAI Letter No. 2 to SCE&G on July 25, 2016 [ML16207A387], regarding their LAR 13-09. SCE&G submitted responses to these latest RAIs in a letter dated November 17, 2016 [ML16323A034].

Because SNC LAR-13-019 is within the scope of NRC RAI Letter No. 1, the additional NRC questions in emails dated February 1 and 3, 2016, and NRC RAI Letter No. 2, SNC elects to provide a voluntary response to these questions based on the responses provided by SCE&G in their letters dated July 09, 2014, September 25, 2014, August 20, 2015, December 17, 2015, June 1, 2016, and November 17, 2016. The SNC responses to RAI Letter No. 1, the February 1 and 3, 2016 emails, and NRC RAI Letter No. 2 are found in Enclosure 5 of this letter. Enclosures 6, 7, 8, and 9 include changes that revise the original LAR-13-019. Enclosures 1 through 4 were provided in SNC letter ND-14-0562.

This SNC revision addresses the SCE&G LAR revisions and supplements provided in the letters identified above. Since SNC submitted the original LAR-13-019 after the SCE&G original LAR 13-09 submittal, some of the corrections included in the SCE&G revised LAR were included in the SNC original LAR submittal.

The information provided in Enclosures 5, 6, 7, 8, and 9 changes the Technical Evaluation, but does not change the scope and conclusions of the Significant Hazards Consideration Determination, in the original request for license amendment and exemption (LAR-13-019) submitted on April 18, 2014.

The sensitive unclassified non-safeguards information (SUNSI), included in Enclosure 8 of SCE&G's letter dated July 09, 2014 and Enclosure 15 of SCE&G's letter dated December 17, 2015 are included in Enclosure 9 of this letter. **The SNC Enclosure 9 contains revisions to the proposed markups related to the RAIs depicting the requested changes to information classified as security-related, also referred to as SUNSI, protected and requested to be withheld under the provisions of 10 CFR 2.390(d).**

This letter contains no regulatory commitments.

SNC requests a revision to the requested date for staff approval of the license amendment and exemption to March 2, 2017. Approval by this date will allow sufficient time to implement the licensing basis changes prior to affected construction activities. SNC expects to implement the proposed amendment within 30 days of approval of the requested changes.

SNC has previously submitted Preliminary Amendment Request (PAR), PAR-13-019, dated May 6, 2014 to allow continued construction of the annex building at column line 10. The NRC issued a PAR No Objection letter on May 22, 2014. The activities conducted under the PAR No Objection letter are fully supported by the technical information in this revised LAR (LAR-13-019R1), and there have been no substantive revisions to the information contained in LAR-13-019 upon which the PAR No Objection letter was based. As noted above, the Enclosures in the original LAR cited by PAR-13-019 remain on the docket and are subsumed by the applicable LAR Revision 1 Enclosures.

In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this LAR revision by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Mr. Adam G. Quarles at (205) 992-7031.

Mr. Brian H. Whitley states that: he is the Regulatory Affairs Director of Southern Nuclear Operating Company; he is authorized to execute this oath on behalf of Southern Nuclear Operating Company; and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Brian H. Whitley

BHW/AGQ/ljs

Sworn to and subscribed before me this 11th *day of* January, *2017*

Notary Public: Lisa Myrick Spears

My commission expires: June 18, 2019

Enclosures: 1) Thru 4) Previously submitted with the original LAR, LAR-13-019, in SNC Letter ND-14-0562.

5) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Voluntary Response to NRC RAIs Related to Exemption and License Amendment Request (LAR) 13-019: Annex and Radwaste Building Changes (LAR-13-019R1)

6) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revisions to Enclosure 1 Request for License Amendment: Annex and Radwaste Building Changes (LAR-13-019R1)

7) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revisions to Enclosure 2 Exemption Request: Annex and Radwaste Building Changes (LAR-13-019R1)

8) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revisions to Enclosure 3 Licensing Basis Document Proposed Changes (LAR-13-019R1)

9) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revisions to Enclosure 4 Proposed Changes (Protected Information) – **Security-Related Information** (SUNSI) – Withhold from Public Disclosure Under 10 CFR 2.390(d) (LAR-13-019R1)

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Southern Nuclear Operating Company

ND-17-0023

Enclosure 5

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Voluntary Response to NRC RAIs Related to Exemption and License Amendment Request (LAR) 13-019: Annex and Radwaste Building Changes (LAR-13-019R1)

(This enclosure contains 36 pages, including this cover page.)

This revision provides the responses to NRC RAI Letter No. 01 [ML14125A297] dated May 5, 2014, additional NRC RAIs in emails dated February 1 and 3, 2016, and NRC RAI Letter No. 2 [ML16207A387] dated July 25, 2016 to South Carolina Electric & Gas Company (SCE&G) related to LAR-13-09 regarding annex and radwaste building changes. These responses also address follow-up questions provided to SCE&G in emails dated August 1, 2014 and October 13, 2015 and comments provided in NRC public calls on August 14 and 21, 2014. SCE&G responses to the NRC questions were submitted in six separate letters dated July 09, 2014 [ML14192A036], September 25, 2014 [ML14268A544], August 20, 2015 [ML15236A100], December 17, 2015 [ML15351A428], June 1, 2016 [ML16154A048] and November 17, 2016 [ML16323A034].

Note that SCE&G assigned question numbers 9 to 12 in responding to the NRC follow-up questions received on February 1 and 3, 2016 via email. Subsequently, NRC RAI Letter No. 2 [ML16207A387] was issued which also assigned question numbers 9 to 12 – these are indicated below with the prefix “New” for consistency with SCE&G’s numbering.

This voluntary response by Southern Nuclear Operating Company (SNC) to the RAIs and follow-up questions provided to SCE&G, addresses each of the NRC original questions and the follow-up questions as applicable. The SNC responses provided below to the NRC questions are consistent with the responses provided by SCE&G. Additional discussion added by SNC or modified to reflect SNC programs are denoted by [ ].

NRC Question 1

Section 20.11 01 (b) of 10 CFR Part 20 states that the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as is reasonably achievable (ALARA).

Section 2.2 of Enclosure 1 (page 4 of 19) proposes to modify the configuration of the radwaste building to add three bunkers for storage of moderate and high activity waste. Section 2.2 also states that since both packaged and unpackaged waste will contain moderate or high activity, both types of waste (packaged and unpackaged) will be stored in the bunkers.

a) In order to ensure that doses to personnel working in the Waste Accumulation Room, including workers moving waste into or removing waste from the three proposed bunkers, are maintained ALARA, describe your criteria for determining what types of wastes will be stored in each of the three proposed bunkers (e.g., will certain bunkers be used for packaged vs. unpackaged waste or for moderate vs. high activity waste).

b) In order to minimize the dose to workers in the Waste Accumulation Room, describe your criteria for determining what wastes will be stored in the bunkers and what wastes will be stored outside the bunkers in the Waste Accumulation Room.

SNC Response to Question 1

[This response is consistent with the response provided by SCE&G in their letter dated July 09, 2014, but the response to question 1.a is supplemented by the response to RAI Question 10, later in this Enclosure.]

General Note: When responding to the questions in this RAI, conventions are applied from approved design certifications, and from the Code of Federal Regulations for interpreting dose rates. These conventions are slightly different, depending upon whether the dose rate is being

used for the designation of dry waste for segregation, or for the assignment of plant radiation zones to a given space. When designating waste for segregation, (including low-activity waste, moderate-activity waste, and high-activity waste), contact dose rates are considered as described in the DCD, Section 11.4.2.3.3. When discussing plant radiation zones, dose rates at 30 centimeters from a surface are evaluated, consistent with the definitions of radiation area, and high radiation area described in 10 CFR 20.1003.

a) The purpose of the three proposed bunkers is for storage of moderate activity packaged or unpackaged waste. The bunkers may also be used for storage of high activity packaged or unpackaged waste with the implementation of portable shielding on the top and the open sides of the bunkers in accordance with [SNC's] ALARA program. There is no distinction between the bunkers as to the type of radioactive waste that may be stored in any particular bunker, although the design basis for the facility involves waste with surface dose rates at or below 100 mrem/hr. A shielding calculation has been performed which demonstrates that, when waste with surface dose rates ≤100 mrem/hr is stored in the bunkers, for the Radwaste Building (RB) proposed updated design described in the License Amendment Request (LAR), the Waste Accumulation Room is a Zone IV area, which is unchanged from the current design, and the RB roof, which is a restricted access area, is a Zone II area. This shielding calculation can be made available for NRC review upon request.

b) As noted in the response to Item a above, only moderate or high activity waste is intended to be stored in the bunkers. Generally, only low or low-to-moderate activity waste is to be stored in the Waste Accumulation Room outside of the bunkers. The storage and handling of this waste is in conformance with the ALARA policy as documented in UFSAR Section 12.1 and the Radiation Protection Program description in Appendix 12AA.

NRC Question 2

Section 20.1101 (b) of 10 CFR Part 20 states that the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as is reasonably achievable (ALARA).

Section 2.2 of Enclosure 1 (page 4 of 19) states that three bunkers will be added to the Waste Accumulation Room in the Radwaste Building to allow for the segregation of moderate or high activity waste from the remainder of the low activity waste. This section also states that the use of these bunkers to separate the moderate or high activity waste from the remainder of the low activity waste in the Waste Accumulation Room reduces operational exposure while workers handle low activity waste. Although this section states that these bunkers will be used for the storage of moderate or high activity waste, it does not include any information on the shielding effectiveness of the bunkers, other than stating that these bunkers will added "to maintain acceptable radiation levels on the Radwaste Building roof and to maintain portions of the radwaste building at radiation Zone I levels as defined in UFSAR Tier 2 Figure 12.3-1 (sheet 1 of 16)." Further, this section states that the three bunkers will have removable steel plates.

a) In order to assure that doses to personnel working in the Waste Accumulation Room are maintained ALARA, 1) verify that you have performed a shielding analysis of the proposed bunkers and associated removable steel plates to justify that dose rate levels in the Waste Accumulation Room will not exceed the designated radiation Zone IV classification from radioactive waste stored in the three proposed bunkers, and 2) provide the results of this analysis.

b) The installation and/or removal of the removable steel plates from the bunkers in the Waste Accumulation Room could result in the expenditure of unnecessary dose to the workers performing this operation. Justify the design decision to use removable steel plates on the bunkers to provide additional shielding for the radioactive waste stored in the bunkers versus designing the bunker walls with adequate shielding to maintain dose rates outside the bunkers at acceptable levels.

c) Describe the criteria for when these removable steel plates will be used. Describe how these removable steel plates will be added to the doors of the bunkers without impeding accessibility to the bunkers (due to the weight of the steel plates).

NRC Follow-up to RAI Question 2.a):

2. a) The licensee response to Question 2.a) states that the design basis sources contributions within the Waste Accumulation Room (WAR) are Zone I, even with design basis sources. Verify that this means that the dose rate contributions from the waste monitor tank in the adjacent cubicle are less than 1 mrem/hr in the WAR, even when the waste monitor tank contains design basis sources?

SNC Response to Questions 2 and Follow-up to Question 2.a):

[This response is consistent with the responses provided by SCE&G in their letters dated July 09, 2014 and September 25, 2014.]

In addition to clarification provided during the NRC public calls on August 14 and 21, 2014 [ML14245A579 and ML14248A344 respectively], the responses to original Question 2 and the follow-up to Question 2.a), are provided as follows:

a) It has been verified that a shielding analysis has been performed of the proposed bunkers. The results of that analysis show that the Waste Accumulation Room can be maintained as a radiation Zone IV, assuming the surface dose rate limit of 100 mrem/hr (note that this surface dose rate limit ensures that Zone IV levels will be individually met for these waste containers, as the dose rate at 30 cm will be lower than the surface dose rate of 100 mrem/hr) is maintained for wastes along with implementation of an ALARA program by [SNC]. The shielding calculations show that waste monitor tank contributions within the Waste Accumulation Room are Zone I (defined as < 0.25 mrem/hr), even considering design basis sources. As noted in the response to Item b of this RAI question, the removable shield plates on the front openings of the bunker are provided for ALARA purposes only and are not credited to maintain the radiation zoning of the facility. These removable shield plates allow for the storage of high level waste in the bunkers provided that the storage and handling of this waste is in conformance with the ALARA policy as documented in UFSAR Section 12.1 and the Radiation Protection Program description in Appendix 12AA.

b) The removable shielding plates for the front opening of the bunkers are not required for the storage of moderate activity waste and were not credited in the shielding analysis. The removable plates are included in the design as an option for the operator and are recommended to allow personnel to have maximum flexibility to operate the facility in an ALARA manner and ensure exposure to plant operating personnel within the limits of 10 CFR 20. For instance, by placing high level waste in the bunkers, if the operators use the front plates, it will significantly reduce exposure in the remainder of the Waste Accumulation Room. The plates are not required, because, as noted in the RAI question, there is a concern that extra time spent moving the plates could increase operator dose

beyond what the operator would receive if he were to quickly locate the waste into the bunker without front plates and exit the room. In this manner, the proposed modifications to the design allow for an ALARA-based decision on whether to use the plates for various plant configurations, considering actual site conditions (as opposed to the design basis conditions considered in the standard plant design). This allowance is intended to reduce personnel exposure through the targeted application of removable shielding where such applications are warranted based upon ALARA considerations.

Note that use of the removable steel plates is consistent with the Radwaste Building design description in UFSAR Subsection 12.3.2.2.5 which states that temporary partitions and shield walls will be provided, as required, to supplement the permanent shield walls surrounding the Waste Accumulation Room inside the Radwaste Building (RB).

c) As noted in the response to Item b above, the removable steel plate(s) can be used for those conditions, such as when placing high level waste in the bunkers, where doses to the workers in the Waste Accumulation Room will be reduced compared with not installing the plates, considering the additional exposure involved when installing the plates. Note that plant procedures will not require that the removable plates be used in all cases where radioactive waste is installed in the bunkers. The determination of the need for these plates will be on a case-by-case basis and will include such ALARA considerations as the level of radioactivity in the bunker, the amount of time operators will be working in the Waste Accumulation Room, and the additional dose incurred by installation of the plates.

   The removable steel plate(s) can be installed on the bunker openings using a forklift and completely cover the bunker opening. Therefore, when the steel plate(s) are installed, the associated bunkers cannot be accessed. Access to the bunker can be regained by removal of the plate(s) using a forklift.

NRC Question 3

Section 3.2 of Enclosure 1 (page 8 of 19) states that three bunkers will be added to the Waste Accumulation Room in the radwaste building “to allow temporary shielding to maintain acceptable radiation levels on the radwaste building roof”.

a) Since the bunkers are being added to maintain acceptable radiation levels on the radwaste building roof, state why the shielding on the bunkers is referred to as "temporary shielding."

b) Verify that routine radiation surveys will be performed on the building roof above the radwaste building to ensure that the radiation zone levels on the roof will not exceed radiation Zone I criteria due to the storage of radioactive waste in the bunkers in the Waste Accumulation Room.

NRC Follow-up to RAI Question 3.a):

3. a) Clarify the description of when the various “temporary” and “permanent” shields will be used to lower dose rates from waste stored in the cubicles.

   - The response to Question 3 a) states that a permanent top steel plate (design basis shielding) must be installed on top of each bunker to ensure that the Radwaste Building roof is maintained as a Zone II area when high level waste is stored in the bunkers. Describe what controls will be in place to ensure that a permanent top steel

plate (design basis shielding) will be installed on a bunker when high level waste is stored in the bunker.

- The response states that, in addition to the use of the permanent top steel plate (design basis shielding), additional shielding can be placed above the bunkers for cases where high level waste is being stored in the bunkers. Clarify criteria for placement of temporary steel plates on top of the bunkers. If the use of a permanent top steel plate alone on each bunker is sufficient to ensure that the Building roof is maintained as a Zone II area, describe under what situations additional temporary shielding would be placed on top of the permanent top steel plates. Verify that the walls of the bunkers are designed to support the weight of multiple steel shields on top of the bunkers.

- The response states that the permanent top steel plates will have to be removed by the overhead crane to permit the movement of radioactive waste inside the bunkers. The response also states that temporary removable steel shields can be installed to cover the front opening of each bunker (to reduce exposure to personnel in the WAR when high activity waste is stored in the bunkers) using a forklift. Specify where these permanent and temporary steel shielding plates will be stored when not being utilized and verify that there will be sufficient laydown space for storage and maneuvering of these permanent and temporary steel shielding plates.

SNC Response to Question 3 and the Follow-up to Question 3.a):

[This response is consistent with the responses provided by SCE&G in their letters dated July 09, 2014 and September 25, 2014, but this response is superseded by the response to RAI Question 10, later in this Enclosure.]

In addition to clarification provided during the NRC public calls, the responses to original Question 3 [and the follow-up to Question 3.a), are] provided as follows:

a) The reference to “temporary shielding” in the technical evaluation of the Radwaste Building changes is intended to indicate that there is flexibility in the revised Radwaste Building design described in the LAR to allow for additional shielding above the bunkers, in addition to the design basis shielding offered by the bunker walls, for cases where high level waste is being stored in the bunkers. Note that this temporary shielding is in addition to the permanent top plate shielding for the bunkers. Acknowledgement of the removable or temporary nature of these plates is included in the shielding calculation, which demonstrates that the Radwaste Building roof is a Zone II area without crediting any attenuation that these plates may offer. Zone II dose rates are maintained by crediting only radiation transport, the limited shielding from the building roof and the distance between the waste storage location and the roof elevation. Further, the walls of the bunker are designed to support the top steel plates and an additional wall loading associated with the use of multiple steel plates, up to six inches in thickness.

   Note that both the temporary shielding and permanent top shielding are removable to allow access for the overhead crane for movement of radioactive waste inside the bunkers. Storage of these plates will be in accordance with plant controls and procedures. As one example, with the additional space afforded in the Waste Accumulation Room, these plates could be stored within this area.

b) UFSAR Subsection 12AA.5.4.1 provides an overview of the radiological surveillance program. As noted in that subsection, the frequency and extent of the radiological surveys depend upon several factors, such as location, actual or potential radiation levels, plant operational status and work in progress, and accessibility/occupancy. The frequency of the surveys may be weekly, monthly, quarterly, semi-annually, annually, or as directed by the Radiation Protection Manager. Site specific procedures will define the survey frequencies and extent and will include the roof of the Radwaste Building to confirm that radiation levels on the roof do not exceed radiation Zone II criteria as a result of waste stored in the bunkers. The implementation of the Radiation Protection Program elements, which includes radiation surveys, is identified in UFSAR Section 13.4.

   Note that the LAR does not identify the Radwaste Building roof as Zone I; for the roof, it discusses maintaining acceptable radiation levels, which this RAI confirms as Zone II. The statement in the Technical Evaluation section of the LAR for the Radwaste Building configuration changes which states “and to maintain portions of the Radwaste Building at radiation Zone I levels” applies to portions within the Radwaste Building, which do not include the roof.

NRC Question 4

Section 20.1101 (b) of 10 CFR Part 20 states that the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as is reasonably achievable (ALARA). In addition, Regulatory Guide 8.8 states that radiation shields should be designed to maintain occupational radiation exposures ALARA.

Section 3.2 of Enclosure 1 (page 8 of 19) proposes that the thickness of the shield walls for the portion of the Waste Accumulation Room associated with the original Packaged Waste Room be reduced from 2' to 1'-4". In order to ensure that this decrease in the thickness of these shield walls will not result in increased dose rates in the rooms adjacent to the Waste Accumulation Room (i.e., the Mobile Systems Facility and the Monitor Tanks Room) from wastes stored in the Waste Accumulation Room, verify that you have performed a shielding analysis to justify this proposed change in shield wall thickness and provide the results of this analysis.

SNC Response to Question 4

[This response is consistent with the response provided by SCE&G in their letter dated July 09, 2014.]

It has been verified that a shielding calculation, specific to the AP1000 Radwaste Building, has been performed. Internal masonry unit walls, including the walls between the Waste Accumulation Room and the Mobile Systems Facility (MSF) and the Waste Monitor Tank (WMT) Room, were modeled as 1'-4" thick concrete walls with a density of 140 pcf. Waste with a surface dose rate of 100 mrem/hr was modeled within the Waste Accumulation Room. The results show that the doses in the MSF will be no greater than Zone II (peak dose rate of 0.29 mrem/hr to the east, and 1.4 mrem/hr in the corridor to the north) considering contributions from waste in the Waste Accumulation Room. The WMT room doses will not exceed Zone IV (33 mrem/hr) considering contributions from waste in the Waste Accumulation Room and contributions from the WMTs with design basis sources. These zone designations are the same as those identified for the current design on UFSAR Figure 12.3-1 (Sheet 14) which are Zone II for the Mobile Systems Facility and Zone IV for the WMT Room, when operating with design basis sources. As noted in the response to RAI Question 8d, the WMT Room is a Zone II during

typical operations, when the WMTs contain only mildly activated water. Therefore, there is no increase in the dose rate to these areas as a result of these LAR changes.

NRC Question 5

There appear to be some inconsistencies in the descriptions of the volume of radwaste that will be stored in the radwaste building.

a) UFSAR Section 11.4.2.1 states that the available minimum useful storage volume for packaged waste in the Waste Accumulation Room is 3900 cubic feet (10 feet deep, 30 feet long, and 13 feet high). UFSAR Section 11.4.2.5.2 states that the waste accumulation room contains three 1000 cubic feet bunkers (10 feet x 10 feet x 10 feet), with a total volume of 3000 cubic feet. On the basis of this information, it appears that the storage volume provided by the three bunkers is 77% of the useful storage volume for packaged waste in the Waste Accumulation Room. However, in UFSAR Figure 12.3-1 (sheet 14 of 16), it does not appear that the three bunkers occupy such a large percentage of the waste accumulation room. Please clarify this apparent inconsistency.

b) Tier 1 Table 3.3-6 Item 6.b originally listed the volume of the radwaste building package storage room as being greater than or equal to 1293 cubic feet. Since the licensee proposes to remove the wall separating the Packaged Waste Storage Room and the Waste Accumulation Room and designate the new larger room as the Waste Accumulation Room, Item 6.b was modified to change the name of the room as well as to change the minimum volume of the room from 1293 cubic feet to 1417 cubic feet.

    1) State the basis for the initial minimum volume of 1293 cubic feet for the Packaged Waste Storage Room.

    2) Specify whether the minimum volume of the Waste Accumulation Room was increased from 1293 to 1417 cubic feet because of the increase in room volume obtained from removal of the wall separating the two original rooms, or whether this change was made to make the minimum room volume consistent with the expected annual shipped volume of 1417 cubic feet for dry waste listed in Tier 2 Table 11.4-1.

SNC Response to Question 5

[This response is consistent with the response provided by SCE&G in their letter dated July 09, 2014.]

a) Although the marked-up UFSAR text in Subsection 11.4.2.1 states that the available minimum useful storage volume for packaged waste in the Waste Accumulation Room is 3900 cubic feet, the actual volume for the proposed revised Waste Accumulation Room is much larger, because of the merging of the Packaged Waste Room (PWR) and original Waste Accumulation Room. The 3900 cubic feet useful storage volume was applicable to the original PWR alone and is currently described in the UFSAR as approximately the storage volume available in the PWR for storage of packaged waste. Because the modified Waste Accumulation Room, which combines the PWR and original Waste Accumulation Room, is much larger in volume than just the PWR alone, the modified text states that the 3900 cubic feet useful storage volume is the minimum available storage volume for storage of packaged waste in the Waste Accumulation Room. The intent of not changing the 3900 cubic feet value is to show that the proposed design modifications to the Radwaste Building

maintain at least the same capability as the unmodified design for storage of packaged waste.

b) Tier 1 Table 3.3-6 Item 6.b

1) The minimum volume of 1293 cubic foot for the Radwaste Building Packaged Waste Storage Room that is provided in Tier 1 Table 3.3-6, Item 6b is based on the minimum volume estimated for waste storage as opposed to the actual building volume. Note also that this minimum volume in Tier 1 Table 3.3-6, Item 6.b is provided in the certified and approved Revision 19 of the AP1000 DCD.

2) As indicated above, the minimum volume for the Radwaste Building Packaged Waste Storage Room that is provided in Tier 1 Table 3.3-6, Item 6b is based on the minimum volume estimated for waste storage as opposed to the actual building volume. Based on that, the volume of 1417 cubic feet is not based on the removal of the wall separating the Packaged Waste Storage Room from the original Waste Accumulation Room, but rather is based on the expected disposal volume of dry waste per year of 1417 cubic feet which is provided in UFSAR Tier 2, Subsection 11.4.2.1.

NRC Question 6:

In Enclosure 3 (page 13 of 15), the proposed changes to UFSAR Figure 12.3-1, (Sheet 14 of 16), included adding notes to the figure. These notes indicate that dose rates in certain areas in the radwaste building may be higher than initially indicated in the AP1000 DCD. In addition, the LAR indicates that high activity waste will be stored in the proposed Waste Accumulation Room bunkers. Finally, the removal of the wall that originally separated the Waste Accumulation Room and the Packaged Waste Storage Room adds some additional space in the Waste Accumulation Room for the storage of waste. These changes all indicate that there is a potential for a larger source term in the radwaste building than what was initially indicated in the AP1000 DCD. The LAR should include an evaluation of these potential increases in source term against the criteria contained in Regulatory Guide 1.143, Revision 2, Regulatory Positions 5 and 6, and determine if the increased source term 1) is acceptable for the current Radwaste Building SSC design and 2) is consistent with radioactivity limits for systems as described in UFSAR Appendix 1A and Chapter 11. Likewise, any increases in the total activity stored in the radwaste building as a result of an increased source term from packaged waste, should be evaluated against the criteria in NUREG-0800 Section 11.4A.

NRC Follow-up to RAI Question 6:

6. a) In the response to question 6, the licensee indicates that none of the changes to the Radwaste Building are indicative of an increase in the source term for the building. However, in the LAR, the licensee adds note D.4 to UFSAR Figure 12.3-1 which states that administrative controls may allow the radiation zone dose limit for the Monitoring Tank Room to be exceeded up to Zone IV if the plant is operating under higher than expected fuel failures. Prior to the LAR, UFSAR Figure 12.3-1 indicated that the monitoring tank room was Zone III, with no footnote. Please explain/correct this apparent discrepancy in their response. If the monitoring tank source term is increasing beyond what was specified in the current UFSAR it should be evaluated against the classification criteria in RG 1.143, Rev 2.

The staff also notes that the current/original UFSAR Chapter 12, Figure 12.3-1, was supposed to be based on the design basis 0.25% fuel failure (the maximum fuel failure for which the plant is allowed to operate). Therefore, the original zoning of Zone III for

the Monitor Tank Room should already have been based on the maximum fuel failure percentage allowed in the plant.

b) In the response to question 6, the licensee indicates that none of the changes to the Radwaste Building are indicative of an increase in the source term for the building and reference the fact that UFSAR Tables 11.4-1 through 11.4-9 are not changing as evidence that the Radwaste Building source term is not changing. However, these tables do not provide the radioactive source term of waste stored in the Radwaste Building. Rather, these tables provide expected and maximum waste generation and shipping rates, and they do not imply any kind of limitation on the amount of wastes that can be stored in the Radwaste Building. In addition, as specified in the UFSAR, not all of this generated waste will be stored in the Radwaste Building. Some of this waste will be stored in the Auxiliary Building. The exact quantities to be contained in each building are not specified. Therefore, in the currently licensed UFSAR, a radioactivity limit for packaged waste in the Radwaste Building does not appear to be specified; however, a volume limit is specified. The current UFSAR Subsection 11.4.2.1 originally states that the useful storage volume for packaged waste was approximately 3900 cubic feet. The LAR modified Subsection 11.4.2.1 to state that the available minimum useful storage volume for packaged waste is 3900 cubic feet. By adding "available minimum" to the description of the waste volume, the UFSAR would now allow the licensee to store as much packaged waste as can fit in the Radwaste Building Accumulation Room, which could be a significantly larger volume than what was originally specified as being in the packaged waste storage room alone. Therefore, in accordance with SRP Section 11.4-A and SECY 94-198, please demonstrate that with the increased volume of packaged waste in the Radwaste Building that the radiological consequences of design basis events (e.g., fire, tornado, seismic occurrences, and flood) do not exceed a small fraction (10 percent) of 10 CFR Part 100 dose limits, or provide an alternative approach demonstrating that the changes made do not increase the risk to the public. In addition, SRP Section 11.4-A and SECY 94-198, states that licensees should evaluate the waste form gas generation rates from radiolysis, biodegradation, or chemical reaction with respect to container breach and the creation of flammable or explosive conditions. Therefore, the licensee should ensure that the Radwaste Building ventilation system can remove explosive gases that could be generated from the waste in the building and demonstrate how they will ensure that they will not reach explosive gas concentrations if the ventilation system is off. Finally, ensure that explosive gas concentrations will not be reached within the enclosed bunkers, added in the LAR. The licensee should assume that the most restrictive waste forms, concentrations, and quantities will be located in the Radwaste Building as would be reasonably be allowed by the UFSAR and this LAR in performing this analysis.

Staff notes that packaged waste is not within the scope of RG 1.143, Rev. 2. Therefore, the source term for packaged waste is not included within the building source term limits specified for RG 1.143, Rev. 2.

NRC Follow-up to RAI Question 6:

6. c) In the response to question 6, the licensee states that they are going to use administrative controls to ensure source term limits are not exceeded but the response does not indicate what the limit is for waste stored in the building. We want them to tell us what the activity limit is for their building and how they know when they reach the maximum amount of activity allowed in the radwaste building and to put this type of information in the response and in the UFSAR.

SNC Response to Question 6 and the Follow-up Questions Related to Question 6:

[This response is consistent with the responses provided by SCE&G in their letters dated July 9, 2014, September 25, 2014, August 20, 2015, and December 17, 2015 but the response to Question 6.b in the August 20, 2015 letter is superseded by the response to RAI Question 12, later in this Enclosure.]

In addition to the clarification provided during the NRC public call, the response to Question 6 is partially updated as follows:

None of the changes to the Radwaste Building (RB) described in the LAR are a result of nor will they lead to an increased source term for radioactive waste in that building. This is evidenced by the fact that there are no changes to any of the already approved source term values currently provided in UFSAR Tables 11.4-1 through 11.4-9 as a result of this LAR. The purpose of these LAR changes is to update the RB design to ensure that adequate shielding exists to handle the source terms as already provided in these UFSAR tables. Note that the shielding analysis for the RB used surrogate waste containers with dose rates that are intended to be bounding, and are not necessarily related to any specific activity or concentration value referenced in Regulatory Guide 1.143, Revision 2. The changes in this LAR do not relieve the operational requirement of ensuring that the total activity stored in the RB is within the limits mentioned in Regulatory Guide 1.143, Revision 2.

The addition of Notes D.1 and D.2 to Figure 12.3-1 (Sheet 14) indicating that dose rates may be locally exceeded in certain instances reflects the possible (but not expected or normal) situation in which operators will arrange radioactive waste storage containers in such a way as to locally exceed a radiation zone. For example, if three containers of waste, each with a surface reading of 70 mrem/hr, are co-located within the Waste Accumulation Room, there could exist a small, localized portion of the Waste Accumulation Room that experiences dose rates above Zone IV levels. This is not expected because an ALARA review or programmatic ALARA approach to waste storage would be likely to identify an optimum means of waste storage that does not involve co-locating such containers. These notes were added to the LAR for completeness and for consistency with notes that already exist for other buildings with radioactive components such as the Nuclear Island (Figure 12.3-1, Sheets 8 and 9, Note 1) and the Annex Building (Figure 12.3-1, Sheet 13, Note 1) and were not added to address an increased source term. Notes D.1 through D.3 were added to define the call-outs for those notes which are already identified in the existing UFSAR Figure 12.3-1 (Sheet 14). Additionally Note D.4 with its call-out is being added to that figure by this LAR.

The addition of the bunkers provides the necessary shielding to handle the existing radioactive source terms and maintain the existing zone designations for the areas inside and outside the Radwaste Building (RB). The added room volume due to removal of the wall that separated the Packaged Waste Room from the Waste Accumulation Room does not result in an increase to the source terms, which are unchanged by this LAR. The modified room allows for better ALARA practices such that the waste can be separated, staged and stored further from the room openings and allows for personnel to maintain a greater distance from the waste than what the smaller space afforded. The 3900 cubic feet of useful storage volume represents space within the modified waste accumulation room. The design described in the Revision 19 of the Design Control Document (DCD) approaches this volume if the space within the former waste accumulation room and the package waste storage area are considered.

It should also be noted that the current RB design described in the UFSAR already has a much greater volume than the estimated solid radwaste volumes provided in UFSAR Table 11.4-1. Consequently, the potential for exceeding the source terms based on available building volume already exists. As a result, administrative controls will be used to ensure that the source term

limits are not exceeded. These administrative controls are necessary with the modified design, as they were necessary with the design approved as part of the AP1000 license certification. The administrative controls will be a part of [SNC's] ALARA program. NEI Template NEI-07-08A is one example of an ALARA program, including administrative controls, which may be employed by [SNC].

Additional Information

The change in radiation zone for the waste monitor tank room has been considered against the guidance in Regulatory Guide 1.143. Specifically, the design basis shielding source terms for the tanks (in terms of radioactivity concentrations and the monitor tank total volume) have been compared to the limits in 10 CFR Part 71. Consistent with the AP1000 design, this comparison showed that even when all three monitor tanks within the building are considered full with liquid at design basis concentrations – which are those levels associated with 0.25% fuel defects and shown to produce dose rates within the definition of radiation Zone IV – the monitor tanks, collectively, occupy only a fraction of the 10 CFR Part 71 limits and provide margin to allow for the inclusion of additional activity within the building. This additional activity could be in the form of radioactivity within the mobile systems facility.

When considering the monitor tanks, additional margin can be demonstrated if a single tank is considered (reflecting conditions where two tanks may be undergoing maintenance, or not used for waste storage), or if assumptions more representative of expected conditions are applied (for example, reflecting operation without fuel defects).

This supports the statement in the certified AP1000 design and licensing basis (section 11.2.1.2.5.1) stating that:

> The monitor tanks in the non-seismic radwaste building are used to store processed water. The radioactivity content of processed water in each tank will be less than the A1 and A2 levels of 10 CFR 71 Appendix A, Table A-1.

Full compliance with commitments to Regulatory Guide 1.143 is achieved through a combination of design features and analyses (which show that waste within the monitor tanks will not exceed 10 CFR Part 71 limits), and administrative controls including the use and application of a Process Control Program (PCP). NUREG-1793, page 11-24 underscores the importance of the PCP when ensuring that equipment and activities within the mobile systems facility are conducted in accordance with Regulatory Guide 1.143 commitments. Packaged waste within the waste accumulation room is not included when considering compliance with Regulatory Guide 1.143 as this waste is regulated under 10 CFR Part 71.

As further background related to the change in radiation zoning designation for the waste monitor tank room in the radwaste building, please consider the chronology of design activities and commitments within the licensing basis of the certified AP1000 design. Initial evaluations and estimates of the contents of the waste monitor tanks in the radwaste building (and the related radiation zones) were based upon preliminary evaluations and assumptions supporting DCP/NRC2257 (2008, ADAMS accession number ML082560237). The information in that document reflected preliminary calculations of radwaste building radiation zones, using the assumptions and inputs stated in that document, which mention the application of PWR-GALE results as source term inputs.

However, established AP1000 design basis sources for the monitor tanks at the time (considered in evaluations of the Auxiliary building) used methods consistent with commitments in Section 12.2.1.1.7 of the licensing basis that did not involve PWR-GALE results. When

completing detailed shielding design activities implementing the change to add waste monitor tanks to the radwaste building, Westinghouse recognized that the source term for the monitor tanks in the radwaste building should match the source terms used for monitor tanks in the Auxiliary building as no physical design feature differentiated which monitor tank (either in the Auxiliary Building or in the Radwaste building) could store processed WLS fluid. At the same time, Westinghouse also noted that PWR-GALE was not a part of the existing methods used to develop radiation shielding source terms. Therefore, while a PWR-GALE output had been used as the source term and basis for radiation zones defined for the radwaste building in 2008, Westinghouse concluded that implementation of existing source terms and Tier 2 commitments in Chapter 12 required the application of a design basis WLS monitor tank source term, consistent with what had been done for the Auxiliary building.

After this conclusion, and analysis activities to determine radiation zones considering design basis WLS source terms consistent with Section 12.2.1.1.7, a change to the radiation zone from Zone III to Zone IV for the waste monitor tank room was included with the Radwaste Building LAR. This change in radiation zone does not reflect an increase in any of the source terms shown in the licensing basis but rather conveys the application of the design basis WLS monitor tank source term to radwaste building design activities.

This change in designation does not represent any physical modification of the plant, or increase in source terms shown in the licensing basis (no modification of the source term in Table 12.2-9 is warranted, nor is a change to Section 12.2 information needed), but rather the increased radiation zone reflects that the information and methods in DCP/NRC2257 (ML082560237), while true, were not consistent with other Tier 2 commitments. At no point in the AP1000 design evolution (going back as far as initial source term development activities in 2001) has the design basis WLS Waste Monitor Tank source term increased. As communicated in the revised Figure 12.3-1 (Sheet 14) on page 4 of 6 of Enclosure [9] of [this letter], if expected radiation source terms are considered, then a lower radiation zone can be applied. Stated differently, the difference in radiation zones of the waste monitor tank room of the Radwaste Building as conveyed in [this letter] compared to Revision 19 of the DCD reflects a difference in margin or conservatism between expected sources (based upon PWR-GALE as described in Section 11.1 of the certified design) and conservative design basis sources (resulting in a Zone IV designation), and does not reflect a change in the source terms or liquid contents of the monitor tank itself. Section 12.3.1.2 of the DCD, Revision 19 states that radiation zones are based upon design basis radiation sources (as opposed to realistic radiation source terms), and so, this change in radiation zone designation was necessary to conform to the statements in 12.3.1.2. With the design basis Radwaste building source term and maximum radionuclide inventory, when considered over a two hour exposure period, the AP1000 Radwaste Building design also limits the total dose to a member of the public located at the protected area boundary resulting from an unmitigated release to less than 100 mrem and the unmitigated exposure to site personnel within the protected area to less than 5 rem.

For the AP1000 plant, gas generation is not a concern because, as stated earlier, the changes proposed in the LAR do not convey an increase in source terms, which have remained consistent with the certified AP1000 design.

Considering the packaged waste in the Radwaste Building as well as other design sources of radiation, the radiological consequences of design basis events does not exceed a small fraction (10 percent) of 10 CFR Part 100 dose limits. With these considerations and using this design approach, the changes conveyed in [this letter] do not increase the risk to the public in accordance with NUREG-0800 Section 11.4-A and SECY 94-198.

Supplemental Information

Activity Limits

The amount of activity in the radwaste building is limited by two criteria. First, the activity in the radwaste building and systems and components in the radwaste building containing radioactive materials are limited and maintained within applicable A2 quantity limits specified in Appendix A to 10 CFR Part 71 to conform with Regulatory Guide 1.143, Revision 2. Second, the source term (activity) within these systems and components is limited by applicable limits on potential unmitigated exposure to personnel and the general public.

The radwaste building is classified and designed as an RW-IIc structure in accordance with Regulatory Guide 1.143, Revision 2. Therefore, the systems and components within the radwaste building that contain radioactive materials are classified and designed as RW-IIc systems and components in accordance with Regulatory Guide 1.143, Revision 2, and include three (3) radwaste monitor tanks, up to three (3) mobile radwaste processing systems, and any additional equipment located in the radwaste building including unpackaged radioactive wastes stored in the waste accumulation room. Conformance with classification RW-IIc limits the activity for radioactive sources, other than packaged waste, within each of these systems and components containing radioactive materials to less than one A2 quantity. This provides an activity limit for each system and component, and, in effect, drives a cumulative activity limit for the radwaste building. Each of the applicable systems and components within the radwaste building is expected to contain a mixture of radionuclides, and so the total A2 quantity that could be present in each system or component is determined in accordance with guidance provided in

Section IV(e) of 10 CFR 71, Appendix A:

$$A_2 = \frac{1}{\sum_i \frac{f(i)}{A_2(i)}}$$

Where:

A_2 = A_2 quantity for the activity in the system or component,

(i) = Fraction of activity of the ith radionuclide in the system or component,

$A_2(i)$ = Appropriate A_2 quantity for the ith radionuclide from 10 CFR 71, Appendix A, Table A-1, and

Σi = Indicates the summation is performed for all radionuclides in the system or component.

To meet the unmitigated radiological release criteria of Regulatory Guide 1.143, Revision 2, the activity within the radwaste building must be controlled and limited to ensure radiation protection for workers inside the protected area and for members of the public at the protected area boundary. Specifically, sources of activity within the building, other than from packaged waste, must be shown to produce exposures that do not exceed the Regulatory Guide 1.143

unmitigated radiological release criteria of 5 rem to workers within the protected area, and the 10 CFR Part 20.1301 dose limit of 100 millirem to a member of the public located at the protected area boundary. An analysis has been performed to ensure these criteria are met. This analysis considers the current design basis activity limits and locations of activity in the radwaste building, including within the applicable systems and components, and demonstrates conformance with the Regulatory Guide 1.143, Revision 2, acceptance criteria with margin to the regulatory limits.

Administrative Controls to Maintain Activity and Doses Within Limits

Administrative controls in the form of operating procedures will be developed prior to fuel load to maintain the activity within the radwaste building, and systems and components, within applicable A2 quantity limits. These administrative controls will employ various methods to monitor and inventory the amount of radioactive materials transferred to and from the radwaste building, and between systems and components.

In addition to maintaining activity within limits, the administrative controls will require monitoring of the source term from all unpackaged wastes, including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste, and from the mobile radwaste processing systems. Limiting the total cumulative source term of the radwaste building prevents exposures exceeding the Regulatory Guide 1.143 unmitigated radiological release criteria and 10 CFR Part 20.1301 dose limit from any unmitigated radiological release in the radwaste building, occurring over a two hour exposure period, to workers within the protected area, and to a member of the public located at the protected area boundary, respectively.

Proposed UFSAR changes to Subsection 11.2.1.2.5.2 Use of Mobile and Temporary Equipment and Subsection 13.5.2.2.5 Radioactive Waste Management Procedures can be found in Enclosure [8].

NRC Question 7:

USFAR Section 11.4 indicates that certain types of radwaste will be processed and stored in the auxiliary building, instead of in the radwaste building. Specifically, UFSAR Section 11.4.2.1 indicates that "High activity filter cartridges fill three drums per year (22.5 cubic feet per year) and are stored in portable processing or storage casks in the rail car of the auxiliary building," which is a Seismic Category I building. UFSAR Section 11.4.2.3.3 defines high-activity wastes as wastes having contact dose rates greater than 100 mrem/hr at the time of initial waste segregation.

One of the proposed changes to UFSAR Figure 12.3-1 (sheet 14 of 16) is the addition of Notes C and D. Note D.2 indicates that spent filter cartridges stored in the waste accumulation room in the radwaste building could also have dose rates which could exceed 100 mrem/hr.

Please, explain the apparent discrepancy between Section 11.4.2.1, which states that high activity filter cartridges will be stored in the auxiliary building and Note D.2 for Figure 12.3-1, which states that high activity filter cartridges could be stored in the radwaste building. Evaluate this potential increase in source term in the radwaste building against the criteria contained in Regulatory Guide 1.143, Revision 2 and NUREG-0800 Section 11.4A, as discussed in question 6 above.

SNC Response to Question 7:

[This response is consistent with the response provided by SCE&G in their letter dated July 9, 2014.]

As noted in the response to Question 6, the added Note D.2 to Figure 12.3-1 (Sheet 14) indicating that dose rates may be locally exceeded in certain instances reflects the possible (but not expected or normal) situation in which operators will arrange radioactive waste storage containers in such a way as to locally exceed a radiation zone due to a combination of dose rates from various sources. Further discussion of a possible situation is included in the response to Question 6. The note was added for completeness and consistency with similar notes for the Nuclear Island and the Annex Building. The reference to spent filter cartridge was intended as an example case for the Radwaste Building, and was not intended to apply to high-activity filters. It should be noted that the note makes no mention of high-activity filters, and is intended to apply to moderate or low activity spent filters.

This note is not intended to communicate that the design intent is for storage of high-activity filter cartridges in the Radwaste Building. The design intent remains that high-activity filter cartridges be stored in the filter storage area of the Auxiliary Building. The purpose of note D.2 is to communicate that an integrated approach to ALARA, waste storage, and administrative controls is necessary. In particular, this note conveys the idea that, just because a spent filter container may read less than Zone IV levels, the local dose rate around this container considering other sources could exceed Zone IV.

Because the design intent related to storage of high-activity spent filters is not changing, and because the source terms in the Radwaste Building are not being modified, no change to the classification of the Radwaste Building, with respect to Regulatory Guide 1.143 is required.

NRC Question 8:

The staff requests that the licensee clarify the following issues related to some of the UFSAR Figures in Enclosure 4 (pages 5, 12, 13, 15 of 15):

a) The change "bubble" through the center of the Waste Accumulation Room in the Radwaste Building in UFSAR Figures 1.2-22 and 9A-4 (pages 5 and 12 of 15) is stepped, while the change "bubble" "through the center of the same room in UFSAR Figure 12.3-1 (sheet 14 of 16) (LAR page 13 of 15) is straight. Since this change "bubble" represents the removal of the wall separating the Packaged Waste Storage Room and the Waste Accumulation Room in the original UFSAR in all three of these figures, explain why the shape of the change "bubble" differs between these figures.

b) In the revised UFSAR Figures of the Radwaste Building (Figures 1.2-22, 9A-4 and 12.3-1 (sheet 14 of 16)), explain the reason for the addition of the additional wall adjacent to the outer building wall on the south end of the Monitor Tanks Room.

c) In the revised UFSAR Figures of the Radwaste Building (Figures 1.2-22, 9A-4 and 12.3-1 (sheet 14 of 16)), explain the reason for the addition of the wall on the north end of the Monitor Tanks Room.

d) In revised UFSAR Figure 12.3-1 (sheet 14 of 16), the radiation zone designations in two of the rooms have changed. Provide the basis for the radiation zone changes in the following rooms:

- HVAC Equipment Room (Zone III to Zone I)
- Monitor Tanks Room (Zone III to Zone II)

e) In revised UFSAR Figure 12.3-3 (sheet 14 of 16) (LAR page 15 of 15), describe why the middle mobile system shown in the Mobile Systems Facility is depicted in a lighter shade than the two adjoining mobile systems

f) In the existing radwaste building design, a shield wall is located inside the east entrance to the Packaged Waste Storage Room. This shield wall provides a labyrinth entrance to this room and does not permit a line of sight view of the packaged waste that would be stored in this room. However, in the proposed redesign of the Waste Accumulation Room, the shield wall opposite the entrance is removed and the entrance door is replaced by what appears to be a sliding door.

1) Verify that the above proposed modifications to the Waste Accumulation Room design (i.e., removal of the labyrinth entranceway and use of a sliding door on the entranceway on the east side of the Waste Accumulation Room) will not result in a potential increase in doses to personnel working in the adjacent Mobile Systems Facility due to an increase in the area dose rates in this room from stored waste in the Waste Accumulation Room.

2) UFSAR Section 3.2 (Enclosure 1) proposes to decrease the thickness of the shield wall on the east side of the Waste Accumulation Room from 2' to 1'-4". Verify that the proposed sliding entranceway on the east entrance to the Waste Accumulation Room will provide an equivalent amount of shielding as the shield wall to this room to ensure that doses in the adjoining Mobile Systems Facility are maintained ALARA.

NRC Follow-up to RAI Question 8:

8. b) & c) The responses to items 8 b) & c) state that the additional wall on the south end of the Monitor Tanks Room and the new wall on the north end of the Monitor Tanks Room were added to provide sufficient shielding to maintain the south yard area and the north hallway at Zone I. The Radwaste Building described in the AP1000 DCD/UFSAR does not have these additional shield walls. Since the license states that the source term in the Radwaste Building (including the source term in the monitor tanks) will not be increasing, justify the need for these additional shield walls in the Monitor Tanks Room.

SNC Response to Question 8:

[This response is consistent with the response provided by SCE&G in their letter dated July 9, 2014. Note the clarification response to the NRC Follow-up to Question 8 was provided in the NRC public calls on August 14 and 21, 2014. No additional response is required beyond that provided below for the original question.]

a) The bubble in question which encompasses the removal of the separation wall between the Packaged Waste Room and the Waste Accumulation Room as well as the shield wall in front of the door to the Packaged Waste Room should look the same for the three figures. Each bubble should have a straight vertical right side edge (no step) representing the removal of the common wall between the Packaged Waste and Waste Accumulation Room, and a left side edge which has a slight bulge in one location to represent the removal of the shield wall in the Packaged Waste Room in front of the door. The bubbles have been

corrected on all of the figures. Note that although the bubbles in the different figures may not look exactly the same, the meaning and intent for all of these markups is the same, as described above.

b) The additional wall adjacent to the outer building wall on the south end of the Monitor Tanks Room was added to provide sufficient shielding of the south yard area from the Waste Monitor Tanks to maintain the south yard area at Zone I. This was verified in the shielding calculation performed for the proposed Radwaste Building design.

c) The additional wall on the north end of the Monitor Tanks Room was added to provide sufficient shielding of the hallway to the HVAC Equipment Room in the Radwaste Building to maintain the hallway as a Zone I area. This was verified in the shielding calculation performed for the proposed Radwaste Building design.

d) The change in radiation zone designations for the HVAC Equipment Room and the Monitor Tanks Room to lower dose level zones is a result of updated calculations using updated Waste Monitor Tank (WMT) source terms which are more typical for normal operation. During typical operations, the WMTs contain only mildly activated water resulting in Zone II or lower dose levels on the tanks surfaces. Based on the WMT design intent (i.e., holding water to be released to the environment) and industry information, the calculation assumes that the fluid in the WMTs has a fraction of the maximum WLS activity for design basis conditions. If a plant were to operate with significant fuel failures, it would be necessary to first use the Auxiliary Building monitor tanks rather than the Radwaste Building tanks. Consequently, the assumption of normal operating source terms is appropriate and results in the revised zone classifications for the HVAC Equipment Room and the Monitor Tanks Room. Note that the design basis radiation zone information is still included as a note to the radiation zone drawing to ensure that [SNC] considers both possible waste monitor tank conditions (expected operations and design basis conditions).

e) The lighter shade for the middle mobile system compared with the two adjoining mobile systems was not intended and all mobile systems should be depicted with the same shading. The lighter shade for the middle mobile system is the result of a graphical issue.

f) Radwaste Building Design

1) The proposed sliding door that was added to the east wall of the Waste Accumulation Room is a six-inch steel shield door, which has the equivalent shielding capability as the one-foot, four-inch concrete wall to which it is attached. This input was used in the shielding calculation which was performed that establishes the Mobile Systems Facility as a Zone II area, which is unchanged from the designation in the current UFSAR.

2) As noted in the response to Item 8.f1 above, the proposed sliding door will provide an equivalent amount of shielding as the shield wall to the Mobile Systems Facility.

NRC General Question:

Section 2.2, “Radwaste Building Configuration Changes” (page 4 of 19 in Enclosure 1) of the February 27, 2014 submittal states that, “It was identified that a small amount of moderate activity waste would require a concrete slab too thick for the current structural design of the building to maintain adjacent areas at Zone 1 radiation levels.”

- Verify that the "concrete slab" referenced refers to the concrete slab used as the roof of the radwaste building.

- If this concrete slab does refer to the roof of the radwaste building, explain how varying the thickness of the concrete roof slab could affect the radiation levels in the adjacent Zone 1 areas (i.e., the HVAC Equipment Room, the Electrical/Mechanical Equipment Room, and the hallway on the north end of the Radwaste Building).

SNC Response to General Question:

[This response is consistent with the response provided by SCE&G in their letter dated September 25, 2014.]

No response required, clarification was presented in the NRC public call.

NRC Question 9:

In Section 2.2 of Enclosure 12 of Revision 1 to LAR 13-09 (second and third sentences), the LAR states,

> "A range of potential radiation levels inside the radwaste building was analyzed and the amount of shielding required to maintain adjacent areas at Zone 1 radiation levels was determined. It was identified that a small amount of moderate activity waste would require a concrete slab too thick for the current structural design of the building to maintain adjacent areas at Zone I radiation levels."

During the staff's telecom with the applicant on August 14, 2014, the staff asked the licensee to verify that the "concrete slab" referenced refers to the concrete slab used as the roof of the radwaste building.

The licensee replied that the concrete slab referenced in this LAR does refer to the roof slab.

The staff then asked the licensee, that if the concrete does refer to the roof of the radwaste building, to explain how varying the thickness of the concrete roof slab could affect the radiation levels in the adjacent Zone I areas (i.e., the HVAC Equipment Room, the Electrical/Mechanical Equipment Room, and the hallway on the north end of the Radwaste Building).

The staff's notes on this telecom show that, instead of explaining how varying the thickness of the concrete roof slab could affect the radiation levels in the adjacent Zone I areas, the licensee described how, in the current configuration of the RWB, the storage of radwaste containers in the RWB could potentially result in the radiation zones on the roof of the RWB exceeding Zone II levels.

The staff would like the licensee to verify that how the thickness of the concrete roof slab could affect the radiation levels in the adjacent Zone I areas.

SNC Response to RAI Question 9:

[This response is consistent with the response provided by SCE&G in their letter dated June 1, 2016. Refer to Enclosure 6 of this letter for changes to SNC's LAR-13-019.]

The statement referring to the thickness of the concrete slab for the radwaste building roof was based on preliminary shielding calculations. The final calculations have confirmed the concrete roof slab to be adequate in providing shielding to maintain the radiation levels at the roof, in the worker occupied areas in the radwaste building, and in the adjacent plant yard areas, as Zone I to Zone IV. The statement discussing the thickness of the roof slab is revised in VCS Units 2

and 3 LAR 13-09 Revision 1 Supplement 1 [refer to Enclosure 6 of this SNC letter] to clearly identify the relationship between the preliminary and final shielding calculations performed. The concrete slab for the radwaste building roof, in conjunction with the removable steel shield bunker roof plates, are described further in the Response to RAI Question 10.

Other design features described in the LAR provide shielding to maintain radiation levels for worker occupied areas in the radwaste building, and in the adjacent plant yard areas, as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14). The specified radiation zones in these areas are not impacted by the thickness of the radwaste building roof, or by the use of the removable steel shield bunker roof plates and removable steel shield bunker door plates that are provided for ALARA considerations only and maximum operational flexibility. This includes the following:

1. Electrical/Mechanical Equipment Room – Zone I.
2. HVAC Equipment Room – Zone I.
3. Monitor Tanks Room – Zone II.
4. Waste Accumulation Room – Zone IV.
5. Mobile Systems Facility – Zone II.
6. Truck Staging Area – Zone II.
7. Adjacent plant yard areas – Zone I.

For changes to the LAR, see Enclosure [6].

NRC Question 10:

There appear to be several inconsistencies between wording in the LAR and some of the licensee's responses to staff questions regarding the function of the temporary shielding provided for the proposed bunkers.

In the licensee's follow-up response to RAI Question 3 (p. 4 of 9, lines 6-11) in Supplement 2 of LAR 13-09, the licensee states,

> "Acknowledgement of the removable or temporary nature of these plates is included in the shielding calculation which demonstrates that the Radwaste Building roof is a Zone II area without crediting any attenuation that these plates may offer. Zone II dose rates are maintained by crediting only radiation transport, the limited shielding from the building roof, and the distance between the waste storage location and the roof elevation."

However, in Section 3.2 (second sentence) of Enclosure 12 and in Section 4 (second sentence of the fourth paragraph) of Enclosure 13 of Revision 1 to LAR 13-09, the LAR states,

> "These proposed changes are made…to allow temporary shielding to maintain acceptable radiation levels on the radwaste building roof…"

The wording in Revision 1 to the LAR imply that temporary shielding (in the form of the removable steel shielding plates) must be used to maintain acceptable radiation levels on the radwaste building roof and this is contradictory to the follow-up response to RAI Question 3. The statements in Sections 3.2 and 4 of Revision 1 to LAR 13-09 are only true if they are revised to state (see additional words in italics),

> "These proposed changes are made…to allow temporary shielding to maintain acceptable radiation levels on the radwaste building roof *when high level waste is being stored in the bunkers*"

This statement that temporary shielding may be needed when high level waste is being stored in the bunkers is based on the licensee's response to RAI Question 1 a) (p. 2 of 4, 2nd sentence) in Supplement 1 of LAR 13-09, which states:

> "The bunkers may also be used for storage of high activity packaged or unpackaged waste with the implementation of portable shielding on the top and the open sides of the bunkers in accordance with SCE&G's ALARA program."

SNC Response to RAI Question 10:

[This response is consistent with the response provided by SCE&G in their letter dated June 1, 2016. Refer to Enclosures 6 and 8 of this letter for changes to SNC's LAR-13-019.]

The design descriptions and purposes of the removable steel shield bunker roof plate above each bunker for providing vertical shielding of the normally unoccupied and access-controlled radwaste building roof area, and the removable steel shield bunker door plates in front of each bunker for horizontal shielding of the worker occupied areas in the radwaste building and in the adjacent plant yard areas, are revised to be consistent and clarified in VCS Units 2 and 3 LAR 13-09 Revision 1 Supplement 1 [refer to Enclosures 6 and 8 of this SNC letter]. Based on the final shielding analysis, the radwaste building configuration is proposed to be modified to add the three bunkers for storage of moderate and high activity waste. The design gives the licensee operational flexibility to add one or two stacked 6″ thick removable steel shield bunker roof plates above each bunker, and multiple layered 1″ thick removable steel shield bunker door plates in front of each bunker. The bunkers are structurally designed to allow two of the removable steel shield bunker roof plates to be placed and stored on top of each bunker, which would provide 12″ thick steel shielding in the vertical direction.

The proposed minimum concrete wall thickness of 1′-8″ for the back and side concrete shield walls surrounding the three bunkers provide adequate shielding to maintain the radiation levels in the worker occupied areas in the radwaste building, and in the adjacent plant yard areas, as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), without the additional vertical shielding from the removable steel shield bunker roof plates and horizontal shielding from the removable steel shield bunker door plates. Therefore, for normally occupied areas, the removable steel shield bunker roof plates and removable steel shield bunker door plates are provided for ALARA considerations only and for maximum operational flexibility.

UFSAR Chapter 12, including UFSAR Figure 12.3-1 (Sheet 14), does not specify a radiation zone for the radwaste building roof, as it is normally unoccupied and is access-controlled. However, the radwaste building is maintained as Zone I to Zone IV. Therefore, the radiation levels on the radwaste building roof could conceivably be as high as Zone IV during storage of moderate and high activity waste in the bunkers. For ALARA considerations, the shielding calculations assume a single 4-1/2″ thick steel shield over each bunker, versus the actual as-designed 6″ thick removable steel shield bunker roof plates that may be used individually or stacked to create a 12″ thick steel shield. The shielding calculations credit the assumed 4-1/2″ thick steel shield, radiation transport, the limited shielding from the building roof, and the distance between the waste storage location and the roof elevation, in order to maintain maximum radiation levels for the radwaste building roof as Zone II to Zone III. Therefore, if access to the normally unoccupied radwaste building roof is required during storage of moderate and high activity waste in the bunkers, the use of a single 6″ thick removable steel shield bunker roof plate above each bunker is adequate to maintain Zone II to Zone III radiation levels or less for ALARA considerations only and for maximum operational flexibility.

UFSAR Subsection 11.4.2.5.2 is proposed to be revised to add a description of the removable steel shield bunker roof plates and removable steel shield bunker door plates referring to UFSAR Subsection 12.3.2.2.5 for a description of their design functions.

UFSAR Subsection 12.3.2.2.5 is proposed to be revised to add a description of the design functions for the removable steel shield bunker roof plates that may be installed to provide vertical shielding during storage of moderate and high activity waste to maintain the radiation levels as Zone II to Zone III on the normally unoccupied and access-controlled radwaste building roof, and to add a description of the design functions for the removable steel shield bunker door plates that may also be installed to provide horizontal shielding to maintain the radiation levels in the worker occupied areas in the radwaste building, and in the adjacent plant yard areas, for ALARA considerations only and for maximum operational flexibility.

The previous Response to RAI Question 3 as quoted above is superseded by the content of this response.

The previous Response to RAI Question 1.a as quoted above is supplemented by the content of this response.

For changes to the LAR, see Enclosure [6 and 8].

NRC Question 11:

The first two statements below are contradictory with third statement:

1) Response to Question 2a) (p. 3 of 14, lines 2-7) in Supplement 1 of LAR 13-09 states,

"The results of an analysis show that the Waste Accumulation Room can be maintained as a radiation Zone IV, assuming the surface dose rate limit of 100 mrem/hr (high level waste)…is maintained for wastes along with implementation of an ALARA program by SCE&G."

2) Response to Question 2a) (p. 3 of 14, lines 9-11) in Supplement 1 of LAR 13-09 states,

"As noted in the response to Item b of this RAI question, the removable shield plates on the front openings of the bunker are provided for ALARA purposes only and are not credited to maintain the radiation zoning of the facility."

3) Response to Question 2b) (p. 4 of 14, lines 1-2) in Supplement 1 of LAR 13-09 states, "The removable shielding plates for the front opening of the bunkers are not required for the storage of moderate activity waste and were not credited in the shielding analysis."

By not including reference to the storage of "high activity waste" in this response, this sentence implies that removable shielding plates ARE REQUIRED for the front opening of the bunkers.

SNC Response to RAI Question 11:

[This response is consistent with the response provided by SCE&G in their letter dated June 1, 2016. Refer to Enclosure 6 of this letter for changes to SNC's LAR-13-019.]

The design descriptions and purposes of the removable steel shield bunker door plates in front of each bunker are revised to be consistent and clarified in VCS Units 2 and 3 LAR 13-09 Revision 1 Supplement 1 [refer to Enclosure 6 of this SNC letter] as described in the Response to RAI Question 10. The proposed minimum concrete wall thickness of 1′-8″ for the back and side concrete shield walls surrounding the three bunkers provide adequate shielding to maintain the radiation levels in the worker occupied areas in the radwaste building, and in the adjacent plant yard areas, as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure

12.3-1 (Sheet 14). This shielding is adequate to maintain the radiation levels for these areas as the specified radiation zones without the additional shielding from the removable steel shield bunker door plates during storage of moderate and high activity waste in the bunkers. This was clarified by the changes implemented in the LAR.

Furthermore, the above quoted statement from Response to RAI Question 2.b is revised as follows to include high activity wastes in addition to moderate activity wastes:

"The removable steel shield bunker door plates in front of each bunker are not required for storage of moderate and high activity waste, and were not credited in the shielding analysis."

For changes to the LAR, see Enclosure [6].

NRC Question 12:

SECY 94-198, Generic Letter 81-39, and SRP 11.4-A, state that gas generation rates should be evaluated to ensure that the facility design precludes potentially explosive conditions. While in LAR 13-09, Revision 1, the licensee indicates that the quantities of material in the Radwaste Building are not increasing, the LAR adds shielded bunkers, which were not included in the initial AP1000 design. In the 2014 phone calls with the licensee to discuss this issue, the licensee indicated that resins would not be stored in the Radwaste Building and that the bunkers have openings to allow gas to escape the bunkers (the waste form which is the predominant concern for explosive gas buildup is ion exchange resin). The licensee indicated that a statement would be added to the UFSAR indicating that resins will not be stored in the Radwaste Building.

However, in reviewing Revision 1 of the LAR and associated RAI responses, the LAR and associated RAI responses do not provide any information regarding what types of waste are being stored in the bunkers (or what is excluded from the bunkers) and therefore, it is unclear if the possibility for potential explosive gas buildup exists within the bunkers. In addition, the LAR and associated RAI responses are unclear if gas generated will escape the bunkers, to the general Radwaste Building atmosphere, which will normally be ventilated and which was within the scope of the initial AP1000 plant review.

The staff recommends that the licensee do one or a combination of the following, in order to resolve this issue: 1) Update the UFSAR to provide information indicating that there will be spacing or openings in the bunkers or some other method to allow potential explosive gases to vent to the general Radwaste Building atmosphere. So that there will not be a potential continual buildup of explosive gases within the enclosed bunkers; 2) Update the UFSAR to specify that ion exchange resins will not be stored within the bunkers, or; 3) Provide a detailed analysis showing that if the bunkers are filled with the highest activity resins, that there is no possibility of explosive conditions within the bunkers.

SNC Response to RAI Question 12:

[This response is consistent with the response provided by SCE&G in their letter dated June 1, 2016. Refer to Enclosure 6 of this letter for changes to SNC's LAR-13-019.]

As described in VCS Units 2 and 3 LAR 13-09 Revision 1 Supplement 1 [refer to Enclosure 6 of this SNC Letter], moderate and high activity waste may be stored in the new bunkers. This might include solid wet waste such as radioactive condensate polishing system and/or steam generator blowdown system electrodeionization resin. Therefore, an evaluation of the temporary storage of resin in the bunkers was performed as further described in the LAR. Given the evaluation assumptions also discussed in the LAR, there is no potential for creation of a hazard from radiolytic hydrogen gas generation. In addition, the administrative controls that limit the

total cumulative radioactive inventory of unpackaged wastes located in the radwaste building to prevent exceeding the Regulatory Guide 1.143, Revision 2, unmitigated radiological release criteria, and 10 CFR Part 20.1301 dose limit, effectively prevent storage of the maximum amount of resins consistent with UFSAR Table 11.4-1. Changes are proposed in the LAR to UFSAR Subsection 11.4.2.5.2 to discuss the analysis and controls established in order to prevent the potential for creation of a hazard from radiolytic hydrogen gas generation.

This response supersedes [the] previous response to RAI Question 6b initially provided in [SCE&G] LAR 13-09 Supplement 3.

For changes to the LAR, see [Enclosures 6 and 8].

The calculation containing the details of the evaluation of the temporary storage of resin in the bunkers is available to the NRC for an audit.

New RAI Question 9:

Section 20.1101 (b) of 10 CFR Part 20 states that the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as is reasonably achievable (ALARA).

As a follow-up to a public meeting with the licensee held on February 3, 2016, the staff submitted three RAI Questions (Questions 9 through 11) to the licensee relating to shielding of the three proposed bunkers in the Waste Accumulation Room.

The licensee provided its response to staff RAI Questions 9 through 11 in Supplement 1 to Revision 1 to LAR 13-09 (June 1, 2016). In this response, the licensee stated that the back and side concrete shield walls surrounding the three bunkers in the Waste Accumulation Room "provide adequate shielding to maintain the radiation levels for the worker occupied areas in the radwaste building, and in the adjacent plant yard areas, as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), without the additional vertical shielding from the removable steel shield bunker roof plates and horizontal shielding from the removable steel shield bunker door plates."

The licensee's response goes on to state that

"Therefore, for normally occupied areas, the removable steel shield bunker roof plates and removable steel shield bunker door plates are provided for ALARA considerations only and for maximum operational flexibility."

The licensee also states that, if access to the normally unoccupied radwaste building roof is required during storage of moderate or high activity waste in the bunkers, the use of a single 6″ thick removable steel shield bunker roof plate above each bunker is adequate to maintain Zone II to Zone III radiation levels or less on the radwaste building roof.

Although the licensee's response to each of RAI Questions 9 through 11 states that the removable steel shield bunker door plates in front of each bunker are not required to maintain the specified radiation zones in worker occupied areas of the radwaste building when moderate and high activity wastes are stored in the bunkers, this description of the function of the removable steel shield bunker door plates is not sufficiently addressed in Supplement 1 to Revision 1 to LAR 13-09 and is not addressed in the UFSAR. In order to address this issue, the staff requests that the licensee amend LAR 13-09 and the UFSAR to describe the functions of the removable steel shield bunker door plates and state that these removable shield plates are not relied upon to maintain the specified radiation zones in the adjacent worker occupied areas of the radwaste building when moderate and high activity wastes are stored in the bunkers.

SNC Response to New RAI Question 9:

[This response is consistent with the response provided by SCE&G in their letter dated November 17, 2016. SNC has incorporated these changes in SNC LAR-13-019 as shown in Enclosures 6 and 8 of this revision.]

As discussed and agreed to with the NRC during the public meeting held on 6/30/2016, the LAR (Sections 2.2 and 3.2) is updated with the following text:

> "The removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1(Sheet 14)."

This text is added in the brackets below from [SCE&G] LAR 13-09 R1 S1 (reference 7):

Enclosure 17 Section 2.2, page 4 of 23

> "...are proposed to be added for maintaining radiation levels ALARA and for maximum operational flexibility. [ ] The bunkers are structurally..."

Enclosure 17 Section 2.2, page 6 of 23

> "4) add a description of the design functions for the removable steel shield bunker door plates that may be installed for ALARA considerations. [ ]"

Enclosure 17 Section 3.2, page 9 of 23

> "...removable steel shield bunker door plates for as low as is reasonably achievable ALARA considerations~~;~~. [ ]"

Additionally UFSAR Subsection 12.3.2.2.5 is updated with the following text:

> "The removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in UFSAR Figure 12.3-1(Sheet 14)."

This text is added in the brackets below from [SCE&G] LAR13-09 R1 S1 (reference 7):

Enclosure 19 - UFSAR Subsection 12.3.2.2.5, page 14 of 14

> "…Zone II to Zone III on the normally unoccupied and access controlled radwaste building roof, and removable steel shield bunker door plates, that may be installed for ALARA considerations. [ ]"

New RAI Question 10:

Section 20.1301(e) of 10 CFR Part 20 states that, in addition to complying with the requirements of this part, each licensee shall comply with the radiation standards in 40 CFR Part 190. 40 CFR Part 190 states that the annual dose equivalent to a member of the public as the result of exposures to planned discharges of radioactive materials (radon and its daughters excepted) to the general environment from uranium fuel cycle operations and to radiation from these operations does not exceed 25 millirems (mrem) to the whole body.

The potential exposure pathways that should be considered when determining the maximally exposed individual dose for comparison with the 40 CFR Part 190 dose limits are the doses from liquid effluents, the doses from gaseous effluents, and the direct doses from radionuclides in plant equipment and systems and doses from sources stored on site (such as the direct doses from spent fuel stored in the ISFSI and irradiated components such as steam generators and reactor vessel heads that are stored onsite).

V. C. Summer UFSAR Table 11.3-206, "Comparison of Maximally Exposed Individual Doses with 40 CFR Part 190 Criteria," shows that the estimated total body dose from liquid and gaseous effluents from both of the V. C. Summer units is estimated to be 2.2 mrem/yr. Supplement 1 to LAR 13-09 (dated July 9, 2014) stated that the radiation levels on the radwaste building roof do not exceed radiation Zone II (less than or equal to 2.5 mrem/hr). The most recent version of this LAR, Supplement 1 to Revision 1 to LAR 13-09 (dated June 1, 2016), states that the radiation levels on the radwaste building roof could conceivably be as high as Zone IV (less than or equal to 100 mrem/hr) during storage of moderate and high activity waste in the bunkers.

On the basis of this apparent large increase in the estimated dose rate on the radwaste building roof, describe and show how this increase in the direct dose from the radwaste building roof effects your compliance with Section 20.1301(e) of 10 CFR Part 20.

SNC Response to New RAI Question 10:

[This response is consistent with the response provided by SCE&G in their letter dated November 17, 2016.]

Shielding calculations have examined dose rates on the radwaste building roof with several configurations of waste storage in the building as discussed below. These configurations were considered for building and shielding design only, and do not reflect additional administrative controls described in proposed UFSAR section 11.2.1.2.5.2 that may be necessary to ensure A1 and A2 limits are met. Therefore, these configurations are considered appropriate for shielding design activities.

The analysis of the design basis shielding configuration, with the WLS monitor tanks containing liquid at the design basis source term levels, dry active waste producing Zone IV dose rates stored in the waste accumulation room, and waste capable of producing Zone IV dose rates stored in the bunkers below a hypothetical 4.5″ steel shield, shows dose rates on the roof of less than 8 mrem/hr, corresponding to Zone III conditions.

Analyses of a more typical configuration, considering significantly fewer fuel defects, source terms that are more aligned with the expected source terms, and waste within the building producing lower surface dose rates, shows Zone II dose rates on the roof.

A documented sensitivity study also indicates that if more typical WLS source terms are considered and waste within the Waste Accumulation Room were limited to 2.5 mrem/hr for a bulk of the room and 15 mrem/hr within the bunkers, then roof dose rates could be maintained below 1 mrem/hr. This configuration would keep dose rates on the roof at or near Zone I levels. However, it is conceivable that, for short term operations, if the bunker roof shielding were removed, and waste producing design basis dose rates were being moved within the building, that additional increases in the roof dose rate could occur. The dose rate on the roof during these transient circumstances would not exceed the dose rate within the building itself. Such dose rate increases would be temporary, however, and dose rates from the steady state storage configuration within the building would be maintained ALARA.

Based upon the results of the shielding analyses, described above, the shine pathway for radiation to pass to a member of the general public through the radwaste building roof is considered insignificant with respect to requirements in Section 20.1301(e) of 10 CFR Part 20.

New RAI Question 11:

10 CFR Part 50, Appendix A, GDC 61 requires, in part, that systems that may contain radioactivity be designed to assure adequate safety under normal and postulated accident conditions and shall be designed with appropriate containment, confinement, and filter systems.

10 CFR Part 50, Appendix A, GDC 3 requires that SSCs important to safety shall be designed and located to minimize the probability and effects of fires and explosions.

RG 1.189 indicates that the design should minimize fires and explosions, including those that could be associated with the release of radioactive material and exposure to workers. RG 1.189 also indicates that the fire hazard analysis should include explosion-prevention measures in areas subject to potentially explosive environments from flammable gases or other potentially energetic sources, including ion exchange columns.

In addition, SRP 11.4A, SECY-94-198, Generic Letter 81-38, Information Notice 90-50, and NUREG/CR-4601 also discuss preventing flammable/explosive conditions from spent resin.

1. LAR 13-09 includes the addition of three bunkers to the radwaste building. Staff's initial RAI, Question 6, requested that the licensee evaluate the LAR against the criteria in NUREG-0800, Section 11.4A. Section 11.4A includes discussion of gas generation and the potential for flammable/explosive conditions from radioactive waste. The licensee's initial response to the staff indicated that the source term was not increasing, therefore, there was no need to evaluate against the criteria in Section 11.4A. However, this response does not address the potential for flammable/explosive gas buildup inside the bunkers.

   In a 2014 teleconference, the staff asked the licensee about the potential for flammable/explosive gas buildup inside the bunkers and the licensee indicated that no resin would be stored in the radwaste building (or in the bunkers). Therefore, the licensee stated that there was no risk of flammable/explosive gas buildup inside the bunkers.

   However, instead of indicating that no resin will be stored in the bunkers, in an August 2015 submittal (S3 to LAR 13-09) and again in a December 2015 submittal (R1 to LAR 13-09), the licensee indicated that explosive/flammable conditions were not a concern because it was not a concern in the AP1000 design. This is not an acceptable response because the AP1000 DCD did not include bunkers. The inclusion of bunkers is a departure from the AP1000 design and provides an enclosed location where flammable/explosive gases from stored radioactive material could achieve flammable/explosive concentrations.

   Therefore, as a result of a February 2016 teleconference, staff asked the licensee to revise the response to either indicate that resin wouldn't be stored in the bunkers, to provide information indicating the bunkers were ventilated, so gas buildup would not be a concern, or to provide an analysis indicating why the design is acceptable.

   In LAR 13-09, Revision 1, Supplement 1 (June 2016), the licensee indicated that the highest activity resins expected to be stored in the bunkers were condensate polishing system resin and steam generator blowdown system electrodeionization module resin. In addition, the licensee indicated that if the maximum amount of condensate polishing

system and steam generator blowdown system electrodeionization unit resin that could be generated over one year of operation, assuming 0.25% failed fuel and design basis primary to secondary leakage, is stored in a radwaste bunker for a period of six months, hydrogen gas concentrations will not exceed 5 volume percent (in the response, the licensee indicates that the calculated hydrogen concentration during these conditions after 6 months is 4.7 volume percent). The licensee also added information to UFSAR Chapter 11 specifying that a new evaluation would be needed to confirm the risk of hydrogen gas generation if the total volume, activity, or storage period was larger than the quantities assumed. The licensee specified that the new evaluation would need to demonstrate that the hydrogen concentration in the bunker air space will not exceed 5 percent hydrogen in air, per NUREG/CR-6673. Based on this response, staff requests the following:

a. The above guidance specifies the possibility of other flammable/explosive gasses being generated besides only hydrogen (such as methane). In addition, other processes can generate flammable/explosive gasses beyond just radiolytic gas generation. However, the information provided by the licensee only considered the generation of radiolytic generation of hydrogen gas as a source of potentially explosive gases. Information Notice 90-050, “Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers - ML08261039,” discusses an event where methane gas accumulated in radioactive waste containers due to microbial activity. Other NRC documents, such as RIS 2008-12, “Considerations For Extended Interim Storage Of low Level Radioactive Waste By Fuel Cycle And Materials Licensees,” and industry documents such as EPRI report 1018644 “Guidelines for Operating an Interim On Site Low Level Radioactive Waste Storage Facility – Revision 1,” note that waste material interactions, including decomposition of organic resins can lead to gas generation.

   Perform a review of all applicable waste forms to be stored within the bunkers and ensure that other forms of potentially flammable/explosive gasses besides hydrogen are considered and that all processes for gas generation beyond radiolysis (such as biodegradation and chemical) are appropriately considered. If there is no potential for other processes generating flammable/explosive gasses, beyond radiolysis, please justify why it is not necessary to consider gas generation from other processes and include information in the FSAR explaining why they need not be considered for the waste stored in the bunkers.

b. The use of 5% hydrogen in NUREG/CR-6673 is for transportation packages in transport. The 5% concentration limit in NUREG/CR-6673 is based on hydrogen flammability limits inside transportation packages only. Since the bunkers are not a transportation package, the guidance specifying a 5% limit is not applicable. The normal flammability limit for hydrogen in air is 4%. In addition, for safety-related systems, Branch Technical Position (BTP) CMEB-9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," specifies controls to maintain hydrogen concentration less than 2 percent for SSCs evaluated using the BTP as guidance. Please specify why the hydrogen concentration limit of 5% is appropriate for the hydrogen concentration limit in the bunkers or modify the limit to a value below the flammability limit, with sufficient conservatism to ensure the flammability limit is not reached or revise the hydrogen concentration limit to a more conservative value.

c. It is unclear if the procedures discussed in the LAR will be covered under part of the radiation protection program or if this is part of a separate program. Please specify what program will include these procedures and update the UFSAR as appropriate.

d. In addition to the above, the staff requests to review the licensee's completed calculations, when the above issues have been addressed.

e. As an alternative to items a through d above, the licensee may add ventilation lines to each of the bunkers and provide information on the ventilation capabilities and requirements for each of the bunkers, demonstrating that the ventilation is adequate to prevent the buildup of flammable/explosive conditions from the waste being stored in the bunkers.

2. SRP 11.4A specifies that "Facility design and operation should assure that radiological consequences of design basis events (e.g., fire, tornado, seismic occurrence, and flood) do not exceed a small fraction (10 percent) of 10 CFR Part 100 dose limits (i.e., no more than a few sieverts whole body dose)." In previous versions of LAR 13-09, the licensee indicated that the total source term within the Radwaste Building was not increasing due to the LAR and therefore, there was no need to evaluate against this criteria. The licensee removed this information from the current revision of the LAR. In addition, the current version of the LAR indicates the possibility for higher dose rates than were specified in previous versions. For example, the licensee now indicates that 4.5 inches of steel shielding, plus credit for the roof thicknesses and distance between the waste storage location and the roof elevation is needed to maintain the dose rate at Zone III on the roof. The waste accumulation room was Zone IV prior to the LAR. This amount of shielding would not be necessary to shield a Zone IV radiation area to a Zone III area. In addition, the licensee also indicates that, in reality, the steel shield bunker roof plate is 6 inches and that two 6 inch plates may be used, if necessary. Therefore, it appears, based on the most recent version of LAR 13-09, that the source term in the Radwaste Building is larger than the source term that was initially approved in the UFSAR. As a result, the licensee is requested to demonstrate how the design and operation will assure that the radiological consequences of design basis events (e.g., fire, tornado, seismic occurrence, and flood) do not exceed a small fraction (10 percent) of the 10 CFR Part 100 dose limits.

SNC Response to New RAI Question 11:

[This response is consistent with the response provided by SCE&G in their letter dated November 17, 2016. SNC has incorporated these changes in SNC LAR-13-019 as shown in Enclosures 6 and 8 of this revision.]

1a. Possibility of "other flammable / explosive gases" vs. just H2

Radiolysis: It is acknowledged that NUREG/CR 6673 discusses the possibility of generation of hydrogen as well as other flammable / explosive gasses due to radiolysis. Table 3.1 of NUREG/CR 6673 provides reasonable bounding experimentally measured G values (defined as molecules of *flammable gas* per 100ev of absorbed energy) for hydrogen and flammable gas under the columns titled G(H2) and G(flam gas) as a result of radiolysis of materials commonly found in radwaste.

The AP1000 analysis performed to address radiolytic generation of hydrogen in the radwaste building bunkers due to storage of spent secondary side resin (specifically, resin from the condensate polishing system (CPS) demineralizers and electrodeionization (EDI) demineralization units supporting cleanup of the steam generator blowdown), used a G value of 1.7 molecules / 100 eV. The referenced G value is listed in Table 3.1 of NUREG/CR 6673 as bounding for resin media under the "hydrogen" column, as well as the "flammable gas" column, thus promoting the concept that "other flammable gases" formed by radiolysis in resin are *insignificant* in comparison to Hydrogen.

The referenced AP1000 analysis assumes that structural material used in packaging the resin prior to storage in the radwaste bunker would have G values less than or equal to the bulk of the waste, i.e., the resin (G-value of 1.7). This is a reasonable assumption since the resin will be stored in 55 gallon drums (carbon steel, G value = 0). Materials that may have higher G-values (such as polyethylene liners or epoxy coatings inside the 55 gallon drums) are expected to be small contributors to hydrogen generation due to their "low mass fraction". Based on engineering judgment, the associated contribution would be insignificant especially when taking into consideration the conservative assumptions used in this analysis (such as “all of the energy from decay of radioactivity on the resin will be utilized to generate hydrogen”)

Other Processes that could generate flammable gases: IE Notice 90-50 focuses on methane production due to bacteria interacting with the “cellulose” of the filter-demineralizered resin (powdex) embedded in its cellulosic substrate. The AP1000 CPS and EDI systems utilize “resin beads” which do not have the “cellulose” component that could support the growth of bacteria and methane production.

The conclusions of BNL-NUREG-40867, a paper presented in Waste Management 1988 CONF-880201-30, titled “Biodegradation of Ion-Exchange Media” by B.S. Bowerman, J.H. Clinton, S.R. Cowdery, Brookhaven National Laboratory, (conducted under the auspices of the NRC) indicates that a “mixed microbial culture can be grown from actual ion-exchange resin wastes *provided nutrient salts, a secondary source of carbon and excess water are added to the waste*.” The above is not representative of the resins stored in the AP1000 radwaste bunkers.

RIS 2008-12 recommends that if radioactive waste is being stored, an assessment needs to be made of whether decomposition and chemical reactions of incompatible waste materials can generate gas or other reaction products over time, and that appropriate measures are taken to mitigate the consequences of these reactions.

The radwaste bunkers were included into the design of the AP1000 Radwaste Building to allow the segregation of materials with radioactivity content higher than the dry active waste (DAW) that is typically expected to be stored in this area. The bunkers are expected to contain dewatered secondary side spent resin and miscellaneous contaminated / activated components or tools exhibiting medium to high levels of radioactivity that reflect the isotopic activity limits imposed by the Category IIc design of the Radwaste Building and are limited by the radiation zoning requirements of adjacent spaces. Based on the listed waste forms intended to be stored in the bunkers, it is reasonable to conclude that flammable gas production due to waste material interactions due to chemistry or decomposition during the 12 month storage period is not likely. EPRI Report 1018644, Revision 1 focuses on guidelines for operating an interim on-site Low Level Radioactive Waste Storage Facility. Section 1.4 of the referenced report indicates that the term “interim storage,” as used in the report “refers to storage within existing or planned interim on-site LLW Facilities.” The report states that it is “not intended to be used for control of radioactive material that is temporarily stored or staged for reuse.” Based on the applicability statement present in the report, it is concluded that it is not applicable to the temporary storage of radwaste material in the AP1000 Radwaste Building waiting for final packaging.

[SCE&G] LAR 13-09 R1 S1 (reference 7) Enclosure 19 text for UFSAR subsection 11.4.2.5.2, pages 10 and 11 of 14, discussing explosive gas generation is updated to explain how hydrogen was selected as the most credible source, see page 14 of this enclosure for the change.

1b. Basis for using 5% volume percent hydrogen in air as the lower flammability limit for H2

Section 4.4.1.1 of NUREG/CR 6673 “Hydrogen Generation in TRU Waste Transportation Packages” indicates that various experiments were performed to determine lower and upper flammability limits for hydrogen in air in a reaction chamber. There is no indication that any credit was taken for outleakage as a result of transport cask design, thus making the experiment applicable for any non-ventilated area. Based on the above, the results of the experiment were considered appropriate for the 10ft by 10ft by 10ft AP1000 radwaste bunkers. Section 4.4.1.1 goes further to indicate that “ignition at the top of the chamber (downward flame propagation) resulted in different results for the flammability limits compared with igniting the gases from the bottom of the chamber (upward flame propagation).” In summary, per NUREG/CR 6673, Section 4.4.1.1:

- For upward flame propagation the lower flammability limit was 4.1 volume percent hydrogen in air
- For horizontal flame propagation the lower flammability limit was 6.7 volume percent hydrogen in air
- For downward flame propagation the lower flammability limit was 9 volume percent hydrogen in air

The above conclusion is similar to that documented Regulatory Guide 1.7, Revision 2, Section B which discusses experiments performed by the Bureau of Mines at its facilities with initial hydrogen volume concentrations on the order of 4 to 12 volume percent. The NRC concludes that in the “…range of 4 to 6 percent, the rate of flame propagation is less than the rate of rise of the flammable mixture. Therefore, the flame can propagate upward, but not horizontally or downward.”

The AP1000 radwaste bunkers can only be opened from the top or the side which would provide the potential location for a source for ignition thus resulting in either a downward flame propagation (limit of 9%) or a horizontal flame propagation (limit of 6.7%), respectively. Thus the scenario of upward flame propagation (limit 4.1%) was deemed not credible for the radwaste bunkers. In addition, Section 4.4.1.1 of NUREG/CR 6673 goes on to state that 5 volume percent hydrogen is considered appropriate as a lower flammability limit based on the methods presented which are intended to provide a simplified analytical approach that is adequately conservative.

The above rationale was used in the initial response provided to the NRC which utilized a lower flammability limit acceptance criteria of 5 volume percent hydrogen in air.

It is agreed that the nuclear industry has conservatively applied a lower flammability limit acceptance criteria for hydrogen in air of 4% when addressing control of combustible gas concentrations in containment following a *Loss-of-Coolant Accident*. Regulatory Guide 1.7, Revision 2, Section B recommends a lower flammability limit of 4 volume percent of hydrogen in air or steam-air atmospheres on the basis that it is well established and is adequately conservative.

In response to this RAI and for purposes of additional conservatism, the AP1000 analysis performed to address radiolytic generation of hydrogen in the radwaste building bunkers due to storage of spent secondary side resin has been reviewed to assess the impact of lowering the lower flammability limit acceptance criteria from 5 to 4 volume percent of hydrogen in air. Summarized below are the currently reported Cases and associated results presented in the referenced AP1000 analysis. All the Cases analyzed reflect design basis radiation source terms

based upon fuel defects in the rods producing 0.25% of the core power and with coincident primary to secondary leakage of 300 gallons/day. The activity accumulated on the resin reflect 1 cycle of operation.

- Case 1 represents 12 month storage in a single bunker in the AP1000 Radwaste building of the "as-designed" total volume of spent resin in the two (2) Condensate Polishing (CP) units and the two (2) EDI units that are typically on-line (i.e., 496 ft^3 of CPS resin and associated membranes + 11 ft^3 of EDI resin and associated membranes). The results indicate that for this Case the concentration of hydrogen in the bunker *does not exceed* 4% volume percent of hydrogen in air.
- Case 2 represents 12 month storage in a single bunker in the AP1000 Radwaste building of the annual volume of solid radwaste estimated for CPS and EDI resin as provided in UFSAR Table 11.4-1 (i.e., 206 ft^3 of CPS resin + 540 ft^3 of EDI resin and associated membrane). Note 6 to UFSAR Table 11.4-1 states that the estimated volume of 540 ft^3 assigned to the steam generator blowdown material (resin and membrane) is conservative and based on removal of both EDI units (inclusive of the associated resin and membrane contents). Thus use of 540 ft^3 in this Case as the anticipated amount of EDI resin and membrane is very conservative. The results indicate that for this conservative Case the concentration of hydrogen in the bunker *exceeds* 4% volume percent of hydrogen in air. For operational purposes, Case 2 is not credible and thus not included in the determination of compliance with the 4% hydrogen limit.
- Case 3 represents 12 month storage in a single bunker in the AP1000 Radwaste building of 540 ft^3 of EDI resin and associated membranes. This case is intended to reflect the eventuality of removing both EDI units (inclusive of the associated resin and membrane contents) and storing them in a single bunker. The results indicate that for this Case the concentration of hydrogen in the bunker *does not exceed* 4% volume percent of hydrogen in air.
- Case 4 determined the minimum free volume required in a AP1000 Radwaste building bunker to ensure a hydrogen concentration below 5% volume percent of hydrogen in air assuming 1-cycle worth of EDI and CPS spent resin was stored in the bunker for 12 months. The analysis reports a required bunker free volume of 335 ft^3.

Based on the above it is concluded that a lower flammability limit acceptance criteria of 4 volume percent of hydrogen in air will be met for the following two scenarios:

i. 12 month storage in a single bunker in the AP1000 Radwaste building of the "as-designed" total volume of spent resin in the two (2) CP units and the two (2) EDI units that are typically on-line (i.e., 496 ft^3 of CPS resin and associated membranes + 11 ft^3 of EDI resin and associated membranes)

ii. 12 month storage in a single bunker in the AP1000 Radwaste building of both EDI units (inclusive of the associated resin and membrane contents).

In addition, it can be concluded, that with a reduced lower flammability limit acceptance criteria of 4 volume percent of hydrogen in air, a required bunker free volume of 423 ft^3 is needed to store 1-cycle worth of EDI and CPS spent resin for 12 months. This updated estimate for the required free volume in a AP1000 radwaste bunker is developed using the methodology outlined in the referenced AP1000 analysis which incorporates the use of the following equation, and a lower flammability limit acceptance criteria of 4 volume percent of hydrogen in air:

$V = (0.96 \times n_{H2} / 0.04) \times (R_g T_0 / P_o)$

Where

V = non-leaking enclosure void volume, cm^3

n_{H2} = Number of moles of hydrogen gas generated, gmol

R_g= Universal gas constant, 82.05 cm^3-atm/gmol-^oK

T_0 = Temperature when the non-leaking enclosure was sealed, ^oK

P_0 = Pressure when the non-leaking enclosure was sealed, atm

The following information is provided to respond to the question of applicability of the criteria presented in Branch Technical Position (BTP) CMEB-9.5-1, which specifies controls to maintain hydrogen concentration to less than 2 percent for SSCs evaluated using the BTP as guidance

- Review of BTP CMEB 9.5-1 indicates that a) routing of "hydrogen lines" in "safety related areas" should take into consideration that in case of a line break, the hydrogen concentration in the affected areas should not exceed 2% and b) that the ventilation systems in battery rooms should be capable of maintaining the H2 concentration to below 2 volume %. There are no other stipulations.
- Table 9.5.1-1 of the UFSAR (summarizes compliance to BTP CMEB 9.5-1) commits to a ventilation system in the battery rooms that is capable of maintaining hydrogen concentrations below 2 percent. Table 9.5.1-1 provides no hydrogen concentration related commitment for any other spaces.

Based on the above it is concluded that:

- Since the radwaste bunkers are not in an area that has SSC, the 2 volume percent of hydrogen in air criteria, is not applicable, and that the previously proposed limit of 4 volume percent of hydrogen in air may be used.
- Though not credited in the AP1000 analysis, the bunkers are not "leak tight", so any generated hydrogen will most likely escape into the radwaste building and be captured and removed by the ventilation system.

LAR Updates

Based on the response above, [SCE&G] LAR13-09 R1 S1 (reference 7) Enclosure 17 Section 3.2, the quoted text from page 13 & 14 of 23 is revised as follows to discuss 4 volume percent rather than 5. An insert is provided to replace some of the existing text, and other changes are also provided throughout the excerpt:

> "Evaluation of Potential for Radiolytic Hydrogen Gas Generation in the Bunkers
>
> …The acceptance criteria for the evaluation is a calculated hydrogen concentration in the radwaste building bunker air space less than 4 volume percent hydrogen in air.
>
> This evaluation included the following cases:
>
> [Blue text above from this response is inserted here to replace existing text]
>
> Controls to Prevent Excess Radiolytic Hydrogen Gas Generation in the Bunkers
>
> To address the results of this evaluation, changes are proposed to UFSAR Subsection 11.4.2.5.2 to describe the controls established in order to prevent the potential for creation of a hazard from radiolytic hydrogen gas generation. The evaluation confirms no

> exceedance of 4 volume percent hydrogen in air based on the conservative two limiting scenarios discussed above. The scenarios assume the bounding amount of CPS and EDI resins that could be generated over one cycle of operation and then stored in a single unventilated bunker for one year. A clarification is also added to note, although the analysis conservatively focuses on storage in a single bunker, during operation all three bunkers will be available for use. In addition, changes are proposed to UFSAR Subsection 11.4.2.5.2 to refer to the administrative controls described in UFSAR Subsections 11.2.1.2.5.2 and 13.5.2.2.5 that limit the total cumulative radioactive inventory of unpackaged wastes located in the radwaste building to prevent exceeding the Regulatory Guide 1.143, Revision 2, unmitigated radiological release criteria, and 10 CFR Part 20.1301 dose limit. These other administrative controls further restrict the amount and activities of resins that are allowed to be stored in the bunker. Should there be a need to store resins with total volume or activity higher than that of the evaluated resins, or for a longer storage period, a new evaluation would be needed to confirm the risk associated with potential hydrogen gas generation by demonstrating that the hydrogen concentration in the bunker air space will not exceed 4 volume percent hydrogen in air."

[SCE&G] LAR 13-09 R1 S1 (reference 7) Enclosure 19 [Enclosure 8] text for UFSAR subsection 11.4.2.5.2, pages 10 and 11 of 14, discussing explosive gas generation is updated to explain how hydrogen was selected as the most credible source and to state that the bunker air space will not exceed 4 volume percent hydrogen. As discussed above, Case 2 is very conservative with respect to the amount of resin available to be stored for a year into a single bunker following one cycle of operation. For operational purposes, Case 2 is not credible and thus not included in the determination of compliance with the 4% hydrogen limit. A clarification is also added to the UFSAR, to describe that although the analysis conservatively focuses on storage in a single bunker, during operation all three bunkers will be available for use.

The UFSAR text is revised as follows:

> "The bunkers have been evaluated for hydrogen gas generation resulting from the temporary storage of resin, specifically condensate polishing system (CPS) resin and steam generator blowdown system electrodeionization (EDI) unit resin. Hydrogen was selected as the most credible source of explosive gas generation. Based on table 3.1 of NUREG/CR 6673 other flammable gases formed by radiolysis in resin are insignificant in comparison to hydrogen. Methane was also considered, but was found not to be a credible source because the AP1000 CPS and EDI systems utilize resin beads which do not have the cellulose component that could support the growth of bacteria and methane production. Generation of flammable gases by processes such as biodegradation, decomposition and waste material interaction due to chemistry, was also determined to not be credible based on the waste forms intended for storage in the AP1000 radwaste bunkers; i.e., secondary side spent resin, and miscellaneous contaminated / activated components or tools.
>
> The evaluation assumes two storage scenarios of the bounding amounts of CPS and EDI resins expected to be generated over one cycle of operation and then stored in a single, unventilated bunker for one year. The scenarios result in a maximum hydrogen concentration of less than 4 volume percent hydrogen in air, and conclude that there is no risk of radiolytic hydrogen gas generation that could result in the creation of a hazard within the stated assumptions. Although the evaluation is focused on storing a bounding amount of resin into only one bunker, all three bunkers are available for use.

The existing administrative controls in subsections 11.2.1.2.5.2 and 13.5.2.2.5 limit the total cumulative radioactive inventory of unpackaged wastes allowed in the radwaste building and bunkers, and the existing radiation zoning and access requirements in subsection 12.3.1.2 further restrict the amount and activities of resins that are allowed to be stored in the bunker. Therefore, a new evaluation for hydrogen gas generation resulting from the temporary storage of resin would only be needed in the unlikely event that storage of resins with total volume or activity higher than that of the evaluated resins, or for a longer storage period, is desired. The new evaluation would be needed to confirm the risk associated with potential hydrogen gas generation by demonstrating that the hydrogen concentration in the bunker air space will not exceed 4 volume percent hydrogen in air."

1c. Request to specify if the procedures discussed in the LAR will be covered under part of the radiation protection program or a separate program. Specify the Program where the procedures discussed in the LAR will be incorporated and to update the UFSAR accordingly.

The procedures have not been developed yet but the controls discussed in UFSAR Subsections 11.2.1.2.5.2, 11.4.2.5.2 and 13.5.2.2.5 will be part of the "Maintenance and Other Operating Procedures" discussed in UFSAR Subsection 13.5.2.2. The operating procedures are also called out in UFSAR Subsection 12.1.3 and 12.1.4, which discuss "Operational Considerations". These sections are tied to Section 12AA, which puts them under the umbrella of the radiation protection program discussed in 12AA and Table 13.4-201, accordingly no additional markup has been proposed for UFSAR Subsections 11.2.1.2.5.2, 11.4.2.5.2 and 13.5.2.2.5.

1d. Request for review the of the licensee's completed calculations, when the above issues have been addressed.

The explosive gas generation calculation was made available for review in an NRC Audit on November 15, 2016.

1e. As an alternative to items a through d above, the licensee may add ventilation lines to each of the bunkers.

Based on the responses provided to NRC RAI Question 11.1a and 1b, it is the opinion of the licensee that ventilation lines are not required for the AP1000 Radwaste bunkers.

2. Maintaining Dose Limits

The total source term within the Radwaste Building is not increasing. As discussed during the public meeting on 6/30/2016, this confusion about the total source term resulted from the wording at the end of the response to previous RAI Question 12 as captured in Enclosure 16 of [SCE&G] LAR 13-09 R1 S1 (reference 7).

The response stated:

"This response superseded previous responses to RAI Question 6b initially provided in LAR 13-09 Supplement 3."

The response to RAI Question 12 [above] superseded only the portion of the previous response to RAI Questions 6b pertaining to explosive gas generation.

The response to New Question 10 above provides details on the basis for the radiation levels on the roof and how it complies with Section 20.1301 (e) of 10 CFR Part 20. The response also describes the use of 6″ plates as opposed to the designed 4-1/2″ plate as an extra conservatism

and for ALARA purposes and not because of an increase in the total source term in the Radwaste Building.

References:

1. South Carolina Electric & Gas Company (SCE&G) Request for License Amendment and Exemption: Annex and Radwaste Building Changes February 27, 2014 (NND-14-0048) (ML14065A022)

2. Letter from Ravindra G. Joshi (NRC) to Ronald Jones (SCE&G), Virgil C. Summer Nuclear Station Units 2 and 3: Request for Additional Information Letter No. 01 Related to Exemption and License Amendment Request (LAR) 13-09, for the Virgil C. Summer Nuclear Station Units 2 and 3: Annex and Radwaste Building Changes (ML14125A297)

3. South Carolina Electric & Gas Company (SCE&G) Request for License Amendment and Exemption S2: Annex and Radwaste Building Changes July 09, 2014 (NND-14-0383) (ML14192A036)

4. South Carolina Electric & Gas Company (SCE&G) Request for License Amendment and Exemption LAR 13-09 S2: Annex and Radwaste Building Changes September 25, 2014 (NND-14-0572) (ML14268A544)

5. South Carolina Electric & Gas Company (SCE&G) Request for License Amendment and Exemption LAR 13-09 S3: Annex and Radwaste Building Changes August 20, 2015 (NND-15-0490) (ML15236A100)

6. South Carolina Electric & Gas Company (SCE&G) Request for License Amendment and Exemption LAR 13-09 R1: Annex and Radwaste Building Changes December 17, 2015 (NND-15-0664) (ML15351A428)

7. South Carolina Electric & Gas Company (SCE&G) Request for License Amendment and Exemption LAR 13-09 R1 S1: Annex and Radwaste Building Changes June 1, 2016 (NND-16-0129) (ML16154A048)

8. Summer Annex and Radwaste Building Changes LAR 13-09 RAI LTR 02 July 25, 2016 (ML16207A387)

Southern Nuclear Operating Company

ND-17-0023

Enclosure 6

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revisions to Enclosure 1 Request for License Amendment:

Annex and Radwaste Building Changes

(LAR-13-019R1)

Portions revised from the original Request for License Amendment, ND-14-0562 Enclosure 1, are indicated by revision bars in the right-hand margin.

(This enclosure contains 24 pages, including this cover sheet)

Table of Contents

1. Summary Description

The proposed changes would revise the Combined Licenses (COLs) in regard to the AP1000 annex building and radwaste building structures and layout by:

1. Revising the annex building column line designations on affected Tier 1 Figures and Tier 2 Figure 3.7.2-19.

2. Revising the radwaste building configuration including the shielding design and radiation area monitoring.

The proposed changes require revision of Updated Final Safety Analysis Report (UFSAR) Tier 2 information, some of which also involve changes to the standard and site-specific UFSAR as well as plant-specific DCD Tier 1 information and the corresponding material incorporated into Appendix C of the COL (as detailed in Section 2). This enclosure requests approval of the license amendment necessary to implement these changes.

2. Detailed Description

2.1 Annex Building Column Line Changes

The annex building column lines on UFSAR Tier 2 Figure 3.7.2-19 (Sheets 2, 3, 5, 6, 7, and 8) sensitive unclassified non-safeguards information (SUNSI) are proposed to be changed from 10 to 10.05 to resolve inconsistencies in the column line designation between the annex building and the auxiliary building figures in the UFSAR. The column line 10 designation for the auxiliary building figures corresponds to North Coordinate 1089′-0″ whereas the column line 10 designation for the annex building figures corresponds to North Coordinate 1092′-0″. This change is proposed to align column line 10 between the annex and auxiliary buildings.

The annex building column line on UFSAR Tier 2 Figure 3.7.2-19 (Sheet 8) (SUNSI) is proposed to be changed from 12 to 11.15 for consistency with the column line designations in Figure 3.7.2-19 Sheets 1, 2, 3, 5, 6, and 7 (SUNSI).

Because the column line changes in Tier 2 are also included in Tier 1, plant-specific DCD Tier 1 Figures 3.3-11A (SUNSI) , 3.3-12 (SUNSI) and 3.3-13 (SUNSI) are proposed to be changed to remove column line designations for columns 6, 8, 10, 11.15, 13.2, 13.3, 14.1, 15.1, 15.2, A, B, C and D. The changes to the Tier 1 Annex Building figures are being made because none of the column lines proposed to be removed are referred to in any Tier 1 tables or text.

The proposed changes to the licensing basis are described below. Figures that contain SUNSI, also known as Security-Related Information (SRI), are identified as such and requested to be withheld under 10 CFR 2.390(d).

Tier 2 Changes:

- UFSAR Figure 3.7.2-19 (Sheets 2, 3, 5, 6, 7, and 8) (SUNSI) – Column Line 10 designation is changed to 10.05.

- UFSAR Figure 3.7.2-19 (Sheet 8) (SUNSI) – Column Line 12 designation is changed to 11.15.

Associated Tier 1 Changes:

- Plant-specific DCD Tier 1 Figures 3.3-11A (SUNSI), 3.3-12 (SUNSI), and 3.3-13 (SUNSI) – Column Line designations for Column Lines 6, 8, 10, 11.15, 13.2, 13.3, 14.1, 15.1, 15.2, A, B, C and D are deleted. There are also corresponding changes to COL Appendix C Figures 3.3-11A (SUNSI), 3.3-12 (SUNSI), and 3.3-13 (SUNSI).

2.2 Radwaste Building Configuration Changes

Based on a range of source terms, potential radiation levels inside the radwaste building were analyzed, with the intent of determining required shielding while minimizing any required structural changes to the existing radwaste building design, including exterior walls and roof. This analysis determined the amount of shielding required to maintain radiation levels for worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV levels as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), and as Zone II to Zone III levels on the normally unoccupied and access-controlled radwaste building roof for ALARA considerations. Based on this preliminary analysis, the configuration inside the radwaste building was modified, including changes to internal shield walls and addition of bunkers. A final analysis determined the potential radiation levels, which form the basis for the proposed changes to the radwaste building configuration and radiation zones further described below.

Based on the final shielding analysis, the radwaste building configuration is proposed to be modified to add three bunkers for storage of moderate and high activity waste. Three bunkers with a 6″ thick removable steel shield bunker roof plate above each bunker, and multiple layered 1″ thick removable steel shield bunker door plates in front of each bunker, are proposed to be added for maintaining radiation levels ALARA and for maximum operational flexibility. The removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14). The bunkers are structurally designed to allow two of the removable steel shield bunker roof plates to be placed and stored on top of each bunker. The back and side concrete shield walls surrounding the three bunkers are proposed to have a minimum concrete wall thickness of 1′-8″, with the interior walls between each bunker having a minimum concrete wall thickness of 8″.

In addition to the change to add the three bunkers, the radwaste building configuration is also proposed to be changed to incorporate the Waste Accumulation Room and the Packaged Waste Storage Room into one room called the Waste Accumulation Room. Because waste before and after packaging may contain moderate or high activity, the new bunkers would be required in both the Packaged Waste Storage Room and the Waste Accumulation Room. However, if the two rooms are combined as proposed in this amendment, greater operational flexibility is achieved with the larger bunker size and the number of new bunkers required is reduced. As part of the merging of the two rooms, the minimum shield wall thickness for the walls associated with the original Packaged Waste Storage Room is changed from 2′ to 1′-4″.

Administrative controls will limit the total cumulative radioactive inventory of unpackaged wastes located in the radwaste building to meet the unmitigated radiological release criteria of Regulatory Guide 1.143, Revision 2.

Due to the rooms merging, one of the two radiation monitors previously located in the two separate rooms (RMS-JE-RE014B) is proposed to be deleted, and the remaining radiation monitor for the Waste Accumulation Room (RMS-JE-RE014A) is renamed to RMS-JE-RE014 and relocated in the newly incorporated room.

The licensing basis document proposed changes are described below:

Tier 2 Proposed Changes:

- UFSAR Figure 1.2-22 (SUNSI) – Modified to depict the incorporation of the Packaged Waste Storage Room into the Waste Accumulation Room and the addition of the three bunkers.
- UFSAR Section 9.4.8 – Removed Packaged Waste Storage Room from the list of rooms served by the radwaste building HVAC system.
- UFSAR Figure 9.4.8-1 – Removed Packaged Waste Storage Room from the list of areas served by the radwaste building HVAC system.
- UFSAR Section 9A.3.5.1 – Removed fire zone 5031 AF 50352, Packaged Waste Storage Room (two places).
- UFSAR Table 9A-3 (Sheets 23 and 24) – Revised the fire protection summary to reflect the incorporation of the Packaged Waste Storage Room (50352) into the Waste Accumulation Room (50351).
- UFSAR Figure 9A-4 (SUNSI) – Modified to depict the incorporation of the Packaged Waste Storage Room into the Waste Accumulation Room and the addition of the three bunkers.

  Note: The Tier 2* information contained in the Section 9A figure is the fire area boundaries. The illustration of fire zones and background detail is not Tier 2* information. Fire area boundaries are not changed by combining the Packaged Waste Storage Room with the Waste Accumulation Room or adding the three new bunkers. The activity modifies fire zones only. Therefore, Tier 2* information is not proposed to be changed as part of this request.
- UFSAR Subsection 11.4.2.1 – Changed the room title from Packaged Waste Storage Room to Waste Accumulation Room. Add clarification in several areas that waste is packaged waste.
- UFSAR Subsection 11.4.2.3.2 – Changed the room title from Packaged Waste Storage Room to Waste Accumulation Room.
- UFSAR Subsection 11.4.2.3.3 – Changed the room title from Packaged Waste Storage Room to Waste Accumulation Room.
- UFSAR Subsection 11.4.2.5.2 – Modified the description of the radwaste building to 1) remove the Packaged Waste Storage Room and revise the description of the Waste Accumulation Room, 2) add a description of the newly added bunkers, 3) add a description of the removable steel shield bunker roof plates and removable steel shield bunker door plates referring to UFSAR Subsection 12.3.2.2.5 for a description of their design functions, and 4) describe the controls established for temporary storage of resin in a

single unventilated bunker in order to prevent the potential for creation of a hazard from radiolytic hydrogen gas generation.

- UFSAR Table 11.5-2 – Deleted radiation monitor RMS-JE-RE014B and renamed RMS-JE-RE014A to RMS-JE-RE014. Renamed "Liquid and Gaseous Radwaste Area 1" to "Liquid and Gaseous Radwaste Area".
- UFSAR Subsection 12.3.2.2.5 – Modified the description of the radwaste building shielding design to 1) remove the Packaged Waste Storage Room 2) add a description of the newly added bunkers, 3) add a description of the design functions for the removable steel shield bunker roof plates that may be installed to provide vertical shielding during storage of moderate and high activity waste to maintain the radiation levels as Zone II to Zone III on the normally unoccupied and access-controlled radwaste building roof for ALARA considerations, and 4) add a description of the design functions for the removable steel shield bunker door plates that may be installed for ALARA considerations. The removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14)
- UFSAR Figure 12.3-1 (Sheet 14) (SUNSI) – Modified to depict the incorporation of the Packaged Waste Storage Room into the Waste Accumulation Room and the three added bunkers. Added a note to state access control requirements and traffic patterns are shown in Figure 12.3-3 sheet 14 and added notes regarding zone dose rate limits.
- UFSAR Figure 12.3-2 (sheet 14) (SUNSI) – Modified to depict the incorporation of the Packaged Waste Storage Room into the Waste Accumulation Room and the three added bunkers.
- UFSAR Figure 12.3-3 (sheet 14) (SUNSI) – Modified to depict the incorporation of the Packaged Waste Storage Room into the Waste Accumulation Room and the three added bunkers.

<u>Associated Standard and Site-Specific Licensing Basis Changes:</u>

- UFSAR Subsection 11.2.1.2.5.2 is revised to specify that the operating procedures discussed in Subsection 13.5.2.2.5 include administrative controls to limit the total cumulative radioactive inventory of unpackaged wastes located in the Radwaste Building to prevent exceeding the Regulatory Guide 1.143, Revision 2, unmitigated radiological release criteria, and 10 CFR Part 20.1301 dose limit. In addition, the changes include: 1) specifying the types of unpackaged wastes to consider, 2) specifying the applicable radionuclide inventory limits, 3) describing the controls over transfer or packaging of spent media from a mobile radwaste processing system, and 4) specifying that the unmitigated, unshielded worker dose is calculated at 11 feet from the source and the design limitations required as a result to maintain worker dose within limit.

- UFSAR Subsection 13.5.2.2.5 is revised to clarify the requirement for operating procedures to be developed, implemented, and maintained prior to initial fuel load for the administrative controls added to UFSAR Subsection 11.2.1.2.5.2, including applicable radionuclide inventory limits.

Associated Tier 1 Proposed Changes:

- Plant-specific DCD Tier 1 Sections 3.3(4c) and 3.3(6b) – Removed description of the walls used for shielding outside of the Packaged Waste Storage Room. Changed the room title from Packaged Waste Storage Room to Waste Accumulation Room. Changed the minimum waste storage volume from 1293 cubic feet to 1417 cubic feet as a result of the merging of the Packaged Waste Storage and Waste Accumulation Rooms and to be consistent with Tier 2, Subsection 11.4.2.1 and Table 11.4-1.
- Plant-specific DCD Tier 1 Table 3.3-6 (Items 4c and 6b) – Removed description of the walls used for shielding outside of the Packaged Waste Storage Room. Changed the room title from Packaged Waste Storage Room to Waste Accumulation Room. Changed the minimum waste storage volume from 1293 cubic feet to 1417 cubic feet because of the merging of the Packaged Waste Storage and Waste Accumulation Rooms and to be consistent with Tier 2, Subsection 11.4.2.1 and Table 11.4-1.
- Plant-specific DCD Tier 1 Table 3.3-6 (Item 4b) – Revised the Acceptance Criteria by adding the following underlined text: "A report exists and concludes that the shield walls of the Waste Accumulation Room in the radwaste building except for designed openings or penetrations are consistent with the minimum concrete wall thicknesses of 1′-4″*, and a minimum concrete wall thickness of 1′-8″ near the radwaste bunkers.*"
- Plant-specific DCD Tier 1 Table 3.5-5 – Removed note regarding the use of multiple detectors for the Liquid and Gaseous Radwaste Area monitor.

(These Tier 1 changes also involve corresponding changes to COL Appendix C Section 3.3, Table 3.3-6, and Table 3.5-5.)

3. Technical Evaluation

3.1 Annex Building column line changes

This activity includes a proposed change for consistency between the annex building and auxiliary building figures in the UFSAR and modifies the description of the facility/design in the plant-specific DCD Tier 1. Plant-specific DCD Tier 1 Section 1.1 identifies that the design function of a column line is to provide a designation on the plant reference grid which is used to define the location of building walls and columns. The lines are used for clarifying the location of specific walls or sections. This proposed change does not adversely affect the design function of the column line because:

- The plant-specific DCD Tier 1 text, tables and figures continue to communicate the structural design of the annex building. The purpose of

the column line designations in the aforementioned Tier 1 figures is to indicate the location of building walls and columns previously discussed in Tier 1. The column lines being removed are considered to be background information and therefore not pertinent to the location of any walls or columns previously discussed in Tier 1 text or tables and would be in conflict with Tier 2 if not revised following the proposed changes. Column lines indicating the locations of walls or columns discussed in Tier 1 text or tables will remain in the aforementioned figures.

- The proposed changes to the UFSAR Tier 2 column line designations resolve inconsistencies between the auxiliary building and annex building column lines. With this change, the UFSAR Tier 2 column lines perform their function of accurately locating the annex building column lines.

Because these proposed changes are only being made to the annex building figure to be consistent with the auxiliary building figure, they do not adversely affect any design function described in the UFSAR. The proposed changes do not involve an adverse change to any method of evaluation for establishing design bases or safety analyses. They do not represent any change to a design feature credited in the ex-vessel severe accident assessment. Tests, experiments, and procedures described in the licensing basis are unchanged by this activity. The changes do not affect the aircraft impact assessment, because the column line change is being made only for consistency, and therefore, they do not affect any key design features credited in the Aircraft Impact Assessment, as described in UFSAR Subsection 19F. The activity does not increase the probability or consequences of an accident previously evaluated, because it does not affect the operation of any systems or equipment that could initiate or mitigate an analyzed accident. No accident source term parameter or fission product barrier is impacted by this activity. The activity does not create the possibility of a new or different kind of accident from any accident previously evaluated, because it does not change the design function of the annex building or of any of the systems or equipment contained therein or in any other Nuclear Island structures. The activity does not involve a significant reduction in a margin of safety, because there is no change to the codes and standards and analysis methods applied to the annex building design. The activity has no effect on off-site dose analysis for analyzed accidents.

The proposed activity has no impact on emergency plans or physical security plans. The changes to the column line indicators are being made only for consistency. The proposed changes are unrelated to any aspect of plant construction or operation that would introduce any change to effluent types (e.g., effluents containing chemicals or biocides, sanitary system effluents, and other effluents), or affect any plant radiological or non-radiological effluent release quantities. Furthermore, the proposed changes do not affect any effluent release path or diminish the functionality of any design or operational features that are credited with controlling the release of effluents during plant operation.

The fire protection analysis is performed for each fire area using the methodology described in UFSAR Tier 2 Section 9A.2. This methodology follows the guidance of Branch Technical Position (BTP) CMEB 9.5-1. The results of the analysis are provided in UFSAR Tier 2 Section 9A.3. This activity does not change the fire protection analysis conclusions.

Because the changes to the annex building column lines are only for consistency with the auxiliary building figures and involve removing column line designations considered to be background information and therefore not pertinent to Tier 1 text or tables, there are no impacts to any regulatory requirements or criteria.

3.2 Radwaste Building configuration changes

The proposed changes to the radwaste building involve the following:

1. The addition of three bunkers for storage of moderate and high activity waste with 1′-8″ concrete shield walls around the bunkers to maintain radiation levels for worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), and with removable steel shield bunker roof plates to maintain radiation levels as Zone II to Zone III on the normally unoccupied and access-controlled radwaste building roof and removable steel shield bunker door plates for as low as is reasonably achievable (ALARA) considerations. The removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1(Sheet 14).
2. Merging of the Waste Accumulation Room and the Packaged Waste Storage Room into one room;
3. Deletion of radiation monitor RMS-JE-RE014B, and renaming RMS-JE-RE014A as RMS-JE-RE014 due to the merging of the rooms;
4. Addition of a partial labyrinth wall to shield the door entrance to the Waste Accumulation Room inside of the Radwaste Building;
5. Changing access to the Monitor Tank Room by routing through the Waste Accumulation Room, addition of a shield labyrinth to the Waste Accumulation Room, and addition of a north wall to the Monitor Tank Room;
6. Changing the normal operations radiation zones for the Monitor Tanks Room from Zone III to Zone II, and the HVAC Equipment Room from Zone III to Zone I; and
7. Decreasing the minimum thickness of the shield walls in the new Waste Accumulation Room corresponding to the walls of the original Packaged Waste Storage Room from 2′ to 1′-4″.

These proposed changes are made to provide for greater operational flexibility in handling waste before and after packaging, to minimize the number of shielded bunkers required for storage of moderate and high activity waste, to maintain radiation levels for worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), and to maintain radiation levels as Zone II to Zone III on the normally unoccupied and access-controlled radwaste building roof for ALARA considerations.

<u>Addition of Radwaste Bunkers and Merging of Waste Accumulation Room and Packaged Waste Storage Room</u>

The proposed changes to add three bunkers allow the moderate or high activity waste to be segregated from the remainder of the lower activity waste. This separation reduces occupational exposure within the radwaste building while workers handle the lower activity waste.

Based on the shielding analysis, the removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the

radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), and are provided for ALARA considerations only. Therefore, a partial labyrinth wall is added to shield the door entrance so that when the bunker door plates are not installed the bunkers are not visible.

The removable steel shield bunker roof plates may be installed as vertical shielding to maintain the radiation levels as Zone II to Zone III on the normally unoccupied and access-controlled radwaste building roof for ALARA considerations, but only based on the activity and distribution of wastes stored in the Waste Accumulation Room and in the bunkers. As an example, during normal operations, and based on storing a maximum of Zone III waste on the floor of the combined Waste Accumulation Room and storing higher activity (up to Zone IV) dry waste in the bunkers, the removable steel shield bunker roof plates provide additional shielding in the vertical direction to maintain the radwaste building roof as Zone II to Zone III. The removable steel shield bunker roof plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14).

The proposed minimum concrete wall thickness of 1′-8″ for the back and side concrete shield walls surrounding the three bunkers provide adequate shielding to maintain the radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14). This shielding is adequate to maintain the radiation levels for these areas to the specified radiation zones without the additional shielding from the removable steel shield bunker roof plates and bunker door plates, as previously described.

The proposed changes to merge the Waste Accumulation Room and the Packaged Waste Storage Room into one room and add three bunkers maintain normally occupied, radiologically restricted area portions of the radwaste building as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14). Exceptions for the peak source scenario, including moderate and high activity waste storage, are addressed by the addition of notes to UFSAR Figure 12.3-1 (Sheet 14) describing potential maximum radiation levels. These notes provide information necessary to support ALARA considerations when handling and storing moderate and high activity waste in the radwaste building. In addition, the proposed changes maintain the adjacent plant yard areas that have unrestricted worker access as Zone I.

Evaluation of Radwaste Building Design Function Impacts

These proposed changes do not adversely affect the design function of the radwaste building, which is a non-seismic structure whose function is to provide for handling and storage of low, moderate, or high activity waste and which contains no safety-related structures, systems or components. These proposed changes do not adversely affect any operations within the radwaste building. The combined Waste Accumulation Room is capable of fulfilling the design functions of the Packaged Waste Storage Room in addition to its own. The radwaste building continues to minimize releases of radioactivity from the solid, liquid, and gaseous material. The solid radwaste system (WSS) continues to collect and store radioactive wastes and provide shielding to maintain radiation exposure to plant operation and maintenance personnel ALARA. The radwaste building continues to support the WSS by functioning to store at least 1417 cubic feet per year dry waste. The useful storage volume in the radwaste building, which accommodates more than one full offsite

waste shipment using a tractor-trailer truck, is unchanged by this activity. Liquid radwaste processing areas within the radwaste building continue to function to contain any liquid spills. The radwaste building continues to include facilities for segregated storage of various categories of waste prior to processing, for processing by mobile systems, and for storing processed waste in shipping and disposal containers.

Radiation Monitor Changes

With respect to Packaged Waste Storage Room and Waste Accumulation Room, the original radwaste building design consisted of one area radiation monitor per room, both of which functioned to monitor area radiation levels in each room and to alarm and alert operators in the event of high radiation. With the removal of the separating wall and the combining of those two rooms into one, the function of monitoring and alarming radiation levels can be accomplished by use of a single area radiation monitor. This monitor is of the same type and design requirements as the existing monitors, and will be relocated to a central location in the newly combined room to ensure all areas of the combined room are detectable, as they were with the separate rooms. The criteria for locating this area monitor (as provided in UFSAR Tier 2 Subsection 11.5.6.1) are not changed by this activity and will continue to be applied for this single monitor.

Changes to Wall Thickness

The proposed change in the wall thickness for the walls associated with the original Packaged Waste Storage Room from 2′ to 1′-4″ and the change in wall thickness for the walls associated with the original Waste Accumulation Room in the bunker area from 1′-4″ to 1′-8″, are possible due to the additional shielding provided by the newly added bunkers. The shielding calculations including these revised wall thicknesses demonstrate that radiation levels for the adjacent plant yard areas that have unrestricted worker access are maintained as Zone I.

Activity Limits

The amount of activity in the Radwaste Building is limited by two criteria. First, the activity in the Radwaste Building and systems and components in the Radwaste Building containing radioactive materials are limited and maintained within applicable A_2 quantity limits specified in Appendix A to 10 CFR Part 71 to conform with Regulatory Guide 1.143, Revision 2. Second, the source term (activity) within these systems and components is limited by applicable limits on potential unmitigated exposures to personnel and the general public.

The Radwaste Building is classified and designed as an RW-IIc structure in accordance with Regulatory Guide 1.143, Revision 2. Therefore, the systems and components within the Radwaste Building that contain radioactive materials are classified and designed as RW-IIc systems and components in accordance with Regulatory Guide 1.143, Revision 2, and include three (3) radwaste monitor tanks, up to three (3) mobile radwaste processing systems, and any additional equipment located in the Radwaste Building including unpackaged radioactive wastes stored in the Waste Accumulation Room. Conformance with classification RW-IIc limits the activity for radioactive sources, other than packaged waste, within each of these systems and components containing radioactive materials to less than one A_2 quantity. This provides an activity limit for each system and component, and, in effect, drives a cumulative activity limit for the Radwaste Building. Each of the applicable systems and components within the Radwaste Building is expected to contain a mixture of radionuclides, and so the total A_2 quantity that may be present in each system or component

is determined in accordance with guidance provided in Section IV(e) of 10 CFR 71, Appendix A:

$$A_2 = \frac{1}{\sum_i \frac{f(i)}{A_2(i)}}$$

Where:

A_2 = A_2 quantity for the activity in the system or component,

$f(i)$ = Fraction of activity of the ith radionuclide in the system or component,

$A_2(i)$ = Appropriate A_2 quantity for the ith radionuclide from 10 CFR 71, Appendix A, Table A-1, and

$\sum_i$ = Indicates the summation is performed for all radionuclides in the system or component.

To meet the unmitigated radiological release criteria of Regulatory Guide 1.143, Revision 2, the activity within the Radwaste Building must be controlled and limited to ensure radiation protection for workers inside the protected area and for members of the public beyond the protected area boundary. Specifically, sources of activity within the building, other than from packaged waste, must be shown to produce exposures that do not exceed unmitigated radiological release criteria of 5 rem to workers within the protected area, and the 10 CFR Part 20.1301 dose limit of 100 millirem for members of the public located at the protected area boundary. An analysis has been performed to ensure these criteria are met. This analysis considers the current design basis activity limits and locations of activity in the Radwaste Building, including within the applicable systems and components, and demonstrates conformance with the Regulatory Guide 1.143, Revision 2, acceptance criteria with margin to the regulatory limits.

Administrative Controls to Maintain Activity and Doses Within Limits

Administrative controls in the form of operating procedures will be developed prior to fuel load to maintain the activity within the Radwaste Building, and systems and components, within applicable A_2 quantity limits. These administrative controls will employ various methods to monitor and inventory the amount of radioactive materials transferred to and from the Radwaste Building, and between systems and components.

In addition to maintaining activity within limits, the administrative controls will require monitoring of the source term from all unpackaged wastes, including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste, and from the mobile radwaste processing systems. Limiting the total cumulative source term of the Radwaste Building meets the guidance in Regulatory Guide 1.143, Revision 2, for unmitigated radiological release criteria and 10 CFR Part 20.1301 dose limit.

Evaluation of Potential for Radiolytic Hydrogen Gas Generation in the Bunkers

Because moderate and high activity waste may be stored in the new bunkers, there is the potential for radiolytic hydrogen gas generation if moderate to high activity ion exchange

resins are stored in the bunkers for an extended period of time. As discussed in: 1) NRC Policy Issue SECY 94-198, Review of Existing Guidance Concerning the Extended Storage of Low-level Radioactive Waste; 2) NRC Generic Letter 81-38, Storage of Low-level Radioactive Wastes at Power Reactor Sites; and 3) NUREG-0800, Standard Review Plant, Section 11.4, Solid Waste Management System, the potential for radiolytic gas generation should be evaluated with respect to creating flammable/explosive conditions.

To address the potential for creation of a hazard from radiolytic hydrogen gas generation in the bunkers, an evaluation of the temporary storage of resin in the bunkers was performed. The evaluation considered storage of the two highest activity resins anticipated to be stored in the bunkers, including the following:

- Condensate polishing system (CPS) resin, which is used to remove corrosion products and ionic impurities from the condensate system during plant startup, hot standby, power operation with abnormal secondary cycle chemistry, safe shutdown, and cold shutdown operations, as described in UFSAR Subsection 10.4.6; and
- Steam generator blowdown system (BDS) electrodeionization (EDI) module resin, which is used for steam generator blowdown filtration as described in UFSAR Subsection 10.4.8.2.1.

The CPS includes mixed bed ion exchanger vessels for purification of the condensate as described in subsection 10.4.6. Should the resins become radioactive, the resins are transferred from the CPS vessel directly to a temporary processing unit or to the temporary processing unit via the spent resin tank. The processing unit, located outside of the turbine building, dewaters and processes the resins as required for offsite disposal. Radioactive CPS resin typically has very low activity, and is packaged in containers for disposal as permitted by DOT regulations. After packaging, the resins may be stored in the radwaste building. Based on a typical CPS operation of 30 days per 18-month refueling cycle with design basis radioactive leakage from the primary (reactor coolant system) to secondary (main steam system) side of the steam generators, the volume of radioactively contaminated resin is estimated to be 206 ft^3 per year (one 309 ft^3 bed per 18-month refueling cycle).

The BDS includes two EDI units, with each containing six parallel EDI modules as described in UFSAR Subsection 10.4.8. Each EDI module consists of alternating pairs of cation and anion membranes, ion-exchange resins, polymeric flow channel spacers, and electrodes. After prolonged use, the EDI module membranes and resin become ineffective in removal of impurities. If an EDI module is not radioactively contaminated, no special packaging is required and the module may be disposed of as clean solid waste in accordance with Department of Transportation (DOT) regulations. Contaminated EDI modules are dewatered, the nozzles blocked, and transported from the turbine building to the radwaste building for further decontamination, packaging, storage, and eventual transport to an offsite disposal facility as permitted by DOT regulations. A conservative estimate of contaminated solid wet waste includes material within the contaminated EDI modules, based on continuous operation with design basis radioactive leakage from the primary to secondary side of the steam generators. The volume of radioactively contaminated material from this source is estimated to be 540 ft^3 per year.

The radiolytic hydrogen gas generation evaluation assumes plant operation with the design basis reactor coolant source term corresponding to 0.25% fuel defects, and with coincident design basis radioactive leakage from the primary to secondary side of the steam generators of 300 gallons/day, for one 18-month refueling cycle. The calculation accounts

for the bunker volume occupied by the packaged CPS resin and EDI resins and membranes, and remaining available free space in the bunker without ventilation or other operator action. Each bunker has a total volume of approximately 1000 ft^3. The acceptance criteria for the evaluation is a calculated hydrogen concentration in the radwaste building bunker air space less than 4 volume percent hydrogen in air.

This evaluation included the following cases:

- Case 1 represents 12 month storage in a single bunker in the AP1000 Radwaste building of the "as-designed" total volume of spent resin in the two (2) Condensate Polishing (CP) units and the two (2) EDI units that are typically on-line (i.e., 496 ft^3 of CPS resin and associated membranes + 11 ft^3 of EDI resin and associated membranes). The results indicate that for this Case the concentration of hydrogen in the bunker *does not exceed* 4% volume percent of hydrogen in air.
- Case 2 represents 12 month storage in a single bunker in the AP1000 Radwaste building of the annual volume of solid radwaste estimated for CPS and EDI resin as provided in UFSAR Table 11.4-1 (i.e., 206 ft^3 of CPS resin + 540 ft^3 of EDI resin and associated membrane). Note 6 to UFSAR Table 11.4-1 states that the estimated volume of 540 ft^3 assigned to the steam generator blowdown material (resin and membrane) is conservative and based on removal of both EDI units (inclusive of the associated resin and membrane contents). Thus use of 540 ft^3 in this Case as the anticipated amount of EDI resin and membrane is very conservative. The results indicate that for this conservative Case the concentration of hydrogen in the bunker *exceeds* 4% volume percent of hydrogen in air. For operational purposes, Case 2 is not credible and thus not included in the determination of compliance with the 4% hydrogen limit.
- Case 3 represents 12 month storage in a single bunker in the AP1000 Radwaste building of 540 ft^3 of EDI resin and associated membranes. This case is intended to reflect the eventuality of removing both EDI units (inclusive of the associated resin and membrane contents) and storing them in a single bunker. The results indicate that for this Case the concentration of hydrogen in the bunker *does not exceed* 4% volume percent of hydrogen in air.
- Case 4 determined the minimum free volume required in a AP1000 Radwaste building bunker to ensure a hydrogen concentration below 5% volume percent of hydrogen in air assuming 1-cycle worth of EDI and CPS spent resin was stored in the bunker for 12 months. The analysis reports a required bunker free volume of 335 ft^3.

Based on the above it is concluded that a lower flammability limit acceptance criteria of 4 volume percent of hydrogen in air will be met for the following two scenarios:

i. 12 month storage in a single bunker in the AP1000 Radwaste building of the "as-designed" total volume of spent resin in the two (2) CP units and the two (2) EDI units that are typically on-line (i.e., 496 ft^3 of CPS resin and associated membranes + 11 ft^3 of EDI resin and associated membranes)

ii. 12 month storage in a single bunker in the AP1000 Radwaste building of both EDI units (inclusive of the associated resin and membrane contents).

In addition, it can be concluded, that with a reduced lower flammability limit acceptance criteria of 4 volume percent of hydrogen in air, a required bunker free volume of 423 ft^3 is needed to store 1-cycle worth of EDI and CPS spent resin for 12 months. This updated estimate for the required free volume in an AP1000 radwaste bunker is developed using the

methodology outlined in the referenced AP1000 analysis which incorporates the use of the following equation, and a lower flammability limit acceptance criteria of 4 volume percent of hydrogen in air:

$V = (0.96 \times n_{H2} / 0.04) \times (R_g T_0 / P_o)$

Where

V = non-leaking enclosure void volume, cm^3

n_{H2} = Number of moles of hydrogen gas generated, gmol

R_g= Universal gas constant, 82.05 cm^3-atm/gmol-^oK

T_0 = Temperature when the non-leaking enclosure was sealed, ^oK

P_0 = Pressure when the non-leaking enclosure was sealed, atm

Controls to Prevent Excess Radiolytic Hydrogen Gas Generation in the Bunkers

To address the results of this evaluation, changes are proposed to UFSAR Subsection 11.4.2.5.2 to describe the controls established in order to prevent the potential for creation of a hazard from radiolytic hydrogen gas generation. The evaluation confirms no exceedance of 4 volume percent hydrogen in air based on the conservative two limiting scenarios discussed above. The scenarios assume the bounding amount of CPS and EDI resins that could be generated over one cycle of operation and then stored in a single unventilated bunker for one year. A clarification is also added to note, although the analysis conservatively focuses on storage in a single bunker, during operation all three bunkers will be available for use. In addition, changes are proposed to UFSAR Subsection 11.4.2.5.2 to refer to the administrative controls described in UFSAR Subsections 11.2.1.2.5.2 and 13.5.2.2.5 that limit the total cumulative radioactive inventory of unpackaged wastes located in the radwaste building to prevent exceeding the Regulatory Guide 1.143, Revision 2, unmitigated radiological release criteria, and 10 CFR Part 20.1301 dose limit. These other administrative controls further restrict the amount and activities of resins that are allowed to be stored in the bunker. Should there be a need to store resins with total volume or activity higher than that of the evaluated resins, or for a longer storage period, a new evaluation would be needed to confirm the risk associated with potential hydrogen gas generation by demonstrating that the hydrogen concentration in the bunker air space will not exceed 4 volume percent hydrogen in air.

Additional Supporting Technical Evaluation

This proposed activity does not involve a change to procedures or a method of control and does not change any method of evaluation or use an alternate method of evaluation from those described in the UFSAR that is used in establishing design bases or in the safety analysis. The activity does not involve a test or experiment which exceeds the reference bounds of the design basis. The proposed activity does not adversely impact any design feature credited in the severe accident analysis. There is no impact on the aircraft impact assessment, because the number of barriers and the thickness of those barriers, as prescribed by NEI 07-13, Revision 7 are unchanged by this activity. The activity does not increase the probability or consequences of an accident previously evaluated, because it does not affect the operation of any systems or equipment that could initiate or mitigate an analyzed accident. No accident source term parameter or fission product barrier is impacted by this activity. The activity does not create the possibility of a new or different

kind of accident from any accident previously evaluated, because it does not change the design function of the radwaste building or of any of the systems or equipment contained therein or in any other Nuclear Island structures. The activity does not involve a significant reduction in a margin of safety, because there is no change to the codes and standards and analysis methods applied to the radwaste building design. The activity has no effect on off-site dose analysis for analyzed accidents.

The proposed changes are unrelated to any aspect of plant construction or operation that would introduce any change to effluent types (e.g., effluents containing chemicals or biocides, sanitary system effluents, and other effluents), or affect any plant radiological or non-radiological effluent release quantities. Furthermore, the proposed changes do not affect any effluent release path or diminish the functionality of any design or operational features that are credited with controlling the release of effluents during plant operation.

The fire protection analysis is performed for each fire area using the methodology described in UFSAR Tier 2 Section 9A.2. This methodology follows the guidance of Branch Technical Position (BTP) CMEB 9.5-1. The results of the analysis for the radwaste building are provided in UFSAR Tier 2 Subsection 9A.3.5. This activity does not change the fire protection analysis conclusions provided in that subsection of the UFSAR. None of the combustible material loading listed in UFSAR Table 9A-3, nor any fire detection and suppression features described in UFSAR Subsection 9A.3.5 is affected by these changes. Because the radwaste building, itself, is one Fire Area (5031 AF 01) and the overall radwaste building envelope is not changing, this activity does not change any fire area boundary. The radwaste building fire area is separated from the safety related areas of the nuclear island by a 3-hour fire barrier wall, which is unchanged by this activity.

10 CFR 20.1101(b) states that “the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).” The radwaste building configuration changes to add shielded bunkers for storage of moderate and high activity waste reduces the exposure of workers in the Waste Accumulation Room when they are working with lower activity waste. In addition, the cumulative configuration and shielding design changes maintain radiation levels for worker occupied areas in the radwaste building as Zone I to Zone IV, and for the adjacent plant yard areas that have unrestricted access as Zone I, as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), and at radiation levels in compliance with the ALARA requirement in 10 CFR Part 20, including on the normally unoccupied and access-controlled radwaste building roof. The proposed administrative controls to maintain the activity within the Radwaste Building, and systems and components, within applicable A_2 quantity limits, and to require monitoring of the source term from all unpackaged wastes, including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste, and from the mobile radwaste processing systems, prevents the exposures for any unmitigated radiological release in the Radwaste Building, occurring over a two hour exposure period, from exceeding the Regulatory Guide 1.143, Revision 2, unmitigated radiological release criteria and 10 CFR 20.1301 dose limit

Subsection 3.7.2.8.2 of NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design,” provides the results of the NRC evaluation of the interaction of the radwaste building with Nuclear Island (NI) structures following a seismic event. Based on the clearance between the radwaste building and NI structures,

the seismic design criteria for the radwaste building, and the methods used to demonstrate that a potential radwaste building impact on NI structures during a seismic event would not impair the NI structural integrity, it was concluded that the collapse of the radwaste building would not damage NI structures. The changes identified for this activity do not change any of these clearances, design criteria, or methods and consequently, the NRC conclusions identified in Subsection 3.7.2.8.2 are still valid.

Combining the Packaged Waste Storage Room and Waste Accumulation Room does not affect compliance with GDC 3, because it does not change the fire protection analysis conclusions provided in UFSAR Tier 2 Section 9A.2. None of the combustible material loading listed in UFSAR Table 9A-3, nor any fire detection and suppression features described in UFSAR Subsection 9A.3.5 is affected by these changes. Because the radwaste building, itself, is one Fire Area (5031 AF 01) and the overall radwaste building envelope is not changing, this activity does not change any fire area boundary. The radwaste building fire area is separated from the safety related areas of the nuclear island by a 3-hour fire barrier wall, which is unchanged by this activity.

The changes to add three bunkers for storage of moderate and high activity waste, incorporate the Packaged Waste Storage and Waste Accumulation Rooms in the radwaste building, revise shield wall thickness, and eliminate an area radiation monitor that is no longer needed have no effect on environmental releases. The quantities of solid and liquid radioactive material being processed in the radwaste building and the method of control for processes used to treat that material are unchanged by this activity. The potential for creation of a hazard from radiolytic hydrogen gas generation during storage of the two highest activity ion exchange resins anticipated to be stored in the bunkers has been evaluated, and controls are defined for the maximum volume or activity of resins that may be stored for a given period of time in a single unventilated bunker to prevent the potential for creation of a hazard from radiolytic hydrogen gas generation. Therefore, it is concluded that there is no risk involved for the potential of an accidental release of radioactive materials from the radwaste building. No potential release paths for radioactive material or holdup capacity are affected by this activity. Consequently, these changes do not affect compliance with GDC 60.

These changes as described above have no adverse impact on radiation monitoring capability. One area radiation monitor is being eliminated following incorporation of the Packaged Waste Storage Room into the Waste Accumulation Room. The eliminated monitor is therefore no longer needed to provide detection in this area. The remaining monitor is being relocated to a central location in the room to provide the necessary detection to the newly combined room. Consequently, all areas within the radwaste building previously monitored are continuing to be monitored with this activity. Safety actions to be performed in response to excessive radiation levels are not affected by this activity. Consequently, these changes do not affect compliance with GDC 63.

The radwaste building changes do not affect any effluent release path or radiation monitoring capability for effluent releases to the environment. Consequently, these changes do not affect compliance with GDC 64.

Physical Security Evaluation (Annex and Radwaste Building Changes)

A review of the Physical Security Plan and the Physical Security ITAAC was completed regarding the changes identified in this amendment request. (Note that the Physical Security Plan is classified as Safeguards Information (SGI) and is not available to the public.) The

review confirmed that the proposed changes do not adversely affect the Physical Security Plan, because:

- The proposed changes have no effect on any pathways or barriers credited by the Physical Security Plan.
- No addition, change or deletion of a security position is requested.
- No lighting change is requested.
- The proposed changes do not involve the responses to the external fighting positions.
- The column line changes have no effect on either response or adversary timelines.

Furthermore, the review confirmed that the proposed changes do not affect any of the existing ITAAC related to physical security.

Summary

The proposed changes would revise the COL in regard to the AP1000 annex building and radwaste building configurations by:

1. Updating the annex building column line designations on affected Tier 1 Figures and Tier 2 Figure 3.7.2-19.
2. Revising the radwaste building configuration including the shielding design and radiation area monitoring.

These proposed changes do not adversely affect any design function. The changes do not involve an adverse change to any method of evaluation for establishing design bases or safety analyses. They do not represent a change to a design feature credited in the ex-vessel severe accident assessment. Tests, experiments, and procedures described in the licensing basis are unchanged by this activity.

4. Regulatory Evaluation

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 52, Appendix D, Section VIII.B.5.a requires that an applicant or licensee who references this appendix may depart from Tier 2 information, without prior NRC approval, unless the proposed departure involves a change to or departure from Tier 1 information, Tier 2* information, or the TS, or requires a license amendment under paragraphs B.5.b or B.5.c of this section. When evaluating the proposed departure, an applicant or licensee shall consider all matters described in the plant-specific DCD Tier 1. This license amendment requests to depart from UFSAR Tier 2 Sections 9.4.8, 9A.3.5, 11.4.2, and 12.3.2, Tables 9A-3 and 11.5-2, and Figures 1.2-22 (SUNSI), 3.7.2-19 (Sheets 2, 3, 5, 6, 7, and 8) (SUNSI), 9.4.8-1, 9A-4 (SUNSI), 12.3-1 (Sheet 14) (SUNSI), 12.3-2 (Sheet 14) (SUNSI), and 12.3-3 (Sheet 14) (SUNSI). These UFSAR Tier 2 changes involve changes to Tier 1 Section 3.3(4c) and 3.3(6b),

Tables 3.3-6 and 3.5-5, and Figures 3.3-11A (SUNSI), 3.3-12 (SUNSI), and 3.3-13 (SUNSI) and thus, require NRC approval. Compliance for each of the building changes with applicable regulatory requirements is provided below.

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a COL. This activity involves departure from plant-specific DCD Tier 1 information, and corresponding changes to COL Appendix C, Inspections, Tests, Analyses and Acceptance Criteria information; therefore, this activity requires a proposed amendment to the COL. Accordingly, NRC approval is required prior to making the plant-specific changes in this license amendment request.

4.1.1 Annex Building column line changes

Because the changes to the annex building column lines are made for consistency with the auxiliary building figures and to remove column line designations considered to be background information and therefore not considered pertinent to the scope of Tier 1 information, there are no impacts to any regulatory requirements or criteria.

4.1.2 Radwaste Building configuration changes

10 CFR 50, Appendix A, General Design Criterion (GDC) 3, *Fire protection*, requires structures, systems, and components important to safety to be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Combining the Packaged Waste Storage Room and Waste Accumulation Room does not affect compliance with GDC 3, because it does not change the fire protection analysis conclusions provided in UFSAR Tier 2 Section 9A.2. None of the combustible material loading listed in UFSAR Table 9A-3, nor any fire detection and suppression features described in UFSAR Subsection 9A.3.5, are affected by these changes. Because the radwaste building, itself, is one Fire Area (5031 AF 01) and the overall radwaste building envelope is not changing, this activity does not change any fire area boundary. The radwaste building fire area is separated from the safety related areas of the nuclear island by a 3-hour fire barrier wall, which is unchanged by this activity.

10 CFR 50, Appendix A, General Design Criterion (GDC) 60, *Control of releases of radioactive materials to the environment*, requires the nuclear power unit design shall include means to control suitably the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid wastes produced during normal reactor operation, including anticipated operational occurrences. Sufficient holdup capacity shall be provided for retention of gaseous and liquid effluents containing radioactive materials. The changes to add three bunkers for storage of moderate and high activity waste, incorporate the Packaged Waste Storage and Waste Accumulation rooms in the radwaste building, revise shield wall thicknesses, and eliminate an area radiation monitor that is no longer needed have no effect on environmental releases. The quantities of solid and liquid radioactive material being processed in the radwaste building and the method of control for processes for treating that material are unchanged by this activity. No potential release paths for radioactive material or holdup capacity are affected by this activity. Consequently, these changes do not affect compliance with GDC 60.

10 CFR 50, Appendix A, General Design Criterion (GDC) 63, *Monitoring fuel and waste storage*, requires that appropriate systems shall be provided in fuel storage and radioactive waste systems and associated handling areas (1) to detect conditions that may result in loss of residual heat removal capability and excessive radiation levels and (2) to initiate appropriate safety actions. The changes to add three bunkers, incorporate the Packaged Waste Storage and Waste Accumulation Rooms in the radwaste building, revise shield wall thicknesses, and eliminate an area radiation monitor that is no longer needed have no adverse effect on radiation monitoring capability. One area radiation monitor is being eliminated, because there is now only one room instead of two for processing of waste before and after packaging. The eliminated monitor is therefore no longer needed. The remaining monitor is being relocated to a central location to support the new combined room. Consequently, all areas within the radwaste building previously monitored continue to be monitored with this activity. Safety actions to be performed in response to excessive radiation levels are not affected by this activity. Consequently, these changes do not affect compliance with GDC 63.

10 CFR 50, Appendix A, General Design Criterion (GDC) 64, *Monitoring radioactivity releases*, requires that means shall be provided for monitoring the reactor containment atmosphere, spaces containing components for recirculation of loss-of-coolant accident fluids, effluent discharge paths, and the plant environs for radioactivity that may be released from normal operations, including anticipated operational occurrences, and from postulated accidents. The radwaste building changes do not affect any effluent release path or radiation monitoring capability for effluent releases to the environment. Consequently, these changes do not affect compliance with GDC 64.

4.2 Precedent

No precedent is identified.

4.3 Significant Hazards Consideration Determination

The proposed changes would revise the Combined Licenses (COLs) with regard to Tier 1 information and associated COL Appendix C information by revising the annex and radwaste buildings by:

1. Updating the annex building column line designations on affected Tier 1 Figures and Tier 2 Figure 3.7.2-19.
2. Revising the radwaste building configuration including the shielding design and radiation area monitoring.

This activity involves changes to UFSAR Tier 2 text, tables, and figures and a change from plant-specific Tier 1 information. The Tier 1 change also involves a proposed amendment to corresponding information in Appendix C of the COLs.

An evaluation to determine whether or not a significant hazards consideration is involved with the proposed amendment was completed by focusing on the three standards set forth in 10 CFR 50.92, “Issuance of amendment,” as discussed below:

4.3.1 Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed annex building changes updating column line designations and the radwaste building change to add three bunkers for storage of moderate and high activity waste, incorporate the Waste Accumulation Room and the Packaged Waste Storage Room, revise shield wall thicknesses, and eliminate a radiation monitor no longer needed do not alter the assumed initiators to any analyzed event. These proposed changes do not affect the operation of any systems or equipment that could initiate an analyzed accident. The proposed changes to the annex building column line designations update the annex building column line designations in the Updated Final Safety Analysis Report (UFSAR) figures to make them consistent with the UFSAR figure for the auxiliary building. The radwaste building proposed changes do not affect any accident initiators, because there is no accident initiator located within that building. Based on the above, the probability of an accident previously evaluated will not be increased by these proposed changes.

The proposed annex and radwaste building configuration changes do not affect any radiological dose consequence analysis for UFSAR Chapter 15. No accident source term parameter or fission product barrier is impacted by these changes. Structures, systems, and components (SSCs) required for mitigation of analyzed accidents are not affected by these changes, and the functions of these buildings are not adversely affected by these changes. Consequently, this activity will not increase the consequences of any analyzed accident, including the main steam line limiting break.

Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

4.3.2 Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed annex building changes updating column line designations and the radwaste building change to add three bunkers for storage of moderate and high activity waste, incorporate the Waste Accumulation Room and the Packaged Waste Storage Room, revise shield wall thicknesses, and eliminate a radiation monitor no longer needed do not change the design function of the either of these buildings or any of the systems or equipment contained therein or in any other Nuclear Island structures. These proposed changes do not adversely affect any system design functions or methods of operation. These changes do not introduce any new equipment or components or change the operation of any existing systems or equipment in a manner that would result in a new

failure mode, malfunction, or sequence of events that could affect safety-related or non-safety-related equipment or result in a radioactive material release. This activity does not allow for a new radioactive material release path or result in a new radioactive material barrier failure mode.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

4.3.3 Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed changes do not affect any safety-related equipment, design code compliance, design function, design analysis, safety analysis input or result, or design/safety margin. The margin in the design of the annex and radwaste buildings is determined by the use of the current codes and standards and adherence to the assumptions used in the analyses of this structure and the events associated with this structure. The column line designations for the annex building in UFSAR Tier 2 figures are updated to make them consistent with the UFSAR figures for the auxiliary building. This change has no adverse impact on plant construction or operation. The design of the radwaste building, including the newly added bunkers for moderate and high activity waste, merging of the Waste Accumulation Room and the Packaged Waste Storage Room, will continue to be in accordance with the same codes and standards as stated in the UFSAR. The activity has no effect on off-site dose analysis for analyzed accidents.

Therefore, the proposed amendment does not involve a significant reduction in a margin of safety.

4.4 Conclusions

Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. The above evaluations demonstrate that the proposed changes can be accommodated without an increase in the probability or consequences of an accident previously evaluated, without creating the possibility of a new or different kind of accident from any accident previously evaluated, and without a significant reduction in a margin of safety. Having arrived at negative declarations with regard to the criteria of 10 CFR 50.92, this assessment determined that the proposed change does not involve a Significant Hazards Consideration.

5. Environmental Considerations

The details of the proposed changes are provided in Sections 2 and 3 of this licensing amendment request.

This review supports a request to amend the Combined Licenses (COLs) to allow departure from various elements of the certification information in Tier 1 of the generic AP1000 DCD and the corresponding elements in Appendix C of the COL. The plant-specific Tier 1 elements for which a departure is requested include the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) and/or ITAAC supporting information referenced in individual ITAAC. The plant-specific Tier 1 changes revise information regarding the annex and radwaste buildings configuration by:

1. Updating the annex building column line designations on affected Tier 1 figures and Tier 2 Figure 3.7.2-19.
2. Revising the radwaste building configuration including the shielding design and radiation area monitoring.

The proposed changes from plant-specific Tier 1 material reflect corresponding changes to UFSAR Tier 2 material.

This review has determined that the proposed change would require an amendment to the COL; however, a review of the anticipated construction and operational effects of the proposed amendment has determined that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9), in that:

(i) There is no significant hazards consideration.

As documented in Section 4.3, Significant Hazards Consideration, of this license amendment request, an evaluation was completed to determine whether or not a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, “Issuance of amendment.” The Significant Hazards Consideration determined that (1) the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the proposed amendment does not involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of “no significant hazards consideration” is justified.

(ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

The proposed changes are unrelated to any aspect of plant construction or operation that would introduce any change to effluent types (e.g., effluents containing chemicals or biocides, sanitary system effluents, and other effluents), or affect any plant radiological or non-radiological effluent release quantities. Furthermore, the proposed changes do not affect any effluent release path or diminish the functionality of any design or operational features that are credited with controlling the release of effluents during plant operation. Therefore, it is concluded that the proposed

amendment does not involve a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed changes to the annex and radwaste buildings do not adversely affect any plant radiation zones, and controls under 10 CFR Part 20 preclude a significant increase in occupational radiation exposure. Therefore, the proposed amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the proposed amendment, it has been determined that there are no anticipated construction and operational effects of the proposed amendment involving (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment of the proposed amendment is not required.

6. References

None.

Southern Nuclear Operating Company

ND-17-0023

Enclosure 7

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revisions to Enclosure 2 Exemption Request: Annex and Radwaste Building Changes

(LAR-13-019R1)

Portions revised from the original Exemption Request, ND-14-0562 Enclosure 2, are indicated by revision bars in the right-hand margin.

(This enclosure contains 8 pages, including this cover sheet)

1.0 PURPOSE

Southern Nuclear Operating Company (the Licensee) requests a permanent exemption from the provisions of 10 CFR 52, Appendix D, Section III.B, "Design Certification Rule for the AP1000 Design, Scope and Contents," to allow a departure from elements of the certification information in Tier 1 of the generic AP1000 Design Control Document (DCD). The regulation, 10 CFR 52, Appendix D, Section III.B, requires an applicant or licensee referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including certified information in DCD Tier 1. Tier 1 includes ITAAC that must be satisfactorily performed prior to fuel load. The design details to be verified by these ITAAC are specified in the text, tables, and figures that are referenced in each individual ITAAC. The Tier 1 information for which a plant-specific departure and exemption is being requested includes non-system based design descriptions and other detailed information related to these design descriptions and the associated ITAAC, such as changes to concrete wall thicknesses, column line designations in the annex building, and interior configuration of the radwaste building.

This request for exemption will apply the requirements of 10 CFR 52, Appendix D, Section VIII.A.4 to allow changes to Tier 1 information due to the following proposed changes to the non-system based design descriptions and ITAAC figures and tables:

- Section 3.3, Buildings
    - Paragraph 4c – delete discussion of the packaged waste storage room, which is incorporated into the waste accumulation room
    - Paragraph 6b – update the description and volume of the waste accumulation room per combination with the packaged waste storage room
- Table 3.3-6, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)
    - Item 4b – update acceptance criteria for concrete thickness in the walls of the waste accumulation room to specify minimum required thickness near the radwaste bunkers
    - Item 4c – delete ITAAC related to the packaged waste storage room, which is incorporated into the waste accumulation room
    - Item 6b - update the design commitment, inspections, tests, analyses and acceptance criteria of the waste accumulation room following incorporation of the packaged waste storage room
- Table 3.5-5, Area Radiation Monitors – update table notes following merging of the rooms such that one monitor will serve the new combined space
- Figure 3.3-11A, Annex Building Plan View at Elevation 100'-0″ sensitive unclassified non-safeguards information (SUNSI) – remove column line designations for columns 6, 8, 10, 11.15, 13.2, 13.3, 14.1, 15.1, 15.2, A, B, C and D
- Figure 3.3-12, Annex Building Plan View at Elevation 117'-6″ (SUNSI) – remove column line designations for columns 6, 8, 10, 11.15, 13.2, 13.3, 14.1, 15.1, 15.2, A, B, C and D
- Figure 3.3-13, Annex Building Plan View at Elevation 135'-3″ (SUNSI) – remove column line designations for columns 6, 8, 10, 11.15, 13.2, 13.3, 14.1, 15.1, 15.2, A, B, C and D

This request will apply the requirements for granting exemptions from design certification information, as specified in 10 CFR Part 52, Appendix D, Section VIII.A.4, 10 CFR 52.63, §52.7, and §50.12.

2.0 BACKGROUND

The Licensee is the holder of Combined License Nos. NPF-91 and NPF-92, which authorize construction and operation of two Westinghouse Electric Company AP1000 nuclear plants, named Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively. During the detailed design finalization of the annex and radwaste buildings, departures from plant-specific DCD Tier 2 information were determined necessary to finalize the layout of space envelopes, orientations, and/or piping runs that comprise the structure or the systems within this structure. This activity requests exemption from the generic DCD Tier 1 descriptions, tables and figures that are involved with the plant-specific DCD Tier 2 departures, and which support the associated COL Appendix C ITAAC.

This activity requests exemption from elements of the AP1000 (Tier 1) design information to allow a departure from annex building Layout Figures to remove column line details that are not discussed in the design descriptions or associated ITAAC. In addition, this activity requests exemption from elements of the AP1000 (Tier 1) design information to allow a departure from design descriptions, figures and associated ITAAC for the radwaste building. The proposed departure would incorporate the Waste Accumulation Room and the Packaged Waste Storage Room of the radwaste building into one room, change the shield wall thicknesses in the radwaste building, add three bunkers to the radwaste building for storage of moderate and high activity waste and eliminate one radiation monitor due to the combination of the Waste Accumulation Room and the Packaged Waste Storage Room.

As discussed above, an exemption from elements of the AP1000 certified (Tier 1) design information is requested to allow plant-specific departures to be taken from non-system based design description and ITAAC Figures and Tables.

3.0 TECHNICAL JUSTIFICATION OF ACCEPTABILITY

An exemption is requested to depart from AP1000 generic Design Control Document (DCD) Tier 1 material by removing column line detail that is not discussed in the design descriptions or associated ITAAC from annex building Layout Figures. As discussed in Tier 1, Section 1.1, the design function of a column line is to provide a designation on the plant reference grid which is used to define the location of building walls and columns. The Tier 1 text, tables, and figures continue to communicate the structural design of the annex building. The proposed changes neither adversely impact the ability to meet the design functions of the structures nor involve a significant decrease in the level of safety provided by the structure. Because the proposed changes are consistent with plant-specific DCD Tier 2 information and the design, the changes do not affect a structure, system or component. The proposed changes to the column line detail continue to provide the detail necessary to implement the corresponding ITAAC.

Additionally, the requested exemption would depart from the description of the radwaste building layout by merging the Packaged Waste Storage Room into the Waste Accumulation Room. The radwaste building is a non-seismic structure that has the non-safety-related design function of handling and storage of low and moderate or high activity wastes. The proposed modification of the radwaste building will continue to support that design function, while providing for greater flexibility in handling these wastes and maintaining dose rates as low as

reasonably achievable (ALARA). The proposed layout changes and associated changes to add shielded bunkers and reconfigure radiation monitors will not adversely impact the design functions or significantly reduce the level of safety. The proposed changes to the radwaste building Structure and contained equipment continue to meet their required functionality.

Detailed technical justification supporting this request for exemption is provided in Section 3 of the associated License Amendment Request in Enclosure 6 of this letter.

4.0 JUSTIFICATION OF EXEMPTION

10 CFR 52, Appendix D, Section VIII.A.4 and 10 CFR 52.63(b)(1) govern the issuance of exemptions from elements of the certified design information for AP1000 nuclear power plants. Because the Licensee has identified changes to the Tier 1 information related to the annex and radwaste buildings' layout and structures as a result of design finalization activities, an exemption to the certified design information in Tier 1 is needed.

10 CFR 52, Appendix D, and 10 CFR 50.12, §52.7, and §52.63 state that the NRC may grant exemptions from the requirements of the regulations provided six conditions are met: 1) the exemption is authorized by law [§50.12(a)(1)]; 2) the exemption will not present an undue risk to the health and safety of the public [§50.12(a)(1)]; 3) the exemption is consistent with the common defense and security [§50.12(a)(1)]; 4) special circumstances are present [§50.12(a)(2)(ii)]; 5) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption [§52.63(b)(1)]; and 6) the design change will not result in a significant decrease in the level of safety [Part 52, App. D, VIII.A.1].

The requested exemption to change the configuration and layout of the annex and radwaste buildings satisfies the criteria for granting specific exemptions, as described below.

1. **This exemption is authorized by law**

   The NRC has authority under 10 CFR 52.63, §52.7, and §50.12 to grant exemptions from the requirements of NRC regulations. Specifically, 10 CFR 50.12 and §52.7 state that the NRC may grant exemptions from the requirements of 10 CFR Part 52 upon a proper showing. No law exists that would preclude the changes covered by this exemption request. Additionally, granting of the proposed exemption does not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations.

   Accordingly, this requested exemption is "authorized by law," as required by 10 CFR 50.12(a)(1).

2. **This exemption will not present an undue risk to the health and safety of the public**

   The proposed exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would allow changes to elements of the plant-specific DCD Tier 1, to depart from the AP1000 certified (Tier 1) design information. The plant-specific DCD Tier 1 will continue to reflect the approved licensing basis for VEGP Units 3 and 4, and will maintain a consistent level of detail with that which is currently provided elsewhere in Tier 1 of the DCD. Therefore, the affected plant-specific DCD Tier 1 ITAAC will continue to serve its required purpose.

   The changes to annex and radwaste buildings do not represent any adverse impact to their design functions or the systems, structures and components therein and will continue to protect the health and safety of the public in the same manner. The annex

and radwaste building changes do not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor do they modify or remove any design or operational controls or safeguards intended to mitigate any existing on-site hazards. Furthermore, the proposed changes would not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that would result in significant fuel cladding failures. Accordingly, these changes do not present an undue risk from any existing or proposed equipment or systems.

Therefore, the requested exemption from 10 CFR 52, Appendix D, Section III.B would not present an undue risk to the health and safety of the public.

3. The exemption is consistent with the common defense and security

The exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would change elements of the annex and radwaste building layout and structures as presented in the non-system based design descriptions and ITAAC figures and tables in the plant-specific DCD Tier 1, thereby departing from the AP1000 certified (Tier 1) design information. The proposed exemption will enable performance of the ITAAC associated with these changed elements, by reflecting the current design information in the text, tables, and figures that are referenced in these ITAAC. The exemption does not alter or impede the design, function, or operation of any plant SSCs associated with the facility's physical or cyber security, and therefore does not adversely affect any plant equipment that is necessary to maintain a safe and secure plant status. The proposed exemption has no adverse impact on plant security or safeguards.

Therefore, the requested exemption is consistent with the common defense and security.

4. Special circumstances are present

10 CFR 50.12(a)(2) lists six "special circumstances" for which an exemption may be granted. Pursuant to the regulation, it is necessary for one of these special circumstances to be present in order for the NRC to consider granting an exemption request. The requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The rule under consideration in this request for exemption is 10 CFR 52, Appendix D, Section III.B, which requires that a licensee referencing the AP1000 Design Certification Rule (10 CFR Part 52, Appendix D) shall incorporate by reference and comply with the requirements of Appendix D, including Tier 1 information. The VEGP Units 3 and 4 COLs reference the AP1000 Design Certification Rule and incorporate by reference the requirements of 10 CFR Part 52, Appendix D, including Tier 1 information. The underlying purpose of Appendix D, Section III.B is to describe and define the scope and contents of the AP1000 design certification, and to require compliance with the design certification information in Appendix D.

Changes are being made to resolve inconsistencies in the column line designation between the annex building and the auxiliary building figures in the UFSAR. The proposed changes to the annex building column line designations will facilitate plant layout and construction by improving the accuracy of the plant layout figures, with no impact on the ability of these structures to perform as designed.

Additional changes are being made because the analysis of the radwaste building identified that a small amount of moderate activity waste would require a concrete slab too thick for the current structural design of the building to maintain adjacent areas at Zone 1 radiation levels. The proposed changes to the radwaste building are made to provide for greater operator flexibility in handling of waste before and after packaging, to minimize the quantity of shielded bunkers required for storage of moderate and high activity waste to keep radiation doses to As Low As is Reasonably Achievable (ALARA) values, to allow temporary shielding to maintain acceptable radiation levels on the radwaste building roof, and to maintain portions of the radwaste building at radiation Zone I levels.

Based on the above, each of the requested changes will facilitate plant construction and maintain or enhance future safe plant operation and maintenance, while providing greater operator flexibility and maintaining radiation doses as low as reasonably achievable. Accordingly, this change to the certified information will enable the licensee to safely construct, maintain, and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR Part 52, Appendix D.

Therefore, special circumstances are present, because application of the current generic certified design information in Tier 1 as required by 10 CFR Part 52, Appendix D, Section III.B, in the particular circumstances discussed in this request would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

5. The special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption

The exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would change elements of the plant-specific DCD Tier 1 by departing from standard AP1000 certified (Tier 1) design information. This exemption would allow a change to a non-system based design description and ITAAC figures and tables. Based on the nature of the proposed changes to the generic Tier 1 information and the understanding that these changes were identified during the design finalization process for the AP1000, it is expected that this exemption will be requested by other AP1000 licensees and applicants. However, a review of the reduction in standardization resulting from the departure from the standard DCD determined that even if other AP1000 licensees and applicants do not request this same departure, the special circumstances will continue to outweigh any decrease in safety from the reduction in standardization because the key design functions of the annex and radwaste building structures associated with this request will continue to be maintained. Furthermore, the justification provided in the license amendment request and this exemption request and the associated mark-ups demonstrate that there is a limited change from the standard information provided in the generic AP1000 DCD, which is offset by the special circumstances identified above.

Therefore, the special circumstances associated with the requested exemption outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

6. The design change will not result in a significant decrease in the level of safety.

The proposed exemption would allow changes to the annex and radwaste building structure and layouts as presented in non-system based design description and ITAAC figures and tables. The level of safety presented by plant structures is defined by the ability of the structures to protect the SSCs contained within these structures from

hazards and to minimize the propagation of damage resulting from postulated events to the degree practical.

As a result of the limited-scope and nature of the proposed changes associated with this exemption request, no systems or equipment will be adversely impacted such that there are new failure modes introduced by these changes and the level of safety provided by the current annex and radwaste buildings and the systems and equipment contained therein will be maintained.

Because the proposed changes to the annex and radwaste building structure and layout will not adversely affect the ability of the buildings to perform their design functions and the level of safety provided by the annex and radwaste buildings and the systems and equipment contained therein is unchanged, it is concluded that the design change associated with proposed exemption will not result in a significant decrease in the level of safety.

5.0 RISK ASSESSMENT

A risk assessment was not determined to be applicable to address the acceptability of this proposal.

6.0 PRECEDENT EXEMPTIONS

None identified.

7.0 ENVIRONMENTAL CONSIDERATION

The Licensee requests a departure from elements of the certified information in Tier 1 of the generic AP1000 DCD. The Licensee has determined that the proposed departure would require a permanent exemption from the requirements of 10 CFR 52, Appendix D, Section III.B, “Design Certification Rule for the AP1000 Design, Scope and Contents” with respect to installation or use of facility components located within the restricted area, as defined in 10 CFR Part 20, or which changes an inspection or a surveillance requirement; however, the Licensee evaluation of the proposed exemption has determined that the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

Based on the above review of the proposed exemption, the Licensee has determined that the proposed activity does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment of the proposed exemption is not required.

Specific details of the environmental considerations supporting this request for exemption are provided in Section 5 of the associated License Amendment Request provided in Enclosure 6 of this letter.

8.0 CONCLUSION

The Licensee requests a permanent exemption for elements of AP1000 design certification information reflected in Tier 1. The proposed changes to Tier 1 are necessary to revise a non-system based design description and ITAAC figure and table in the plant-specific DCD Tier 1 to reflect proposed plant-specific design. The proposed exemption would allow departure from AP1000 generic Tier 1 DCD information by removing column line designations from Tier 1 figures to allow updated column line designations in the corresponding more-detailed Tier 2 figures of the annex building, revise the radwaste building layout to increase operator flexibility in handling waste before and after packaging, and modify the building structures and area radiation monitors of the affected area per the new layout. The exemption request meets the requirements of 10 CFR 52.63, “Finality of design certifications,” 10 CFR 52.7, “Specific exemptions,” 10 CFR 50.12, “Specific exemptions,” and 10 CFR 52 Appendix D, “Design Certification Rule for the AP1000.” Specifically, the exemption request meets the criteria of 10 CFR 50.12(a)(1) in that the request is authorized by law, presents no undue risk to public health and safety, and is consistent with the common defense and security. Furthermore, approval of this request does not result in a significant decrease in the level of safety, satisfies the underlying purpose of the AP1000 Design Certification Rule, and does not present a significant decrease in safety as a result of a reduction in standardization.

9.0 REFERENCES

1.) Westinghouse Electric Company, “AP1000 Design Control Document,” Revision 19, June 2011.

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Enclosure 8

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revisions to Enclosure 3 Licensing Basis Document Proposed Changes

(LAR-13-019R1)

Insertions are denoted by Blue Underline and Deletions by ~~Red Strikethrough~~

Green text is Site-specific FSAR content.

Portions revised from the original Licensing Basis Proposed Changes, ND-14-0562 Enclosure 3, are indicated by revision bars in the right-hand margin.

(This enclosure contains 4 pages, including this cover page)

Enclosure 3, page 11 of 13, is revised to add the following proposed changes:

UFSAR, Subsection 11.4.2.5.2, *Radwaste Building*

The radwaste building, described in Section 1.2, houses the mobile systems facility~~. It also includes~~ and the waste accumulation room ~~and the packaged waste storage room~~. These rooms are serviced by the mobile systems facility crane.

In the mobile systems facility, three truck bays provide for mobile or portable processing systems and for waste disposal container shipping and receiving. A shielded pipe trench to each of the truck bays is used to route liquid radwaste supply and return lines from the connections in the shielded pipe pit at the auxiliary building wall. Separate areas are reserved for empty (new) waste disposal container storage, container laydown, and forklift charging. An area is available near the door to the annex building for protective clothing dropoff and frisking.

The waste accumulation room ~~(pre-processing)~~ is divided as needed, using partitions and portable shielding to adjust the storage areas for different waste categories as needed to complement the radioactivity levels and volumes of generated wastes. The accumulation room also contains three 1000 cubic feet (10 feet x 10 feet x 10 feet) bunkers with removable steel shield bunker roof plates and removable steel shield bunker door plates. The design functions of this removable shielding are described in subsection 12.3.2.2.5. The accumulation room has lockable doors to minimize unauthorized entry and inadvertent exposure.

The bunkers have been evaluated for hydrogen gas generation resulting from the temporary storage of resin, specifically condensate polishing system (CPS) resin and steam generator blowdown system electrodeionization (EDI) unit resin. Hydrogen was selected as the most credible source of explosive gas generation. Based on table 3.1 of NUREG/CR 6673 other flammable gases formed by radiolysis in resin are insignificant in comparison to hydrogen. Methane was also considered, but was found not to be a credible source because the AP1000 CPS and EDI systems utilize resin beads which do not have the cellulose component that could support the growth of bacteria and methane production. Generation of flammable gases by processes such as biodegradation, decomposition and waste material interaction due to chemistry, was also determined to not be credible based on the waste forms intended for storage in the AP1000 radwaste bunkers; i.e., secondary side spent resin, and miscellaneous contaminated / activated components or tools.

The evaluation assumes two storage scenarios of the bounding amounts of CPS and EDI resins expected to be generated over one cycle of operation and then stored in a single, unventilated bunker for one year. The scenarios result in a maximum hydrogen concentration of less than 4 volume percent hydrogen in air, and conclude that there is no risk of radiolytic hydrogen gas generation that could result in the creation of a hazard within the stated assumptions. Although the evaluation is focused on storing a bounding amount of resin into only one bunker, all three bunkers are available for use.

The existing administrative controls in subsections 11.2.1.2.5.2 and 13.5.2.2.5 limit the total cumulative radioactive inventory of unpackaged wastes allowed in the radwaste building and bunkers, and the existing radiation zoning and access requirements in subsection 12.3.1.2 further restrict the amount and activities of resins that are allowed to be stored in the bunker. Therefore, a new evaluation for hydrogen gas generation resulting from the temporary storage of resin would only be needed in the unlikely event that storage of resins with total volume or activity higher than that of the evaluated resins, or for a longer storage period, is desired. The new evaluation would be needed to confirm the risk associated with potential hydrogen gas generation by demonstrating that the hydrogen concentration in the bunker air space will not exceed 4 volume percent hydrogen in air.

~~The packaged waste storage room may be separated into high- and low-activity areas,using portable shielding to minimize exposure while providing operational flexibility. A lockable door is provided to minimize unauthorized entry and radiation exposure.~~

The heating and ventilating system for the radwaste building is described in Subsection 9.4.8.

Enclosure 3, page 13 of 13, is revised to add the following proposed changes:

UFSAR Subsection 12.3.2.2.5, *Radwaste Building Shielding Design*

Shielding is provided as necessary for the waste storage areas in the radwaste building to meet the radiation zone and access requirements. Depending on the equipment in the compartments, the radiation zoning varies from Zone I through IV as shown on the radiation zone drawing of Figure 12.3-1. Temporary partitions and shield walls will be provided, as required, to supplement the permanent shield walls surrounding the waste accumulation ~~and packaged waste storage~~ room~~s~~ inside the radwaste building. The three bunkers described in subsection 11.4.2.5.2 include removable steel shield bunker roof plates that provide vertical shielding during storage of moderate and high activity waste to maintain radiation levels as Zone II to Zone III on the normally unoccupied and access controlled radwaste building roof, and removable steel shield bunker door plates, that may be installed for ALARA considerations. The removable steel shield bunker door plates are not required to be installed to maintain radiation levels in the worker occupied areas in the radwaste building and in the adjacent plant yard areas as Zone I to Zone IV as defined in UFSAR Figure 12.3-1 (Sheet 14).

The following new text is added after Enclosure 3, page 13 of 13:

UFSAR Subsection 11.2.1.2.5.2, *Use of Mobile and Temporary Equipment*

Add after the fifth paragraph the following text (blue text denotes standard FSAR content and green text is site-specific FSAR content):

Operating procedures also discussed in Section 13.5 include administrative controls to limit the total cumulative radioactive inventory of unpackaged wastes located in the radwaste building so that the Regulatory Guide 1.143 unmitigated radiological release criteria of 5 rem to site personnel, and the 10 CFR Part 20.1301 dose limits of 100 millirem at the protected area boundary for members of the public, are not exceeded. These unpackaged wastes include liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste. These administrative controls limit the radionuclide inventory to less than the A2 limit specified in Appendix A to 10 CFR Part 71 in each of the three (3) radwaste monitor tanks, in each of up to three (3) mobile radwaste processing systems, and in any additional equipment located in the radwaste building. Transfer or packaging of spent media from a mobile radwaste processing system located in the radwaste building is procedurally controlled such that either spent media packaging for off-site shipment in process in the radwaste building is considered in the inventory with the operation of the mobile radwaste processing system, or the spent media is transferred to the seismic Category I auxiliary building for packaging. Once the packaging in the radwaste building is complete, the activity of the packaged spent media is no longer added to the applicable mobile radwaste processing system activity for comparison with the applicable A2 quantity limit. This results in preventing exposures

from any unmitigated radiological release in the radwaste building, occurring over a two hour exposure period, from exceeding the Regulatory Guide 1.143 unmitigated radiological release criteria and 10 CFR Part 20.1301 dose limits to site personnel and members of the public at the protected area boundary, respectively. The unmitigated, unshielded worker dose is calculated at 11 feet from the source. Unlimited worker occupancy workstations and low dose rate waiting areas are located no closer than 11 feet from a mobile radwaste processing system or a radwaste monitor tank.

UFSAR Subsection 13.5.2.2.5, *Radioactive Waste Management Procedures*

Add after the first paragraph the following text (blue text denotes standard FSAR content):

Operating procedures to limit the total cumulative radioactive inventory of unpackaged wastes located in the radwaste building will be developed, implemented, and maintained prior to initial fuel load. These operating procedures are based on monitoring and controlling the radioactive inventory of unpackaged wastes so that the Regulatory Guide 1.143 unmitigated radiological release criteria of 5 rem to site personnel, and the 10 CFR Part 20.1301 dose limits of 100 millirem at the protected area boundary for members of the public, are not exceeded. These administrative controls limit the radionuclide inventory to less than the A2 limit specified in Appendix A to 10 CFR Part 71 in the radwaste building. Further details regarding administrative controls of unpackaged radioactive waste located in the radwaste building are described in Section 11.2.

Southern Nuclear Operating Company

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Enclosure 9

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revisions to Enclosure 4 Proposed Changes (Protected Information) – Security-Related Information (SUNSI) - Withhold from Public Disclosure Under 10 CFR 2.390(d)

(Withheld Information)

(LAR-13-019R1)

Note: These revisions updates 5 figures from Enclosure 4 submitted with the original LAR-13-019. This update ensures that all figure change "bubbles" appear consistent as discussed in Enclosure 5 Question 8a.

(This enclosure contains 6 pages, including this cover page)