

SummerRAIsPEm Resource

From: Gleaves, Bill
Sent: Friday, March 04, 2016 2:32 PM
To: SummerRAIsPEm Resource
Subject: FW: VC Summer LAR 13-29; Request for License Amendment and Exemption: Consolidation of IDS Spare Battery Termination Boxes
Attachments: VC Summer SE Final.docx

From: Reyes, Ruth
Sent: Thursday, March 03, 2016 2:33 PM
To: Gleaves, Bill
Subject: FW: VC Summer LAR 13-29; Request for License Amendment and Exemption: Consolidation of IDS Spare Battery Termination Boxes

Billy
The staff sent me the SE back in September but because the LAR wasn't needed until Summer 2016 I had to work on other amendments before working on this one...anyway, here is the SE...good luck. And like I told Chandu, I'm still here if you need help. I can always try to find some time if you and Chandu are struggling

From: Basturescu, Sergiu
Sent: Tuesday, September 08, 2015 1:48 PM
To: Reyes, Ruth <Ruth.Reyes@nrc.gov>
Cc: Ray, Sheila <Sheila.Ray@nrc.gov>; Zimmerman, Jacob <Jacob.Zimmerman@nrc.gov>
Subject: VC Summer LAR 13-29; Request for License Amendment and Exemption: Consolidation of IDS Spare Battery Termination Boxes

Ruth,

I have attached the safety evaluation for LAR 13-29 for VC Summer. Jake has concurred on it. Let me know if you have any questions.

Sergiu Basturescu
NRR/DE/EEEEB
(301) 415-1237

Hearing Identifier: Summer_COL_eRAIs
Email Number: 120

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Subject: FW: VC Summer LAR 13-29; Request for License Amendment and Exemption:
Consolidation of IDS Spare Battery Termination Boxes
Sent Date: 3/4/2016 2:31:56 PM
Received Date: 3/4/2016 2:31:57 PM
From: Gleaves, Bill

Created By: Bill.Gleaves@nrc.gov

Recipients:
"SummerRAIsPEm Resource" <SummerRAIsPEm.Resource@nrc.gov>
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Post Office: HQPWMSMRS02.nrc.gov

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MESSAGE	1185	3/4/2016 2:31:57 PM
VC Summer SE Final.docx	31275	

Options
Priority: Standard
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Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
CONSOLIDATION OF IDS SPARE BATTERY TERMINATION BOXES
VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3
DOCKET NOS. 52-027 AND 52-028

1.0 INTRODUCTION

By letter dated December 19, 2014 (Agencywide Documents Access and Management System Accession No. MI14353A126), as supplemented by letter dated February 25, 2015 (ADAMS Accession No. ML15056A429), South Carolina Electric & Gas Company (the licensee) requested a revision to the Combined Operating License (COL) for the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3. The proposed License Amendment Request (LAR) would change the Class 1E DC and Uninterruptible Power Supply System (IDS) by replacing four Spare Termination Boxes with a single Spare Battery Termination Box.

2.0 REGULATORY REQUIREMENTS

The regulatory requirements and guidance documents which the staff applied in the review of the application include:

General Design Criterion (GDC) 17, "Electric power systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety.

GDC 18, "Inspection and Testing of Electric Power Systems," requires, in part, that electric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features, such as wiring, insulation, connections, and switchboards, to assess the continuity of the systems and the condition of their components.

10 CFR 52.98(f) requires, in part, that any modification to, addition to, or deletion from the terms and conditions of a combined operating license (COL) to be submitted as a proposed amendment for NRC approval.

10 CFR 50.49, "Environmental Qualification (EQ) of Electric Equipment Important to Safety for Nuclear Power Plants," requires licensees to establish programs to qualify electric equipment important to safety.

RG 1.75, Revision 3, "Criteria for Independence of Electrical Safety Systems," describes a method acceptable to the NRC staff for complying with the NRC's regulations with respect to the physical independence requirements of the circuits and electric equipment that comprise or are associated with safety systems.

RG 1.118, Revision 3, "Periodic Testing of Electric Power and Protection Systems," describes a method acceptable to the NRC staff for complying with the Commission's regulations with respect to the periodic testing of the electric power and protection systems.

3.0 TECHNICAL EVALUATION

3.1 Description of the Direct Current Power System

VCSNS's direct current (DC) power system is comprised of independent Class 1E and non-Class 1E DC power systems. Each system consists of ungrounded stationary batteries, DC distribution equipment, and IDS. The Class 1E DC and IDS system provides reliable power for the safety-related equipment required for the plant instrumentation, control, monitoring, and other vital functions needed for shutdown of the plant. In addition, the Class 1E DC and IDS system provides power to the normal and emergency lighting in the main control room and at the remote shutdown workstation. The Class 1E DC and IDS system is capable of providing reliable power for the safe shutdown of the plant without the support of battery chargers during a loss of all AC power sources coincident with a design basis accident (DBA). The system is designed so that no single failure will result in a condition that will prevent the safe shutdown of the plant.

Four independent divisions of Class 1E 250 VDC battery systems are provided for the Class 1E DC and IDS system. Divisions B and C have two battery banks; one battery bank is sized to supply power to safety-related loads for at least 24 hours and the other battery bank is sized to supply power to a second set of safety-related loads for at least 72 hours following a design basis event (including the loss of all AC power). Divisions A and D each have one 24-hour battery bank. Each switchboard connected with a 24-hour battery bank (divisions A, B, C and D) supplies power to an inverter, a 250 VDC distribution panel, and a 250 VDC motor control center. Each switchboard connected with a 72-hour battery bank (divisions B and C) supplies power to an inverter. No load shedding or load management program is needed to maintain power during the required 24-hour safety actuation period.

A single spare battery bank with a spare battery charger is provided for the Class 1E DC and IDS system. The spare battery and charger have sufficient capacity and capability to permit continuous plant operation at 100-percent power in case of a failure or unavailability of one 24 hour or 72 hour Class 1E battery bank and the associated battery charger. The spare battery and the battery charger can also be utilized as a substitute when performing offline testing, maintenance, and equalization of an operational battery bank.

3.2 Proposed Changes to License Basis Documents

The proposed changes revise VCSNS's COL for the Class 1E DC and IDS. The proposed changes replace four Spare Termination Boxes with a single Spare Battery Termination Box and include minor raceway and cable routing changes.

The proposed changes require revisions to Updated Final Safety Analysis Report (UFSAR) Tier 2 information, which involves changes to COL Appendix C and departure from plant-specific Tier 1 information:

UFSAR Table 3.11-1 (Sheet 4 of 51), Table 31.6-2 (Sheet 3 of 29), and Figure 8.3.2-1 (Sheet 2 of 2), are revised.

COL Appendix C Tables 2.6.3-1, 2.6.3-4 and corresponding Plant-Specific Tier 1 Tables are revised.

3.3. Staff's Review

On page 5 of Enclosure 1 of the LAR, the licensee stated that because of final design activities including vendor selection and procurement, the licensee is proposing that four Spare Termination Boxes (divisions A, B, C and D) be replaced with a single Spare Battery Termination Box, and that minor raceway and cable routing changes be made. The Spare Termination Boxes are used to manually connect the Spare Battery Bank and Spare Battery Bank Charger to supply the loads of one of the four 24 Hour Battery Switchboards or one of the two 72 Hour Battery Switchboards at a time. The original four Spare Termination Boxes were located in close proximity to each other in the same location as the new Spare Battery Termination Box. Thus, there are no additions or deletions of cabling required and the routing changes are minimal. The routing revision will be from the Spare Fused Transfer Switch Box to the original four Spare Termination Boxes/new Spare Battery Termination Box and to the four 24 Hour and two 72 hour Battery Fused Transfer Switch Boxes. The staff has reviewed the routing revision of the cables from the Spare Fused Transfer Switch Box to the original four Spare Termination Boxes/new Spare Battery Termination Box and to the four 24 Hour and two 72 hour Battery Fused Transfer Switch Boxes. The staff reviewed the licensee's UFSAR Subsection 8.3.2.4, "Independence of Redundant Systems," and found that the licensee's current cables separation criteria is in accordance with the guidance in Regulatory Guide 1.75. Non-Class 1E circuits are electrically isolated from Class 1E circuits, and Class 1E circuits from different separation groups are electrically isolated by isolation devices, shielding and wiring techniques, physical separation (in accordance with Regulatory Guide 1.75 for circuits in raceways) or an appropriate combination thereof. In the LAR the licensee stated that the different divisions of cabling are routed to remain in compliance with Regulatory Guide 1.75 separation criteria as described in UFSAR Subsection 8.3.2.4. The staff finds that the routing revision of the cables does not affect the cable separation criteria described in the licensee's UFSAR. Therefore the staff finds that with the proposed routing revision of the cables, the licensee would continue to remain in compliance with Regulatory Guide 1.75 separation criteria as stated in the LAR and UFSAR.

On page 6 of Enclosure 1 of the LAR, the licensee stated that in the existing design the Spare Termination Boxes use plug-in locking type disconnects to permit connection of the Spare Battery Bank and Spare Battery Bank Charger to one of the 24 Hour or 72 Hour Battery Switchboards at a time, so that the independence of each IDS division is maintained.

Furthermore, on page 7 of Enclosure 1 of the LAR, the licensee stated that the new Spare Battery Termination Box is a dry-type metal-enclosed low-voltage power circuit breaker switchgear that contains six draw out-type circuit breaker cubicles with power output connected by normally de-energized cabling to each of the six respective Fused Transfer Switch Boxes. A single breaker is supplied in the proposed design such that only one compartment contains a breaker at a time. The staff notes that the proposed design maintains electrical independence of the different divisions of this cabling, by ensuring that with only one breaker, only one Battery Switchboard can be connected to the Spare Battery Bank and Spare Battery Bank Charger at a time. In the licensee's design description from COL Appendix C, the licensee lists electrical independence between the Class 1E divisions as one of the safety-related functions of the IDS system. The IDS design ensures that a fault in one of the divisions will not propagate to another division through the proposed Spare Battery Termination Box. The staff finds that with the proposed Spare Termination Box, the licensee would continue to maintain electrical independence of the different cable divisions and that this revision does not adversely affect the electrical independence safety-related design function described in COL Appendix C.

The staff has reviewed the operation of the Spare Termination Boxes in the existing design and the proposed operation of the new Spare Battery Termination Box. In the existing IDS design, in case of a failure or unavailability of the normal battery bank and the battery charger, plug-in locking type disconnects located at the Spare Termination Boxes along with kirk-key interlock switches located in the associated Fused Transfer Switch Box allow the spare battery bank to be manually connected to the affected bus. In the proposed IDS design, in case of a failure or unavailability of the normal battery bank and the battery charger, a single circuit breaker located at the Spare Battery Termination Box along with the aforementioned kirk-key interlock switches allow for the manual connection to be made. The staff reviewed the LAR and the UFSAR Subsection 8.3.2.1.1.1, "Class 1E DC Distribution," and finds that with the proposed IDS configuration, the licensee will be able to manually connect backup power to a single 24 Hour Battery Switchboard or 72 Hour Battery Switchboard without any additional steps to the current design. The licensee stated that the new IDS configuration does not affect the system's testability and that it is consistent with the existing inspection, testing requirements and procedures. To ensure that the proposed periodic onsite testing capabilities of the safety-related DC power system satisfy the requirements of GDC 18 and the positions of RGs 1.118, the staff reviewed the descriptive information and schematics in the UFSAR. The staff finds that components of the 250 VDC systems undergo periodic maintenance tests to determine the condition of the system. Batteries, battery chargers, inverters, voltage regulating transformers, circuit breakers, switches, and fuse/fuse holders are part of the surveillance testing required by the Technical Specifications part of the licensee's COL. In particular, all circuit breakers in the Class 1E DC system that are credited for an isolation function are tested through the use of breaker test equipment. This is to confirm the ability of the circuit to perform the designated coordination and corresponding isolation function between Class 1E and non-Class 1E components. The staff finds that the proposed IDS system continues to permit integral periodic testing of safety-related DC systems and that the licensee continues to meet the requirements of GDC 18, and continues to remain in compliance with Regulatory Guide 1.118.

Commented [RS1]: Add UFSAR Section #

As described above the proposed design uses a single circuit breaker instead of the current plug-in locking type disconnects, to connect the Spare Battery Bank and Spare Battery Bank Charger to one of the Battery Switchboards. The circuit breaker is a horizontal draw out, stored-energy, and air-break type, three-pole, single-throw, mechanically actuated, without trip devices. The staff reviewed the LAR and finds that both the current plug-in locking type disconnects and the proposed circuit breaker are only provided to permit connection of the Spare Battery Bank and Spare Battery Charger to one of the Battery Switchboards. Furthermore the staff reviewed the licensee's UFSAR Section 8.3.2.1.1.1, and found that for circuit continuity and protection the Class 1E DC switchboards employ fusible disconnect switches and have adequate short circuit and continuous-current ratings. Fused transfer switch boxes, equipped with double pole double throw transfer switches, are provided to facilitate battery testing, and maintenance. The staff verified that the IDS system continues to be protected from faults upstream of the proposed Spare Termination Box by having the Spare Fused Transfer Switch Box between the Spare Battery Bank/Spare Battery Charger and the proposed Spare Termination Box. Also the staff verified that the IDS system continues to be protected from faults downstream of the proposed Spare Termination Box by having each division's Fused Transfer Switch Box between the proposed Spare Termination Box and the 24 Hour or 72 Hour Battery Switchboards. The staff finds that the proposed Spare Termination Box and circuit breaker, do not adversely affect the protection of the IDS system and of the safety related equipment needed to shutdown the plant. The staff notes that the IDS configuration, with the new Spare Termination Box and circuit breaker, continues to support the onsite electric power systems by allowing for the desired Battery Switchboard to provide 250 VDC to the safety related equipment required for the plant instrumentation, control, monitoring, and other vital functions needed for shutdown of the plant. Therefore, the staff finds that the IDS continues to perform its safety function, continues to meet the requirements of GDC 17 and continues to follow the COL Appendix C design criteria.

On page 5 of Enclosure 1 of the LAR, the licensee stated that UFSAR Table 3.11-1, Table 3I.6-2, and Figure 8.3.2-1, are revised to replace the four Spare Termination Boxes with a single Spare Battery Termination Box. The staff has reviewed the revised UFSAR Table 3.11-1 and verified that the listings for the four Spare Termination Boxes have been replaced with a single Spare Battery Termination Box and that the new Termination Box is in the same environmental zone, has the same operating time requirement and maintains the same qualification program as the previous Termination Boxes. The staff has reviewed the revised UFSAR Table 3I.6-2 and verified that the listings for the four Spare Termination Boxes have been replaced with a single Spare Battery Termination Box in the list of potential high frequency sensitive AP1000 safety-related electrical and electro-mechanical equipment. The staff has reviewed the revised Figure 8.3.2-1, and verified that the Class 1E DC System One Line Diagram accurately depicts the new Spare Battery Termination Box instead of the four separate Spare Termination Boxes. Therefore the staff finds that the IDS with the proposed changes will continue to meet the same EQ requirements, regulatory acceptance criteria, electrical codes, and industry standards specified in the UFSAR and that it would continue to meet the requirements of 10 CFR 50.49.

On page 5 of Enclosure 1 of the LAR, the licensee stated that COL Appendix C Tables 2.6.3-1, 2.6.3-4 are revised to replace the four Spare Termination Boxes with a single Spare Battery Termination Box. The staff has reviewed the revised COL Appendix C Table 2.6.3-1 and verified that the listings for the four Spare Termination Boxes have been replaced with a single Spare Battery Termination Box and that the new Termination Box is listed in the same seismic category as the previous Termination Boxes and is listed as Class 1E. The staff has reviewed the revised COL Appendix C Table 2.6.3-4 and verified that the listings for the four Spare Termination Boxes have been replaced with a single Spare Battery Termination Box and that the new Termination Box is listed in the same location as the previous Termination Boxes. The staff reviewed the design commitments related to the IDS in the existing COL Appendix C Table 2.6.3-3, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC), and verified that those commitments do not require any changes in order to confirm that the structures, systems, and components related to the IDS are constructed in accordance with the design certification. The staff finds the proposed changes to information provided in the COL Appendix C Tables are at a level of detail that is consistent with the other information currently presented in these tables and that they provide the detail necessary to implement the corresponding ITAAC that address these tables.

4.0 CONCLUSION

Based on the above evaluation, the staff concludes the proposed change to VCSNS's Class 1E DC and IDS provide reasonable assurance of the continued availability of the required power to shut down and maintain the reactor in a safe condition after an anticipated operational occurrence or a postulated design-basis accident. Furthermore, the staff concludes that with the proposed changes, the licensee would continue to meet the requirements of GDCs 17 and 18. Therefore, the staff finds the proposed changes acceptable.