Southern Nuclear Operating Company

ND-21-0843

Enclosure 1

SNC Position and Additional Information for the Final Significance Determination for Apparent Violations in NRC Letter EA-21-109

(This Enclosure consists of 14 pages, not including this cover page)

In late 2020 and into 2021, SNC began to identify issues associated with installation of electrical commodities. Some of these issues became the subject of the Apparent Violations included in NRC Letter EA-21-109, which provides the Special Inspection Report, dated August 26, 2021. SNC has implemented, and continues to develop, comprehensive actions in response to these issues, which were identified during extent of condition assessments using the site processes and procedures including the corrective action program along with plant walkdown and inspection activity. Based on discovery of these issues, SNC initiated comprehensive extent of condition reviews and root cause investigation for electrical commodity installation. In March 2021, SNC conducted a site wide standdown to reinforce the expectations for adherence to quality requirements.

It is important to consider the timing of discovery of the issues and the SNC response to these issues. SNC completed a Root Cause Determination (RCD) for the electrical commodity installation conditions described in Corrective Action Report (CAR) 80004436 on April 28, 2021, prior to the NRC Special Inspection, which began on June 21, 2021. At the time the special inspection began, many of the corrective actions coming out of the RCD were still in progress. Additionally, every RCD requires a review of the actions to determine their effectiveness, which had not yet been completed to provide an opportunity for SNC to fully assess the effectiveness of the corrective actions. These corrective actions are described in detail in the information provided below. In summary, the corrective actions cover a wide range of management and process-related activities. Additionally, actions to identify any further electrical commodity installation nonconformances and ensure they are corrected are in progress. The more broadly applicable management and process-related actions are being implemented to ensure that future construction issues are minimized.

It is also important to note that SNC is still in the process of implementing corrective actions and performing extent of condition reviews. While NRC identification of some electrical construction issues did occur while SNC was in the discovery process, SNC is confident that continued investigation and assessment of the conditions would have resulted in the same discovery and correction of the full scope of the electrical construction issues that have occurred.

The completion of RCD for CAR 80004436, prior to the notification that an NRC Special Inspection would be conducted, demonstrates that SNC recognized the significance of the construction issues that were identified. SNC also recognizes the significance of the issues identified in the NRC Special Inspection Report, particularly the Apparent Violations (AVs). SNC has reviewed the AVs and, as allowed by the NRC Inspection Report, has chosen to provide our position on these preliminary findings to the NRC in writing. The information provided below is the SNC position on the identified AVs. Additional information is also provided to convey technical details and the status regarding conditions associated with the AVs.

In summary, the SNC position on the AVs is provided as follows:

- The proposed apparent violations are examples of the same performance deficiency and should not be identified as two separate findings.
- The issue described in the second AV (05200025/2021010-02) is associated with the design functions described in Inspection Manual Chapter (IMC) 2519, "Construction Significance Determination Process," for Class 1E Cable Raceways, which is intermediate risk, and therefore is not "High Risk Importance."

- For the first AV (05200025/2021010-01), only a portion of the Class 1E raceway structure was affected, and therefore should not be categorized as any higher than Row 2 for "Quality of Construction."
- The second AV is very low safety significance (Green), as demonstrated through a Probabilistic Risk Assessment (PRA) analysis which shows the risk (delta-CDF, which is change in core damage frequency) is less than 1E-6.
- The failure modes and effects of the identified cable separation issues are very low safety significance.

The following details are provided in support of the SNC position on the AVs:

The proposed apparent violations are examples of the same performance deficiency and should not be identified as two separate findings.

The information provided in the NRC Inspection Report does not provide any specific explanation for citing two individual findings. The NRC Inspection Report does state that the two apparent violations both pertain to identified Institute of Electrical and Electronics Engineers Standard 384 (IEEE-384) nonconforming conditions. The first AV states, "Specifically, the licensee failed to promptly identify that cable separation was not maintained in accordance with RG 1.75 and IEEE 384-1981..." The second AV states, "...the licensee's failure to maintain 1-inch vertical and horizontal separation between Class 1E electrical divisions and non-Class 1E electrical divisions inside switchgear cabinets..."

The two proposed apparent violations meet the NRC inspection guidance criteria for being considered as a single finding. Specifically, IMC 0613, "Power Reactor Construction Inspection Reports," Section 17.07 states, "Multiple examples of the same performance deficiency that share the same cause and require the same corrective actions shall be documented as a single finding."

The basis for combining the two AVs in EA-21-109 is provided, as follows:

Performance Deficiencies (PD):

As provided in the NRC Inspection Report, the first AV states, "The licensee's failure to promptly identify and correct conditions adverse to quality associated with the installation of Class 1E cables and associated raceways was a performance deficiency (PD), and a violation of 10 CFR Part 50, Appendix B, Criterion XVI, 'Corrective Action.' Specifically, the licensee (1) failed to promptly identify that cable separation was not maintained in accordance with RG 1.75 and IEEE 384-1981, (2) failed to promptly identify widespread deficiencies in installation of seismic supports and structural components, and (3) failed to timely correct these issues." The second AV states, "The inspectors determined that the licensee's failure to maintain one-inch vertical and horizontal separation between Class 1E electrical divisions and non-Class 1E electrical divisions within switchgear cabinets as specified in safety related installation specification APP-G1-V8-01, was a PD and constituted a failure to comply with 10 CFR Part 50, Appendix B, Criterion V."

Both PDs pertain to the IEEE-384 nonconforming conditions. While the two AVs are based on different Appendix B criteria, the NRC process for determining the criteria to cite in a proposed violation allows for judgment of the applicable criterion. In most cases, there is more than one criterion that could be applicable to a performance deficiency. The NRC Inspection Report recognizes that the second AV was based on failure to properly implement the requirements of the installation specification, APP-G1-V8-001, "AP1000 Electrical Installation Specification." The

inspection report identifies this noncompliance with the installation specification as a violation of 10 CFR 50, Appendix B, Criterion V. The first AV also identifies conditions that did not meet the same APP-G1-V8-001 specification. Therefore, the first AV could have also cited Criterion V. Further, the second AV identifies conditions that were not properly identified and corrected via the corrective action program. For example, the cable separation nonconformance within the reactor coolant pump switchgear cabinet had not been previously identified by SNC and had not been entered into the corrective action program. This is consistent with the first AV statement that SNC had failed to promptly identify that cable separation was not maintained. Hence, the second AV could have also cited Criterion XVI.

Therefore, SNC agrees that either Criterion XVI or Criterion V could be cited for both AVs. The applicability of both cited criteria to both AVs provides evidence that the AVs are examples of the same performance deficiency.

Cross-cutting Aspects (CCAs):

The NRC report states that both AVs were assigned the same CCA of H.2, as follows, "The inspectors determined the finding was indicative of present licensee performance and was associated with the cross-cutting aspect of "Field Presence" in the area of Human Performance, in accordance with IMC 0613, Appendix F, "Construction Cross-Cutting Areas and Aspects," dated November 4, 2020. The proximate cause of the PD was attributed to leaders not reinforcing standards, behaviors, and expectations for performing work in accordance with design standards and procedures for placing issues into the CAP. [H.2]"

IMC 0613, Appendix F, provides the following guidance for assignment of the CCA, "The NRC assigns cross-cutting aspects to inspection findings in accordance with this IMC. Inspectors are required to evaluate each finding to determine if the principal cause of the finding can be associated with one of the cross-cutting aspects. When the principal cause of a finding is similar to a cross-cutting aspect, that cross-cutting aspect should be assigned to the finding."

The identification of the same CCA for each AV indicates that the NRC inspectors determined the principal causes are the same. This provides relevant data to support the conclusion that the causes of these AVs are the same. This is consistent with the previously referenced guidance from IMC 0613, which states sharing the same cause is a factor for considering documenting the examples in a single finding.

Causes and Corrective Actions:

The RCD for CAR 80004436 identified the root cause for electrical issues, including electrical system IEEE 384 separation and structural components, as follows:

- "Root Cause (RC): Inadequate Enforcement of Construction Standards and Behaviors related to electrical installations."

The RCD for CAR 80004436 was completed prior to the completion of extent-of-condition (EOC) reviews. There was substantial data available prior to the completion of the EOC reviews that was documented in the corrective action program to allow the RCD to develop an accurate and complete assessment of the causes and necessary corrective actions. Based on the way the Special Inspection Report describes the AVs, the RCD for CAR 80004436 is predominantly associated with the first AV. Although, as stated, the RCD was based on sufficient data to develop

an accurate and complete causal analysis, this includes the circumstances of both AVs. SNC considers the root cause in RCD for CAR 80004436 to be applicable to both AVs.

Additionally, RCD for CAR 80004436 states two contributing causes, as follows:

- Contributing Cause 1 (CC1): Construction leadership failed to ensure electrical personnel (craft, field engineers, QC, and supervision) were able to locate, understand, and translate some design requirements.

- Contributing Cause 2 (CC2): SNC did not recognize the extent of gaps in contractor execution of electrical installation quality program requirements until the electrical commodity installations were near completion.

SNC also considers these contributing causes to be applicable to both AVs.

The corrective action to prevent recurrence (CAPR) and corrective actions (CAs) identified in the RCD for CAR 80004436 have been established for the Root Cause (RC) and Contributing Causes (CC1 and CC2) as shown in the following table:

Action Addresses	Description
RC Inadequate Enforcement of Standards and Behaviors	CAPR: Develop and implement a recovery plan to include, but not limited to, the corrective actions associated with RC Inadequate Enforcement of Standards and Behaviors. Include metrics for measurement of action effectiveness and provide weekly reports of progress to key stakeholders. Metrics and weekly reports shall be continued until SNC obtains the Unit 4 103g letter or as determined by SNC management.
RC	CA: Revise procedures to require field walkdown verification of separation requirements as defined in design specifications and segregation requirements are met to ensure there is no impact to safety-related installation commodities.
RC	CA: Revise the 26139-000-4MP-T81C-N1204 procedure to add: - a new attachment to capture work complete. - superintendent responsibilities to document work complete per the new form.
RC	CA: Implement a change management plan for documenting work as you go to include at a minimum: -communication on the revised procedure -updating existing work packages to add the new form. -conduct follow-up observations to measure effectiveness of the change and reinforce the expectation. Work with appropriate workgroups to implement all aspects of the action described.
RC	CA: Develop and implement a focused communications campaign on quality installation expectations.
RC	CA: Develop and execute training during on-boarding of construction personnel for Nuclear Safety Culture, Quality Assurance requirements, Nuclear Professional, and Human Performance awareness, as well as providing the expectations for generating Condition Reports.

Action Addresses	Description
RC	CA: Provide Nuclear Safety Culture, Quality Assurance requirements, Nuclear Professional, and Human Performance awareness training, as well as providing the expectations for generating Condition Reports, for Bechtel and RCC personnel who were hired prior to the first implemented on-boarding training completed. This training may be conducted at any time prior to completion of the first execution, requires all personnel who were currently onsite and /or not trained during the on-boarding process.
RC	CA: Implement a change management plan for actions identified from the previously performed Quality Control Assessment.
RC	CA: Develop and implement a plan to ensure Field Engineering and QC in progress monitoring and surveilling are adhered to.
CC1 Locate, understand, and translate some design requirements	CA: Modify and implement the practice for updating specifications after 5 approved changes are in effect.
CC1	CA: Develop training focused on installation requirements and inspection of Class 1E and Seismic Class I/II electrical commodities which includes an assessment for comprehension.
CC1	CA: Ensure standards for electrical pre-job briefs are being met in accordance with procedures by having personnel who conduct Pre-Job Brief's perform a "read and sign" acknowledgement of the requirements.
CC1	CA: Perform targeted observations of pre-job briefings to ensure technical requirements are discussed.
CC1	CA: Develop and make available for use a What Excellence Looks Like (WELL) template for clear documentation of the specific required attributes for electrical installations being signed for to improve documentation and traceability of what specifically was inspected and signed as quality. This detail should include identifying items such as the proper seating of bolts (spring nuts, thread engagement, etc.), the required separation distance, verification of segregation, etc. A space should be added to require documenting the number of items inspected and on what specific area the inspection was performed to allow for clear identification of the item inspected.
CC1	CA: Develop and implement a method to effectively utilize the electrical Foreman's Books in the field.
CC2 SNC Oversight	CA: Develop and implement a plan to perform focused observations on QC inspections. Focus areas to include at minimum, proper inspection behaviors, independence behaviors from the line, and verification activities for proper attributes. Consider using "manager-in-the-field" observations.

Action Addresses	Description
CC2	CA: Develop a plan and implement the execution of SNC oversight of construction activities. Construction Experience and INPO documents 08-005 Historical Construction Experience to Apply to New Plant Deployment and INPO IER L4-13-35, Lessons Learned from New Construction Projects That Involve Lapses in Oversight should be reviewed for support in development of the plan.
CC2	CA: Develop a plan to ensure IEEE 384 requirements are restored and maintained. Present plan to SNC Management Review Committee for review and approval prior to implementation.

As demonstrated by the preceding list, the corrective actions being implemented cover a wide range of management and process-related activities. SNC considers the CAPR and CAs to be applicable to both AVs.

Based on the preceding assessments of the performance deficiencies, cross-cutting aspects, root cause, contributing causes, and corrective actions, it is concluded that the IMC 0613 criteria for combining PDs, as described in Section 17.07, which states, "Multiple examples of the same performance deficiency that share the same cause and require the same corrective actions shall be documented as a single finding," has been met. Therefore, SNC maintains that the proposed apparent violations are examples of the same performance deficiency and should not be identified as two separate findings.

The issue described in the second AV is associated with the design functions described in IMC 2519 for Class 1E Cable Raceways, which is intermediate risk, and therefore is not "High Risk Importance."

The NRC Inspection Report describes the Significance Determination Process being considered for the second AV. As part of this description, the second AV states, "The inspectors determined that the licensee's failure to maintain one-inch vertical and horizontal separation between Class 1E electrical divisions and non-Class 1E electrical divisions within switchgear cabinets as specified in safety related installation specification APP-G1-V8-01... Specifically, the licensee failed to install Class 1E cabling in the RTS and RCP switchgear cabinets per APP-G1-V8-01, as prescribed by work instructions, which could have adversely impacted PMS, IDS, RTS, and ESF functions." The NRC Inspection Report goes on to state, "Because the finding could reasonably be expected to impair a design function of all trains of the associated systems, the inspectors determined the PD could fall above Row 1 of the High Risk Importance column because it has the potential to affect all divisions of the PMS and IDS for reactor trip and ESF functions for the RCP trip."

SNC disagrees with this characterization of the Class 1E separation issue. The installation of electrical circuits that do not comply with IEEE 384 separation requirements would not directly result in the failure of those circuits. An initial cable fault would be required to cause any subsequent nearby cable failures. Cable separation in accordance with IEEE 384 is intended to mitigate the likelihood that individual circuit failures could impact nearby circuitry if such failures were to occur. The circumstances of IEEE 384 cable separation do not involve any identified issues where a cable fault would have been expected or caused to occur. Therefore, the safety function of the cabling identified in the second AV was not impaired. Impairment of the safety function for these cables would only occur if a failure of another cable were to occur and impact

one of the circuits that was not adequately separated. As documented in the PRA analysis (Enclosures 3 and 5) regarding cable failure rate data, the failure of an individual cable is an unlikely event. Additionally, the AP1000® is designed to maintain plant safety, even with a safety-related failure.

Further, IMC 2519 lists the design functions for the Class 1E Raceway, as follows:

a) Class 1E electrical cables, fiber optic cables associated with only one division, and raceways are identified according to applicable color-coded Class 1E divisions.
b) Class 1E divisional electrical cables and communication cables associated with only one division are routed in their respective divisional raceways.
c) Separation is maintained between Class 1E divisions in accordance with the fire areas as identified in Table 3.3-3.
d) Physical separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables.
e) Class 1E communication cables which interconnect two divisions are routed and separated such that the Protection and Safety Monitoring System voting logic is not defeated by the loss of any single raceway or fire area.

Both AVs identify noncompliance based on inadequate separation between Class 1E electrical divisions and non-Class 1E electrical cables. Therefore, Criterion "d)" is the design function not being met, as described in both AVs.

In IMC 2519, the cable separation design function is only assigned to the Class 1E Raceway structure. This indicates that the IMC 2519 assigned risk importance of the cable separation design function was based on the understanding that the failure to meet physical separation requirements does not directly cause impairment of any function or system. This conclusion is based on recognition that IMC 2519 associates the cable separation design function with the Class 1E Raceway structure, which is intermediate risk importance. As previously stated, the failure to meet separation requirements only creates the possibility of impairment if a cable failure were to occur in the specific location and with sufficient energy to cause the failure of the adjacent cabling.

Additionally, the design functions in IMC 2519 for functions listed in the second AV were reviewed. The listed systems (PMS, IDS, RTS, and ESF [ESF is listed under PMS]) are identified in IMC 2519 as high risk importance. Cable separation was not identified in the design function for any of these systems. This provides evidence that IMC 2519 intended cable separation to be characterized as "intermediate risk," because it is only associated with the Class 1E Raceway structure, which is "intermediate risk."

Further, the description of the second AV refers to UFSAR Section 8.3.2.4.2, "Raceway and Cable Routing," which states, in part, that separation between Safety-Related (SR) divisions, and between SR divisions and Non Safety-Related (NSR) cables are routed according to spatial separation stipulated in RG 1.75 and IEEE 384-1981. This reference to UFSAR Section 8.3.2.4.2 is additional indication that the second AV should be associated with the Class 1E raceway structure and design functions, which is consistent with the intermediate risk column of the "AP1000 Construction Significance Determination Matrix."

Therefore, based on the preceding assessment of the second AV and IMC 2519, it is concluded that the issue described in the second AV is not "High Risk Importance" and this AV is associated

with the design functions described in IMC 2519 Class 1E Cable Raceways, which is intermediate risk.

For the first AV, only a portion of the Class 1E raceway structure was affected, and therefore should not be categorized as any higher than Row 2 for "Quality of Construction."

The NRC inspection report for the first AV states, "This finding was determined to be preliminary White because it was associated with the Class 1E raceway structure which is assigned to the intermediate risk column of the 'AP1000 Construction Significance Determination Matrix' and because the finding was associated with structures such that reasonable assurance is not provided that the structure can meet its design function."

The IMC 2519 guidance for determination of "Quality of Construction" Row states the following:

a. Row 1: Findings determined to be More-than-Minor for which reasonable assurance is provided that the structure or the applicable portion of the structure would have been able to meet its design function.
b. Row 2: Findings associated with a portion of a structure such that reasonable assurance is not provided that the portion of the structure can meet its design function.
c. Row 3: Findings associated with structures such that reasonable assurance is not provided that the structure can meet its design function.

The NRC assessment is based on the application of the IMC 2519, Figure 1, Row 3 criterion. It is noted that the Row 3 criterion identifies that it is applicable to the "structure." The Row 2 criterion identifies that it applies to "a portion of a structure." The issues identified in the first AV do not present a situation where the design function for the Class 1E Raceway structure could not be met. The Row 2 criterion for "portion of a structure" is more appropriate for the conditions identified in the first AV. Specifically, only a portion of the Class 1E raceway would not have been able to meet the design function d) for Class 1E Raceway structure, which is stated as, "Physical separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables." Therefore, it is concluded that Row 2 is applicable for the conditions described in the first AV and is a finding of very low safety significance (Green).

The second AV is very low safety significance (Green), as demonstrated through a Probabilistic Risk Assessment (PRA) analysis which shows the risk (delta-CDF) is less than 1E-6 occurrences per year.

A PRA analysis was performed for the second AV that shows risk (delta-CDF) is less than 1E-6, which corresponds to very low safety significance. IMC 2519 provides the following information pertaining to the use of probabilistic risk assessment insight for the determination of significance, "A major aspect of the ROP SDP is the interaction that the regional senior reactor analysts have with the licensees to obtain the most accurate, yet timely, quantification of risk before the conduct of a SERP. While the construction SDP does not employ senior reactor analysts or have quantified risk numbers, the staff must determine a finding's impact on the design function of the respective system or structure. Inspectors should gather the necessary information through interactions with

the licensee regarding the finding's impact on the respective system and structure's design function before conducting the SERP."

IMC 2519 also states that in SRM-SECY-10-0140 the Commission directed that for the construction SDP the staff should assess risk using risk importance measures with selected thresholds that are comparable and technically consistent with risk threshold levels used in the ROP. IMC 2519 also states that structures were assigned to risk importance columns based on the review of the equipment contained within them and the judgment that the risk importance should be comparable.

The use of risk information for cROP significance determination is an important consideration. Recent precedence for using a risk-informed approach is demonstrated in SECY-19-0036, "Application of the Single Failure Criterion to NuScale Power LLC's Inadvertent Actuation Block Valves," where the following was stated, "Moreover, consistent with the White Paper on Risk-Informed and Performance-Based Regulation (SECY-98-144), the staff should take a risk-informed approach to assessing whether to apply the single failure criterion to the IAB closing function as an active failure."

In support of providing a more accurate determination of the risk significance for the second AV identified in the NRC inspection report, Southern Nuclear calculated the delta risk using Vogtle 3&4 updated plant-specific Internal Event (IE) model being used to support fuel loading. The details of this assessment are provided in Enclosure 3 (non-proprietary version) and Enclosure 5 (proprietary version).

The assessment included:

- Addition of non-Class 1E failures resulting in failure of 1E Cables.
- Common cause failures of non-Class 1E cables across trains within each system.
- Consideration of both failure-induced initiating events and failures of mitigation functions.

The SNC risk assessment estimated the potential risk associated with a construction phase non-compliance with IEEE Standard 384. The assessment that was performed had a significant level of conservatism to account for the lack of the type of information typically used for a PRA application. The key results were as follows:

At-Power Internal Events PRA Risk Results- Baseline, Risk Assessment Cases and Sensitivity Studies						
	CDF[1]	Delta-CDF from Baseline[1]	% difference from Baseline	LERF[1] (Large Early Release Fraction)	Delta-LERF from Baseline[1]	% difference from Baseline
Current Vogtle 3/4 Baseline	3.87E-07	-		3.72E-08	-	
Revised Baseline with Cable CCF	3.95E-07	8.00E-09	2.03%	3.74E-08	2.00E-10	0.54%
Sensitivity 1 - RCP Switchgear 10 nonconformances	3.95E-07	8.00E-09	2.07%	3.74E-08	2.00E-10	0.54%
Sensitivity 2 - Cable Failure Rate	3.99E-07	1.20E-08	3.10%	3.96E-08	2.40E-09	6.45%
Sensitivity 3 – Common Cause	3.95E-07	8.00E-09	2.07%	3.77E-08	5.00E-10	1.34%
Note: (1) Per reactor year						

The revised baseline, taking into account the nonconformance to IEEE 384, is a delta-CDF of 8.00E-09/yr and delta-LERF of 2.00E-10/yr. In addition to the revised baseline, a series of additional sensitivity studies were performed to insert even greater levels of conservatism into the analysis. The worst-case sensitivity result is a delta-CDF of 1.20E-08/yr and delta-LERF of 2.40E-09/yr.

These results were compared to the AP1000® Construction SDP Matrix in IMC 2519. The delta-CDF result is lower by several orders of magnitude than the 1E-6/yr Green-White threshold. Therefore, the second AV should be "Green," which is very low safety significance.

The failure modes and effects of the identified cable separation issues are very low safety significance.

An engineering assessment has been completed that describes potential failure modes and effects of cable separation issues associated with the second AV. The electrical separation issues that have been identified for the AVs were identified during the construction of Vogtle Unit 3. The discovery of these issues prior to operation of the facility has ensured that the identified conditions will be corrected prior to the occurrence of any actual operational safety impact. It is recognized that the NRC IMC 2519 construction significance determination process attempts to determine significance of construction findings in a manner that considers the potential for safety impact during operation if the condition were to be left uncorrected. To assist with the understanding and characterization of the potential operational safety impact of the identified issues, SNC requested that an engineering assessment be performed by the AP1000® design authority, Westinghouse, to provide further details on the potential impacts. This engineering assessment was conducted using conservative assumptions that exceed typical design basis assumptions for failure mode and effects of the AP1000®.

The results of that engineering assessment are provided in Enclosure 2. This engineering assessment provides evaluation of the cable separation issues identified through extent-of-condition inspections of the electrical panels and switchgear. This information is intended to cover the issues identified by the second AV. As previously noted, SNC maintains that the conditions described in the second AV are associated with the cable separation design function for Class 1E Raceway. Also, as previously described, SNC maintains that only a portion of the Class 1E cables and raceway are impacted, so Row 2 "Quality of Construction" should be applied.

Therefore, the following engineering assessment results are provided as additional information regarding the identified conditions. The extent-of-condition inspections performed for electrical panels and switchgear identified cable separation nonconformances in the Class 1E DC and UPS System (IDS) panels, Reactor Trip Switchgear (RTS), and the Reactor Coolant Pump Switchgear (RCPS).

The evaluation of the IDS panel nonconformances was performed by circuit type, and the results of the assessment are summarized as follows:

Circuit Type	Consequence of Failure
Associated Circuits	No safety function is lost or degraded for associated circuits since the application of associated circuits are consistent with the requirements of IEEE 384.
Circuits with Class 1E-Supplied Cables	No safety function is lost or degraded for circuits designed and installed using safety-related Class 1E cabling since the design and quality pedigree of the cable is consistent with that of the target cables within the enclosure.

Circuit Type	Consequence of Failure
Instrumentation Circuits	No safety function is lost or degraded for the postulated failure of instrumentation circuits within IDS enclosures. This conclusion is based upon an assessment of fault types, the design basis insulation rating of instrumentation cabling, the normal operating voltage, and current limiting mode of system operation.
Regulating Transformer Power Circuits	No safety function is lost or degraded in the event of a postulated failure of power circuits within the Regulating Transformer. This conclusion is based upon the use of the regulating transformer to normally supply non-safety related loads. Alignment of the regulating transformer to safety-related instrumentation loads was not considered since this alignment is restricted under administrative control of the Technical Specifications.
Battery Charger Power Circuits	The battery charger power circuits have the potential for affecting the safety function of the IDS 250VDC power system. Specifically, postulated circuit faults that target normal DC power output to the DC switchboard or the undervoltage relay circuits to the PMS loss of alternating current feedback loops can result in loss of instrumentation and control functions and DC power supply functions in the affected division. A fault in an individual battery charger power circuit would only impact one division, which would result in degradation of the associated safety functions but would not result in the loss of safety function since the AP1000 plant is designed for the loss of a division of Class 1E power and I&C in combination with the full spectrum of design basis events.
Battery Charger Battery Test Circuits	No safety function is lost or degraded in the event of a postulated failure of the battery charger battery test circuits. Postulated circuit faults that target battery testing capabilities would not adversely affect or degrade a safety function because this is alignment is restricted by the Technical Specifications.
Separated Circuits	No safety function is lost or degraded in the event of a potential failure of separated circuits. Within the scope of Enclosure 2, the term "separated circuits" denotes those circuits that are implemented using design controls consistent with those applied to "associated circuits" per IEEE 384. While these circuits are not officially considered associated circuits per the standard, the design provisions provided to prevent propagation of faults and mitigation of maximum credible faults from external sources are applicable to these circuits such that the propagation of cable failure to the safety-related DC system is not credible.

These results show that in the unlikely event that a cable separation nonconformance were to cause a malfunction, it would be expected to be confined such that no safety function would be lost or degraded. The only exception is the battery charger power circuits. The battery charger power circuits are essentially equivalent to Class 1E circuits and hence, multiple failures would normally not be postulated. This leads to the conclusion that the identified panel separation conditions are consistent with the IMC 2519 guidance for "Quality of Construction" Row 1 in the significance determination process, which states the following for Row 1 for systems, "If left uncorrected, the finding could reasonably be expected to impair the design function of only one train of a multi-train system." The engineering analysis shows that it would be unreasonable to conclude the finding would be expected to impair the design function of more than one train.

The RCPS nonconformances were also evaluated. The safety function to trip each RCP is performed as part of the passive core makeup tanks (CMTs) actuation within the reactor coolant system piping for events that require passive core cooling initiation. Review of the physical impacts of the postulated faults on the RCPS hardware has concluded that the faults will likely

damage or degrade Class 1E components required to apply control voltage to the RCPS circuit breaker trip coil. However, the AP1000 plant design is equipped with multiple means, both safety-related and non- safety related, to perform the RCP trip function. The RCP power supply for the AP1000® is a non-safety related AC power system because operation of the reactor coolant pumps is not required for accident mitigation or safe shutdown. There are two Class 1E qualified breakers in series that provide power to each RCP. The successful trip of either breaker will achieve completion of the safety function.

Additionally, the plant control system (PLS) and the defense-in-depth diverse actuation system (DAS) provide for a trip of a third breaker in series with two Class 1E supply breakers. These diverse non-Class 1E RCP trip functions provide additional capability to ensure the safety function will be met.

The RTS nonconformances were also evaluated. The RTS provide the safety function to remove power from the control rod drives when signal is received to trip the reactor. Review of the physical impacts of the postulated faults on the RTS hardware has concluded that the faults may result in a degraded material condition by means of loss of the shunt trip function; however, the nuclear-safety function of reactor trip is preserved by the use of the undervoltage release feature. Therefore, it is concluded that even with the identified nonconformances the safety function of RTS would be met.

Therefore, based on the preceding results of the engineering evaluation and the IMC 2519 AP1000® Construction Significance Determination Matrix, SNC concludes that the significance of this issue is "Green" or very low safety significance. Specifically, a finding that is in Row 1 is "Green" regardless of the System/Structure Risk Importance and for the items where some impact could occur, the conditions would not be greater than Row 2 with risk importance not greater than "intermediate." Additionally, SNC maintains that the conditions described in the second AV are associated with the separation design function for Class 1E Raceway. Also, as previously described, SNC maintains that only a portion of the Class 1E cables and raceway are impacted, which is associated with Row 2 "Quality of Construction," which results in a finding of very low safety significance (Green).

Additional information from Extent-of-Condition (EOC) Reviews.

Inspections of electrical installations in both Unit 3 and Unit 4 to identify nonconformances were performed and continue to be performed. The results of these inspections are captured in the SNC Corrective Action Program using the Condition Report process.

Nonconforming items have been identified through these efforts; however, the nonconforming items represent a small fraction of the installed items. For example, in the auxiliary building and containment vessel, where the safety systems for the AP1000® are located, there are about 10,000 individually identified raceway segments. The initial extent of condition identified nonconforming separation conditions in approximately 7% of the installed population.

It is also important to clarify that the issues identified were associated with raceway segments that were in various states of construction completion (i.e., many raceway segments were still under construction). This was further analyzed in the RCD for CAR 80004436, which found only about 22% of the sample work package installations were at the point of QC inspection completion. This shows the identification of many of the nonconforming conditions occurred prior

to completion of construction. In the consideration of significance for the first AV, identification of issues prior to construction completion would not be considered a performance deficiency.

Continued extent of condition inspections have been recently completed for safety-related electrical panel installations. These inspections covered the safety-related electrical panels where the potential could exist for cable separation nonconformance. Nonconforming conditions were found in some of these panels. These nonconformances predominantly involved lack of required separation (nominally one-inch) between non-safety-related and safety-related cables inside the panel. For example, the panel IDSA-DK-1, which is the Class 1E 250V DC Motor Control Center, has 71 cables going to and from this panel. These cables are typically multi-conductor and the individual conductor wires are routed to the proper locations in the panel. Estimating that most of the cables are 2-conductor, this is about 142 individual wires routed inside the panel. The inspection of this panel found 4 non-safety-related cables were involved in the identified cable separation non-conformances in this panel.

An engineering analysis of the failure modes and effects of the panel separation issues is provided in Enclosure 2. The engineering analysis provides additional information that demonstrates the cable separation issues are very low safety significance, as previously described.

Additional information regarding further causal analysis and corrective actions.

On August 27, 2021, Condition Report 50105410, describing the NRC-identified AVs, was entered into the SNC Corrective Action Program for Vogtle Units 3 & 4. An RCD for CR 50105410 is being conducted under CAR 80006298. This RCD will determine the root cause, contributing causes, and corrective actions for these NRC-identified AVs. As part of this RCD, SNC is evaluating several previous RCDs that pertain to electrical construction issues, to determine the relationship of the NRC AVs to issues previously identified by SNC. The RCD for CAR 80006298 is currently expected to be completed in October 2021.

Conclusion

The preceding information provides SNC position on the AVs. The SNC position is summarized as follows:

- The proposed apparent violations are examples of the same performance deficiency and should not be identified as two separate findings.
- The issue described in the second AV is associated with the design functions described in IMC 2519 for Class 1E Cable Raceways, which is intermediate risk, and therefore is not "High Risk Importance."
- For the first AV, only a portion of the Class 1E raceway structure was affected, and therefore should not be categorized as any higher than Row 2 for "Quality of Construction."
- The second AV is very low safety significance (Green), as demonstrated through a Probabilistic Risk Assessment (PRA) analysis which shows the risk (delta-CDF, which is change in core damage frequency) is less than 1E-6.
- The failure modes and effects of the identified cable separation issues are very low safety significance.

Therefore, SNC believes the two Apparent Violations are one issue with cable separation where multiple examples exist, and the issue has very low safety significance. This has been demonstrated by the in-depth analysis of the issues identified. SNC fully recognizes the

importance of the issues identified in the NRC AVs and corrective actions are being implemented for these issues which cover a wide range of management and process-related activities. SNC will continue to monitor and assess the progress towards resolution of these issues. SNC is committed to ensuring the design and operational requirements for the affected systems, structures, and components are met prior to reliance on these systems for plant operation.

The information that has been provided here is intended to assist the NRC in the final significance determination for the apparent violations identified in EA-21-109. Also, additional information is provided that includes description of the causes, corrective actions, the status of additional causal analysis being performed, and the development of additional corrective actions, which is intended to provide relevant information for the NRC to consider pertaining to SNC's plans and approach to these issues.