

June 13, 2023

NL-23-0339  
10 CFR 50.90

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Vogtle Electric Generating Plant Units 3 and 4  
Docket Nos.: 52-025 & 52-026

Subject: Response to Request for Additional Information Regarding License Amendment  
Request for Technical Specification 3.8.3, Inverters – Operating, Completion Time Extension  
(LAR-22-002S1)

Ladies and Gentlemen:

On January 3, 2023, pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) submitted License Amendment Request (LAR) LAR-22-002 per ND-22-0881 requesting an amendment to the combined licenses (COLs) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Numbers NPF-91 and NPF-92, respectively) (ADAMS Accession Number ML23003A797). The LAR proposes changes to COL Appendix A, Technical Specifications (TS) 3.8.3, Inverters – Operating, to extend the Completion Time for Required Action A.1.

On May 17, 2023, the Nuclear Regulatory Commission (NRC) Staff issued a final Request for Additional Information (RAI) (ADAMS Accession No. ML23137A216) seeking clarifications related to the requested LAR. This letter submits a supplement to LAR-22-002. Enclosure 2 provides the responses to the RAI.

This supplement does not impact the scope or conclusions of the Technical Evaluation, Significant Hazards Consideration Determination, or Environmental Considerations of the original submittal.

This letter contains no regulatory commitments. This letter has been reviewed and determined not to contain security-related information.

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

Should you have any questions, please contact Amy Chamberlain at (205) 992-6361.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 13<sup>th</sup> of June 2023.

Respectfully submitted,

A handwritten signature in cursive script, reading "Amy C. Chamberlain", is positioned above a horizontal line.

Amy Chamberlain  
Licensing Manager  
Southern Nuclear Operating Company

Enclosure: [Provided with LAR-22-002]

Enclosure 2: Responses to Requests for Additional Information (LAR-22-002S1)

cc:

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VPO Project Manager  
Senior Resident Inspector – Vogtle 3 & 4  
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File AR.01.02.06

**Southern Nuclear Operating Company**

**NL-23-0339  
Enclosure 2**

**Vogtle Electric Generating Plant (VEGP) Units 3 and 4**

**Responses to Requests for Additional Information  
(LAR-22-002S1)**

(Enclosure 2 consists of 13 pages, including this cover page.)



On January 3, 2023, Southern Nuclear Operating Company (SNC) submitted License Amendment Request (LAR) 22-002 per ND-22-0881 requesting an amendment to the combined licenses (COLs) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Numbers NPF-91 and NPF 92, respectively) (ADAMS Accession No. ML23003A797). On May 17, 2023, the Nuclear Regulatory Commission (NRC) Staff issued final Request for Additional Information (RAI) (ADAMS Accession No. ML23137A216) seeking clarifications related to the requested LAR.

The NRC RAI and SNC responses follow.

**NRC RAI #1:**

Staff regulatory guidance C.2.2 of Regulatory Guide 1.200, "Acceptability of Probabilistic Risk Assessment Results for Risk-informed Activities," Revision 3, states in part, that "[Facts and Observations (F&Os)] that are not closed using an NRC-endorsed process should be evaluated by the licensee or applicant for their impact on a risk-informed application and addressed with documented justification with necessary changes made to the PRA prior to the use of PRA in the risk-informed application."

The discussion of F&Os (pg. 17 of the LAR) indicates that, "the PRA has been updated to address peer review F&Os, to the extent possible for a pre-operational plant." The staff requests that SNC provide a complete list of open F&Os for all Probabilistic Risk Assessment (PRA) analyses, and where the F&O is related to or may impact the LAR, provide information as to planned disposition or resolution.

This information is being requested in order to support a determination that PRA standards have been followed and the reasonable assurance of quality and completeness of the PRA.

**SNC RAI#1 Response:**

Internal Events:

The At-Power Internal Events PRA was peer reviewed against Part 2 of ASME/ANS RA-Sa-2009 in 2013. Since the 2013 peer review, the Vogtle Units 3&4 plant At-Power Internal Events PRA has been updated to address plant changes. Additionally, it was also updated to address several peer review F&Os, to the extent possible for a pre-operational plant.

Seven of the open F&Os are identified in the peer review report as "Met Intent, Not Achievable" due to the operational/construction stage of the plant at the time of the peer review. The following is the list of these F&Os. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. See section "Dispositions for impact of "Met Intent, Not Achievable." Open Findings:" at the end of the RAI response for information on how these findings are dispositioned for impact on this application.

- IE-A3-01 - Update when plant-specific data are available.
- SY-A2-01 - Update when plant-specific information is available.
- SY-A16-01 - Include system pre-initiators HFEs into the applicable system notebooks when sufficient information is available.
- HR-A1-01 - When final versions of applicable test and maintenance procedures are available, perform a verification review.
- HR-C2-01 - Evaluate generic operating experience of mispositioning events and miscalibration events to identify any new failure modes.
- DA-C2-01 - Once plant specific data is available, update in accordance with the standard and existing guidance.



- QU-D4-01 - When other comparable plants are operating, a review could be performed.

Since the 2013 peer review, the Vogtle Units 3&4 plant At-Power Internal Events PRA has also been updated to address other peer review Findings & Observations (F&Os) that were not categorized as “not met, not achievable.” The following is a list of the F&Os where action was taken to incorporate impact of the finding into the PRA and/or its associated documentation. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. All updates to address the findings were characterized as PRA maintenance. The additional documentation and updates do not represent a methodology change.

- Initiating Event
  - IE-A10-01 – Provide/enhance documentation discussing the consideration of multi-unit LOOPs and shared systems.
  - IE-B3-01 - Provide/enhance documentation to support the basis for each initiator that is grouped in the IE analysis.
  - IE-C1-04 - Provide/enhance documentation on the small break LOCA frequency estimate.
- Accident Sequence
  - AS-A5-01 -Potential impact of assumptions related to Spurious ADS Stage 4 and IRWST Injection on the PRA results.
- Systems
  - SY-A14-01 - Exposure time for locked open valves.
  - SY-A15-01 - Perform a review of pipe ruptures which have been screened to ensure that excluded failure will not result in loss of more than one train.
  - SY-A18-01 - Include conditions that cause the system to isolate or trip, or those conditions that once exceeded cause the system to fail, explicitly in the system notebooks.
  - SY-A21-01 - Document the bases for the assumption that there are no spatial or environmental hazards associated with system impacts.
  - SR-B12-01 - Include MCR HVAC system in the HVAC notebook or provide additional analysis to justify exclusion.
  - HR-A2-01 - Review calibration procedures for important actuation systems to identify, assess, and potentially screen out miscalibration actions.
  - HR-D5-01 - Review the assumption of independence of potentially related pre- initiator actions based on the test and maintenance being performed by different crews and different times.
  - HR-E3-01 - Conduct additional interviews with trained operators and/or training staff when they are available to verify the understanding of EOPs and AOPs.
  - HR-G1-01 – Provide additional discussion of the recovery options and credit more than one recovery, but without using zero dependence.
  - HR-G4-01- Remove the reference to multiple-tube-rupture events in the discussion of the timing of SGTR-related operator actions.
  - HR-G6-01 - Provide a more quantitative check for consistency.
- Quantification
  - QU-E2-01 - Need to perform a more comprehensive identification of assumptions throughout the PRA model documentation and evaluate the potential impact.



- QU-F3-01 - Use the Standard definition as a guide or provide a new definition of significant accident sequences and significant cutsets.
- LERF
  - LE-F1-01 - Perform summary calculation to quantify PDS relative contribution.

One F&O continues to be tracked as open. Finding LE-E2-01 is related to conservative assumptions related to the treatment of diffusion flames at the IRWST vents, the size of diffusion flames, and the thermal loading on the containment shell. This finding is specific to the LERF contribution due to hydrogen DDT and diffusion flame. Full resolution of this finding could reduce the overall LERF. Given the lower ICLERP estimated for internal events when compared to other hazards, full resolution of this finding is not anticipated to impact this application.

#### Internal Flooding:

The At-Power Internal Flooding PRA was peer reviewed against Part 3 of ASME/ANS RA-Sa-2009 in 2013. Since the 2013 peer review, the AP1000 plant At-Power Internal Flooding PRA has been updated to address peer review F&Os, to the extent possible for a pre-operational plant. In 2020, an independent F&O closure assessment was performed in accordance with Appendix X of NEI 05-04.

Two of the open F&Os are identified as “Met Intent, Not Achievable” due to the operational/construction stage of the plant at the time of the peer review and the independent F&O closure assessment. The following is the list of these F&Os. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. See section “Dispositions for impact of “Met Intent, Not Achievable.” Open Findings:” at the end of the RAI response for information on how these findings are dispositioned for impact on this application.

- IFPP-A5-01 - Perform plant walkdowns and update analysis when plant is construction is sufficiently advanced in order to verify as-built plant. Review maintenance procedure when available and develop human-induced flood initiator.
- IFSO-A4-01 - Re-evaluate HELB taking into consideration the specific impact of high temperature, pressure, humidity, pipe whip and jet impingement. This includes treatment of human-induced flood mechanisms.

#### Internal Fire:

The At-Power Fire PRA was peer reviewed against Part 4 of ASME/ANS RA-Sa-2009 in 2017. Since the 2017 peer review, the Vogtle Units 3&4 plant At-Power Fire PRA has been updated to address several peer review F&Os, to the extent possible for a pre-operational plant. No internal fire F&Os are identified as having possible impact to this application.

Two of the open F&Os are identified as Met Intent, Not Achievable due to the operational/construction stage of the plant at the time of the peer review. The following is the list of these F&Os. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. See section “Dispositions for impact of “Met Intent, Not Achievable.” Open Findings:” at the end of the RAI response for information on how these findings are dispositioned for impact on this application.



- 27-6 - Collect and analyze plant specific fire event data when needed to identify outliers and update frequency.
- 29-2 - When achievable, perform the required plant walkdowns to satisfy this SR.

Since the 2017 peer review, the Vogtle Units 3&4 plant At-Power Internal Fire PRA has been updated to address several peer review F&Os. The following is a list of the F&Os where action was taken to incorporate impact of the finding into the PRA and/or its associated documentation. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. All updates to address the findings were characterized as PRA maintenance. The additional documentation and updates do not represent a methodology change.

- 29-4 - The potential for hot gas layer impacts beyond the first exposed compartment to additional compartments with open boundaries needs to be addressed and documented in the FSS Notebook.
- 30-3 - Refine or add justification for the modelling approach for scenario 1100AF11303B (Full Compartment Burn.)
- 30-7 - Ensure fire equivalent gates are developed for these gates if necessary: SLBD-FI and L2-SGS-SS-PA-PLA (fire induced steam line break logic.)
- 31-2 - Clearly identify in the global analysis boundary drawing the scope of the Fire PRA.
- 31-4 - Clarify in the plant partitioning notebook that doors are closed and mechanisms for closing doors when fires are detected are not needed in the analysis.
- 31-5 - Implement the treatment of shared equipment between units in the apportioning frequency process.
- 31-6 - Include the analysis of the containment in Table 6.1-41.
- 32-1 - Discussion on how the review of the seismic induced fire ignition sources was performed should be documented in the notebook. In particular the results of the comparison between the fire scenarios identified in the Seismic PRA and Fire PRA should be documented.
- 32-3 - The hot short probabilities should be recalculated using the tables from NUREG/CR-7150, Volume 2 for control cables that are part of a double break circuit or provide a justification for utilizing the probabilities from the single break tables.
- 33-3- Include 1 specific table that dispositions all basic event in the Vogtle PRA model. If the FSS database will be used for this, ensure that all basic events from the fault tree are included. In addition, add the FSS database as a reference. Update the disposition used in Attachment 4 of V34-RIE-FIREPRA-U00-02A to be clearer on the impact on the Fire PRA for Vogtle.

The following Fire F&Os continue to be tracked as open. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. Each of these F&Os were reviewed and all were characterized as no impact to this application. No impact on the fire treatment for the IDS systems was identified due to these findings. Resolution of the findings could shift importance within the fire PRA results, but given the low quantified risk results in the supporting analysis, resolution of the findings is not anticipated to impact the conclusions or challenge the RG 1.174 and RG 1.177 thresholds of 1E-6 ICCDP or 1E-7 ICCLERP.

- 27-2 - Use type codes in CAFTA to implement the CMFLA data.
- 27-4 - Describe the frequency values assigned to fire scenarios representing building collapse.



- 29-3 - Determine where the 5 minute detector timing would impact risk results, perform detector calculations to determine actuation timing for the specific fire scenario HRR and configuration. Ensure the detector location/configuration (i.e., consideration of beam pockets, distance, obstructions, etc.) is effective for actuation of the specific fire scenario.
- 30-1 - Develop or justify the conservative RCP trip treatment.
- 30-5 - Credit an operator action to secure CVS prior to a primary safety lifting or add justification that not crediting operator action is appropriate for plant design / procedures.
- 30-8 - Either update the documentation to reflect different fire modelling or model the HFE credited to prevent spurious actuation.
- 31-7 - Remove reference to damage temperatures as the criteria for quantification. Clarify that the criteria for quantification is based on exposed steel or the presence of a high hazard fire. In addition, add reference to the technical specifications for the credited fire proofing if actually credited in the analysis.
- 31-8 - Replace risk significant full compartment burn scenarios with individual scenarios identified within the fire compartment following the detailed fire modelling process.
- 31-9 - Clearly identify the fire scenarios and damage states representing hot gas layers in the analysis so that they are not mixed with those treated as full compartment burns.
- 32-2 - As a minimum, the DC control power cables and breaker control cables should be cable selected for the RCP breaker FTO functional states.
- 33-5 - Update the HRA analysis (HRA Calculator and FRANX target impact) to reflect the correct procedures used by site.
- 34-1 - Implement the guidance in NUREG/CR-7150, Vol. 2, Section 7.3.4.2 with respect to the limitation of conditional probabilities for MSOs.

### Seismic:

The At-Power Seismic Probabilistic Risk Assessment (SPRA) was peer reviewed against Part 5 of ASME/ANS RA-Sa-2009 in 2017. Since the 2017 peer review, the Vogtle Units 3&4 plant At-Power Seismic PRA has been updated to address several peer review F&O, to the extent possible for a pre-operational plant. In 2020 an independent F&O closure assessment and focused-scope peer review was performed in accordance with Appendix X of NEI 12-13. No seismic F&Os are identified as having possible impact to this application.

Two of the open F&Os are identified as Met Intent, Not Achievable due to the operational/construction stage of the plant at the time of the peer review. The following is the list of these F&Os. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. See section "Dispositions for impact of "Met Intent, Not Achievable." Open Findings:" at the end of the RAI response for information on how these findings are dispositioned for impact on this application.

- 19-1 - When the construction of the AP1000 plants is complete, perform the required activities to satisfy the SR or confirm the ABAO plant is consistent with the PRA or design assumptions.
- 04-001 - Perform and document the seismic walkdowns to be performed in the future and integrate it into the overall seismic fragility documentation package and SPRA analyses.



The following Seismic F&Os continue to be tracked as open with no direct impact on the IDS fragilities were identified. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. Each of these F&O were viewed and all were characterized as no impact to this application is anticipated due to the resolution of this F&O. Resolution of these findings could shift importance within the seismic PRA results, but given the low quantified risk results in the supporting analysis, resolution of the findings is not anticipated to impact the conclusions or challenge the RG 1.174 and RG 1.177 thresholds of 1E-6 ICCDP or 1E-7 ICCLERP.

- 04-003 - For these cabinets that are identified as potential seismic induced fire sources, evaluate seismic functional fragility (structural damage) to determine which is the governing failure mode.
- 04-008 - Provide a fragility evaluation for the trays and their attachment device to the tray supports.
- 03-006 - Estimate the dynamic soil pressures on basement walls including foundation sliding, and include potential below-grade wall in-plane and out-of-plane failure modes.
- 03-009 - Estimate the total settlement and tilt which can occur for the ground motion range of interest and include such failure mode(s) in the SPRA model as applicable.
- 03-010 - Use  $F_{\mu}=1.0$  for the buckling failure mode of the containment vessel, or develop an  $F_{\mu}$  factor that accounts for the cyclic behavior of the buckling mode.
- 03-011 - Update the IRWST and PCCS fragilities to include non-seismic load effects including hydrostatic loads.
- 04-005 - Evaluate floor diaphragm capability to withstand higher seismic demands due to load redistribution among the major shear walls in a story.
- 04-009- Revise the current trolley uplift restraint bolt fragility calculation by following the CDFM criteria.
- 04-002 - Provide justification in the calculation why the vibration isolators at the base of the AHU are not the governing failure mode of the unit that could result in a fire by revising the fragility calculation to include the SNC response to Question V34-SPRA- APPX-2020\_WHT-07.
- 03-002 - Revise the documentation to incorporate the items identified for document enhancements.

The following Seismic F&O also continue to be tracked as open, but with a potential impact on the IDS fragilities but still no impact on the application. Resolution could impact only the seismic treatment for IDS. Correlated impacts have a larger impact when compared to individual components within the seismic PRA results. Resolution of this finding could shift importance within the seismic PRA results for the seismic-induced failure modes. Changes in the fragility values have no impact on the functional random failure mode addressed by this application. Given the current margin available for this application (RG 1.177 ICCDP of less than 1.0E-06 and ICCLERP of less than 1.0E-07) and the lower conditional CDF and LERF impacts when compared to the other hazards, resolution of this finding is not anticipated to impact the conclusions.

- 03-004- Evaluate the effect of an adjusted clipping procedure on fragilities for components that used clipped spectra for seismic demand and assess the relative significance of that effect on risk insights. Or, update the fragilities using an appropriate clipping procedure and update the SPRA model accordingly. Evaluate the effect of an adjusted clipping procedure on fragilities for components that used clipped spectra for seismic demand.



External Events:

The At-Power External Events analysis was peer reviewed against Part 6 of ASME/ANS RA-Sa-2009 in 2016. Since the 2016 peer review the AP1000 plant At-Power external events PRA has been updated to address peer review F&Os. No external events F&Os are identified as having possible impact to this application.

Since the 2016 peer review, the Vogtle Units 3&4 plant At-Power external events PRA has been updated to address several peer review Findings & Observations (F&Os.) The baseline PRA used to support this application incorporated impacts. The following is a list of the F&Os where action was taken to incorporate impact of the finding into the PRA and/or its associated documentation. The short description of the finding is paraphrased from the possible resolution provided from the peer review team. All updates to address the findings characterized were as PRA maintenance. The additional documentation and updates do not represent a methodology change.

- EXT-A1-01 - Reference EPRI report 1022997 as another source providing lists of external hazards.
- EXT-A1-02 - Evaluate the potential and impact of solar storms in future updates.
- EXT-A2-01 - Identify and evaluate events involving related and compound hazards; e.g., local intense precipitation in conjunction with dam failure.
- EXT-A2-02 - Perform a formal search of site events (e.g., plant event reports for the operating units) to identify any site-specific external hazards and document the results of that search. Discuss the Vogtle 3/4 plant-unique design and whether that introduces any additional hazards.
- EXT-B1-01 - Provide additional site characteristics and evaluation considerations to justify that the risk of the snow hazard is below the screening criteria.
- EXT-B1-02 - Evaluate or extrapolate the results and insights from previous analysis the dispersion of propane vapor cloud due to accidental release from liquid propane tanks located onsite.
- EXT-B2-01 - Clarify whether SRP criteria were actually used in the screening and if so, why those applications are appropriate.
- EXT-B3-01 - Wherever qualitative screening criterion 5 is used, provide additional information concerning how slowly the event develops and describe potential actions that can be performed within that time to eliminate or mitigate the hazard's impact.
- EXT-C2-01 - Correct the typographical errors in Equations 7.4-4, 7.4-6, and 7.4-5.
- EXT-C2-02 - Correct the calculations of the annual strike frequencies based on the site structure strike model and update the documentation.
- EXT-C2-03 - Re-evaluate the risk of meteorite and satellite strikes using recent data (e.g., data from the NASA analysis of meteorites and space debris).
- EXT-C2-04 - Collect the air traffic data from FAA for overflights through the airspace above the area in the vicinity of the plant.
- EXT-C2-05 - Use the wind speed data from the met tower and the NOAA wind speed data to perform a correlation analysis as the basis for correcting the NOAA wind speed data.
- EXT-C3 - Provide additional discussion to support the model assumption that instrumentation is not needed after 72 hours.
- EXT-C3-01 - Collect accident data and develop crash rates for general aviation and military flights.
- EXT-C6-01 - Collect accident data and develop crash rates for general aviation and



military flights.

- EXT-E1-01 - Provide the following information in the documentation: 1. The analysis performed to determine the incident heat flux and temperature rise resulting from the forest fire (or fires outside the plant). 2. The calculations for the emission concentrations in the control room air intake resulting from the forest fire (or fires outside the plant).
- EXT-E1-02 - Expand Section 5 to more comprehensively identify assumptions used in the screening arguments. Also, explicitly discuss uncertainty impacts.
- EXT-E2-01 - Suggest removing Screening Criterion 4 from Items 10 and 11 in Appendix for frost and hail.
- EXT-E2-02 - Identify clearly the realistic margin and mitigation features to demonstrate that there is no concern of the cliff edge effects.
- EXT-E2-04 - Document the evaluation of chemicals stored or processed at these offsite facilities, including the potential and impact of explosions.
- EXT-E2-05 - Various editing changes should be made to the Vogtle 3/4 external hazards report.
- EXT-E2-06 - Provide additional description on the chemical control measures in the evaluation of this hazard.

Dispositions for impact of “Met Intent, Not Achievable.” Open Findings:

The Vogtle Unit 3 and 4 PRA model reflects the design reference point of August 2018 (“model freeze date”). The changes to the design up to the model freeze date for the Vogtle Unit 3 and 4 have been incorporated in the PRA model. For the design changes or departures from the certified design that would have occurred after August 2018, a model maintenance process was used to identify, collect, and screen them for any necessary model update.

Walkdowns have been performed that confirm the assumptions used in the PRA represent the Vogtle Unit 3 as-built plant conditions. The walkdown teams followed industry guidance outlined in the walkdown notebooks. Walkdowns of the plant were conducted in the August 2020 to April 2021 timeframe when the plant construction was approximately 98% complete. Results of these walkdowns including as-built observations are documented in the walkdown notebooks. Since the plant construction was not fully complete at the time of the walkdowns, as-found conditions were evaluated for potential risk-significance and prioritization for incorporation into the models.

Full resolution of these findings related to the pre-operational/construction stage (including incorporation of operating experience) could shift importance within the fire PRA results. Given the current margin available for this application (RG 1.177 ICCDP of less than  $1.0\text{E}-06$  and ICLERP of less than  $1.0\text{E}-07$ ) resolution of this finding is not anticipated to impact the conclusions. It should also be noted that the VEGP Units 3&4 Maintenance Rule program monitors the reliability and availability of the IDS inverters and confirms that appropriate management attention and goal setting are applied based on pre-established performance criteria. The VEGP Units 3&4 configuration risk management program (CRMP) is consistent with 10 CFR 50.65(a)(4) (Maintenance Rule) and is managed to prevent entering risk-significant plant configurations for planned maintenance activities, and to identify and take appropriate risk management actions should unforeseen events place the plant in a risk-significant configuration during the IDS inverter Completion Time.



**NRC RAI#2:**

Section 1.1.2 of Regulatory Guide 1.177, "Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," Revision 0, states in part, "TS may be changed to establish consistently based requirements across the industry or across an industry group." Precedents referenced in the LAR consistently indicate extensions from 24 hours to 7 days.

From a probabilistic perspective, explain, at a high level, both the relevance of these precedents and the basis for the proposed 14 day extension and the allowed completion times that maintain acceptable thresholds for Conditional Core Damage Frequency (CCDF) and Conditional Large Early Release Frequency (CLERF) for VEGP Units 3 & 4.

This information is being requested in order to support a determination, from a risk perspective, the basis for the extension to 14 days and the potential for additional risk that may not have been evaluated.

**SNC RAI #2 Response:**

LAR 22-002 (SNC Letter ND-22-0881) Table 1 provided examples of industry operating experience supporting extension of the Completion Time from 24 hours. These examples were intended to show precedents for utilizing the Regulatory Guide (RG) 1.177 approach, as supported by plant-specific probabilistic risk assessment (PRA), to determine the acceptability of the plant-specific requested extension time. They also show the extent to which the 24-hour Completion Time presents an undue burden for plant operations. The examples were not intended to specifically address the VEGP-specific requested Completion Time of 14 days, which was supported by a VEGP Units 3 & 4-specific PRA risk assessment provided in the LAR.

RG 1.177, subsection C.1.1, "Reason for Proposed Change" provides "Generally, acceptable reasons for requesting TS changes fall into one or more of the categories below." The RAI cited subsection C.1.1.2 reason ("... to establish consistently based requirements across the industry or across an industry group") was not the basis for the SNC request. The SNC request cited reason for the request followed the "reason" of RG 1.177, subsection C.1.1.3, "Reduce Unnecessary Burdens," by providing greater operational flexibility for online repair or replacement of an inoperable inverter.

The inverters are explicitly modeled components in the Vogtle 3&4 PRA. From LAR 22-002 (SNC Letter ND-22-0881), Technical Evaluation subsection "Probabilistic Risk Assessment" (commencing on Enclosure page 10 of 27), and Table 4, provide the PRA basis that demonstrates acceptable thresholds for Conditional Core Damage Frequency (CCDF) and Conditional Large Early Release Frequency (CLERF) for VEGP Units 3 & 4 are maintained. For each case performed, including cases where multiple inverters within a division are unavailable (i.e. the division is unavailable), the results in Table 5 of LAR 22-002 for Incremental Conditional Core Damage Probability (ICCDP) and Incremental Conditional Large Early Release Probability (ICLERP) are demonstrated to have a small impact (i.e., less than 1E-6 and 1E-7, respectively) for the requested 14 day Completion Time. Additional cases show the impact would be small even for a 30 day Completion Time.

Furthermore, the VEGP design being the Westinghouse AP1000 simplified passive advanced light water reactor is a unique "industry group" in the context of RG 1.177 subsection C.1.1.2, with this request reflecting a proposed change that could be considered applicable to this industry group of simplified passive advanced light water reactor plants. The plant is designed with significantly fewer components and significantly fewer safety-related components than a current pressurized water reactor of a comparable size, and the risk associated with the VEGP AP1000



design compares favorably against the Commission's goals for Core Damage Frequency and Large Early Release Frequency. While the VEGP Units 3&4 PRA results for an inoperable division of inverters support nearly twice the 14-day Completion Time, SNC conservatively proposed the 14-day Completion Time consistent with the RG 1.177 recommended use of standard practices used in setting Completion Times.

**NRC RAI#3:**

10 CFR 50.65(a)(4) (Maintenance Rule) requires the assessment and management of the increase in risk that result from proposed maintenance activities. The LAR states that VEGP Units 3&4 Maintenance Rule program monitors the reliability and availability of the Uninterruptable Power Supply System (IDS) inverters and confirms that appropriate management attention and goal setting are applied based on pre-established performance criteria.

Clarify whether "the planned vital AC inverter on-line maintenance" as stated in the LAR (page 23 of 27) is limited to monitoring the reliability & availability of the IDS inverters in accordance with the Maintenance Rule Program (i.e., no remote control or operation of the inverters). If otherwise, provide a detailed description of the operations taken during online maintenance activities related to the AC inverter.

This information is being requested in order to support an assessment of operational risk associated with the remote control of the inverters, if any.

**SNC RAI#3 Response:**

The VEGP inverter design does not provide for remote control or operation of the inverter.

**NRC RAI#4:**

10 CFR 50.36(c)(2) requires that operating licenses for nuclear reactors must include TS that specify limited conditions for operation (LCOs) for equipment required for safe operation. TS Section 1.3, "Completion Time," states that LCOs specify minimum requirements for ensuring safe operation of the unit. ACTIONS for an LCO state Conditions that usually describe ways in which the LCO requirements can fail to be met and that specify Required Action(s) and Completion Time(s). Required Actions must be completed prior to the expiration of the specified Completion Time (CT).

LAR Section 1 states that "the proposed change would revise COL Appendix A, TS 3.8.3, Inverters – Operating, to extend the CT for Required Action A.1 from 24 hours to 14 days." The LAR section titled "Industry Experience Related to Inverter Maintenance" indicates that VEGP Units 3&4 have no direct operating experience for the specific VEGP inverter. LAR Table 1 shows examples of industry experience supporting extension of CTs for inoperable inverters beyond 24 hours, and in some cases more than 7 days. The longest postulated timeline listed in that table for inoperable inverter repair and maintenance is 5.5 to 7.5 days for Palo Verde. LAR Section 4.2 lists four precedents with CT extensions going from 24 hours to 7 days. LAR section "Probabilistic Risk Assessment" states that SNC used Regulatory Guide 1.177 guidance to assess the impact of the CT extension from 24 hours to 14 days. RG 1.177 Section 2 shows the staff expects licensees to provide strong technical bases, rooted in deterministic engineering and system analysis, for any TS change not just based on PRA results alone. RG 1.177, Section 2.3 indicates



that PRA should model specific components and their unavailability models that include test and maintenance downtimes.

SNC does not provide a sufficient deterministic justification to support the proposed 14-day CT extension since it is beyond CT extensions for inoperable inverter both for industry operating experience and precedents that SNC notes in the LAR. The staff requests SNC provide a maintenance timeline (in hours/days) to restore an inoperable inverter to OPERABLE status including high-level activities with margin(s) for each and overall to address reasonable uncertainties in accordance with 10 CFR 50.36, TS 1.3, and guidance in RG 1.177.

#### **SNC RAI#4 Response:**

The LAR 22-002 (SNC Letter ND-22-0881) provided the SNC evaluation consistent with RG 1.177, Section C.2, Element 2: Perform Engineering Analysis, with regard to the key principles that ensure (1) current regulations are met, (2) adequate defense in depth is maintained, (3) sufficient safety margins are maintained, and (4) proposed increases in risk are small and are consistent with the intent of the Commission's policy statement on safety goals for the operation of nuclear power plants. These key principles are addressed in SNC Letter ND-22-0881 as follows: (1) LAR Section 4.1, Applicable Regulatory Requirements/Criteria, (Enclosure page 21 of 27) evaluation that current regulations are met, (2) LAR Enclosure page 5 of 27 for the defense in depth evaluation, (3) LAR Enclosure page 7 of 27 for the safety margin evaluation, and (4) LAR Enclosure beginning page 10 of 27 for the risk evaluation.

RG 1.177, Section C.2, Element 2 also mentions that "TS change requests should give proper attention to the integration of considerations such as conformance to the STS [*Standard Technical Specifications*], generic applicability of the requested change if it is different from the STS, ... " and "Standard practices used in setting AOTs [*allowed outage times, i.e., Completion Times*] ... should be followed, e.g., AOTs normally are 8 hours, 12 hours, 24 hours, 72 hours, 7 days, 14 days, etc." Since the current STS for AP1000 (NUREG-2194) (as well as all other STS NUREGs) provides for a 24-hour Completion Time consistent with current VEGP TS, conformance to the NUREG STS is not applicable. While the VEGP PRA results support nearly twice the 14-day Completion Time, SNC conservatively proposed the 14-day Completion Time consistent with the guidance suggesting use of standard times.

The RAI also requests information regarding anticipated maintenance and plant activities for restoration of an inoperable inverter to OPERABLE status. Based on the VEGP inverter design and maintenance practices, SNC anticipates typical maintenance activities and maintenance timeline durations for restoration would be generally consistent with the cited industry experience. However, SNC notes that within the experience of the precedents cited in LAR 22-002 (SNC Letter ND-22-0881) Table 1, durations of up to 7-days are noted as well as two instances where restoration was greater than 7 days. It is also reasonable to anticipate that additional unforeseen difficulties could arise that could extend any such timeline. As such, the SNC proposed 14-day Completion Time (i.e., consistent with the next standard Completion Time suggested by the RG 1.177 guidance) provides appropriate operational flexibility for unforeseen issues, consistent with the AP1000 design-specific defense-in-depth, safety margin, and low change in risk demonstrated in the LAR, which is enabled by the VEGP plant-specific design. A 14-day Completion Time minimizes the potential operational burden of an impending required plant shutdown, or exercising requests for regulatory relief, should extenuating circumstances arise that challenge shorter Completion Times. It should be noted that when unforeseen issues result in restoration timelines that begin to approach the CT limit, these operational burdens are realized even if final restoration

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Enclosure 2

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is made within the allowed CT. Imposing these operational burdens with no safety benefit should be minimized. Providing a 14-day CT for a division of inoperable inverters provides this burden reduction.