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ND-16-1655  
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U.S. Nuclear Regulatory Commission  
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Southern Nuclear Operating Company  
Vogtle Electric Generating Plant Units 3 and 4  
Supplement to Request for License Amendment:  
Update of Common Qualified (Common Q) Platform  
Software Program Manual and Topical Report (LAR-15-017S3)

Ladies and Gentlemen:

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, by letter ND-16-0083, dated February 15, 2016 [ADAMS Accession Number ML16046A009], Southern Nuclear Operating Company (SNC), the licensee for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, requested an amendment to Combined License (COL) Numbers NPF-91 and NPF-92, for VEGP Units 3 and 4, respectively. This license amendment request (LAR), LAR-15-017, proposed changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2 information and involves related changes to the associated plant-specific Tier 2\* information.

This letter supplements LAR-15-017 to address a Request for Additional Information (RAI) [ADAMS Accession Number ML16190A263] from the NRC Staff to support review of LAR-15-017. This letter provides the response to RAIs 1 through 3 regarding Enclosure 2, RAI 3 regarding Enclosure 3, and additional information requested by the NRC Staff during the audit of LAR-15-017 held on August 2 - 3, 2016. Prior to this supplement, two supplements to LAR-15-017 were submitted. Supplement LAR-15-017S1, submitted on August 19, 2016 [ADAMS Accession Numbers ML16232A577 and ML16232A578], provided a partial response to these RAIs. Supplement LAR-15-017S2 [ADAMS Accession Number ML16239A392] provided a revised schedule for the submittal of remaining RAIs not covered in supplement LAR-15-017S1. This supplement, LAR-15-017S3, along with supplement LAR-15-017S1, completes SNC's response to these NRC RAIs.

Enclosure 11 provides additional information and proposed revised marked up UFSAR text to support the RAI responses.

Enclosure 12 provides WCAP-15927, "Design Process for AP1000 Common Q Safety Systems," Revision 5.

The supplemental information provided in Enclosures 11 and 12 does not change the scope, or affect the Technical Evaluation, or alter the conclusions of the Significant Hazards Consideration Determination or Environmental Considerations in LAR-15-017.

This letter contains no regulatory commitments.

SNC requests staff approval of this license amendment by December 22, 2016, to support installation of the Protection and Safety Monitoring System (PMS) cabinets for Unit 3. This approval date has been revised since the original submittal of LAR-15-017 to reflect the current construction activity schedule. Delayed approval of this licensing request could result in delay of the associated construction activity and subsequent dependent construction activities. SNC expects to implement the proposed amendment through incorporation into the licensing basis documents; e.g., the UFSAR, within 30 days of approval of the requested changes. South Carolina Electric & Gas Company (SCE&G) has stated that the current requested approval date for Virgil C. Summer Nuclear Station (VCSNS) Unit 2 is April 2017.

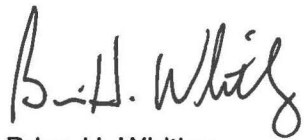
In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this LAR supplement by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Mr. Christopher Whitfield at (205) 992-5071.

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

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY



Brian H. Whitley

BHW/CLW/ljs

Sworn to and subscribed before me this 13<sup>th</sup> day of September, 2016

Notary Public: Lisa Myrick Spears

My commission expires: June 18, 2019



Enclosure 12 provides WCAP-15927, "Design Process for AP1000 Common Q Safety Systems," Revision 5.

The supplemental information provided in Enclosures 11 and 12 does not change the scope, or affect the Technical Evaluation, or alter the conclusions of the Significant Hazards Consideration Determination or Environmental Considerations in LAR-15-017.

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Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Brian H. Whitley

BHW/CLW/ljs

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2016

Notary Public: \_\_\_\_\_

My commission expires: \_\_\_\_\_

- Enclosures:
- 1) - 6) (previously submitted with the original LAR, LAR-15-017, in SNC letter ND-16-0083)
  - 7) – 10) (previously submitted with Response to NRC Staff Request for Additional Information (RAI), LAR-15-017S1, in SNC letter ND-16-1391)
  - 11) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Response to Request for Additional Information (RAI) Regarding LAR-15-017 (LAR-15-017S3)
  - 12) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – WCAP-15927, Revision 5, Design Process for AP1000 Common Q Safety Systems (LAR-15-017S3)

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ND-16-1655

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**Southern Nuclear Operating Company**

**ND-16-1655**

**Enclosure 11**

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

**Response to Request for Additional Information (RAI)**

**Regarding LAR-15-017**

**(LAR-15-017S3)**

**(Enclosure 11 consists of 21 pages, including this cover page.)**

**Enclosure 2, “Plant-Specific Action Item and Generic Open Item Dispositions for WCAP-16096, Revision 4 and WCAP-16097, Revision 3”**

**WCAP-16097: Common Q Topical Report – Plant-Specific Action Items (PSAI)**

**NRC Question:**

**1. WCAP-16097, PSAI 6.18 (Pages 5-6 of Enclosure 2):**

10 CFR 50.36 sets forth requirements for technical specifications to be included as part of the operating license for a nuclear power facility.

WCAP-16097, “Common Qualified Platform Topical Report,” Plant-Specific Action Item (PSAI) 6.18, states that, “...*administrative controls must be in place to ensure that changes to setpoints are only performed while the system is not being relied upon to perform its safety functions. In addition, the affected division of the Common Q safety system must be declared inoperable prior to implementation of setpoint changes.*” To address WCAP-16097 PSAI 6.18, the Licensee proposes to add a new Tier 2 Subsection 7.1.2.14.3, “Operational Process,” to describe the software operations plan and the administrative controls within it. The proposed markups for this new Subsection (see page 9 of Enclosure 4) states:

A software operations plan includes administrative controls to require that the PMS and its division room are in the appropriate configuration prior to making setpoint changes. This includes requiring a channel to be bypassed prior to making setpoint changes for reactor trip or ESFAS functions. In addition, the PMS division is declared inoperable prior to making setpoint changes for blocks and resets. The administrative controls prevent the protection and safety monitoring system division room environment from interfering with protection and safety monitoring system equipment when plant personnel are making setpoint changes. The administrative controls account for local emissions from nearby equipment and activities (e.g., welding) while the maintenance test cabinet (MTC) door is open.

In addition, the disposition to WCAP-16097 PSAI 6.18, states, in part, that:

Since the PMS division will remain operational during setpoint changes for reactor trip and ESFAS actuation functions, as described above, the PMS division room environment needs to be considered when opening the MTC door to make setpoint changes.

The requested amendment does not provide a discussion any specific details on how the administrative controls for implementing setpoint changes will affect the Technical Specifications. Therefore, the NRC staff requests the Licensee to:

- (1) Describe how the administrative controls for implementing setpoint changes will affect the Technical Specifications actions for the affected PMS division (e.g. one sub-channel bypassed, the other sub-channel fully operational, while the remainder of the safety divisions are operational etc.).



(2) The proposed markups for Tier 2 Subsection 7.1.2.14.3, states, in part, that:

...In addition, the PMS division is declared inoperable prior to making setpoint changes for blocks and resets...

Is this meant to include permissive signals that permit manual bypass of associated Function(s)? If so, discuss how the same procedural controls will apply to changing permissive setpoints for manually bypassing, and setpoints for automatic enabling of Functions that utilize such setpoints, within the same PMS division.

(3) The proposed markups for Tier 2 Subsection 7.1.2.14.3, states, in part, that:

Since the PMS division will remain operational during setpoint changes for reactor trip and ESFAS actuation functions...

It is not clear for the NRC staff what is meant by “operational,” in the underline text shown above. Does operational mean “degraded but operable”? Define what is meant by “operational.”

Update the requested amendment accordingly.

**SNC Response:**

(1) The administrative controls for implementing setpoint changes will not impact the current Technical Specifications. When the plant is in a condition where the associated function is required to be operable, the administrative controls will involve declaring the channel associated with the setpoint change inoperable and not relying on its function until declared operable again. The controls for an inoperable channel would then comply with the required actions described in the Technical Specifications for inoperable channels. In each case, the Technical Specification Required Action(s) provides the appropriate level of safety when a channel is declared inoperable for the setpoint change. Alternatively, setpoint changes can be made when the plant is in a condition where the associated channel is not required to be operable, in which case, no Technical Specification action would apply.

When implementing a setpoint change, both sub-channels for the function within that division will be declared inoperable and will not be relied upon for any function. The appropriate Technical Specification actions for the affected channel will be entered, setpoint changes made, and channel operability reestablished prior to declaring the channel operable and exiting the Limiting Condition for Operation (LCO) actions. For example, the reactor trip (RT) and Engineered Safety Features Actuation System (ESFAS) functions in LCOs 3.3.1 and 3.3.8 require 4 operable channels; with one channel inoperable the Required Action is to place the channel in bypass or trip within 6 hours. If the setpoint change is implemented and the channel declared operable prior to expiration of the allowed Completion Time, completing the Required Action to bypass or trip the channel is not required to comply with the Technical Specification action.

The original PSAI response and Updated Final Safety Analysis Report (UFSAR) proposed wording are updated below to align with this response.

- (2) Yes, the proposed license amendment request (LAR) update below includes implementing setpoint changes for permissive signals that automatically bypass/enable or permit manual bypass of associated functions. When the plant is in a condition where the function associated with a permissive is required to be operable and a permissive setpoint is to be changed, the associated Technical Specification function's channel(s) are first declared inoperable and the required Technical Specification action is taken as described in response (1) above. The PMS division does not need to be declared inoperable prior to making setpoint changes for permissives, therefore the proposed LAR and UFSAR wording is corrected below.
- (3) When making setpoint changes during plant conditions that require the associated channel to be operable, only the channel for which the setpoint (or an associated permissive setpoint) is being changed is declared inoperable. The other channels within the PMS division will remain "operational" in that they are not declared inoperable and they are not bypassed or tripped (i.e., they will be operable - capable of performing their specified safety function).

#### **License Amendment Request update**

- The change to WCAP-16097 PSAI 6.18 is proposed:

##### PSAI 6.18 Disposition

PMS setpoints for reactor trip and ESFAS actuation functions are changed using the safety-related Maintenance and Test Panel in the Maintenance Test Cabinet (MTC), as described in WCAP-16675. The SE states that "Placement of the function enable key switch in the enable position causes a system alarm but does not inhibit operation of the remaining Common Q system in any way." However, for the AP1000 PMS the MTP performs an interlock such that setpoint changes cannot be made unless the MTP function enable keyswitch is in the enable position. This interlock is part of the MTP safety-related software. ~~As a result, it is sufficient to only bypass the channel associated with the setpoint change instead of the entire division. Bypassing an entire division would revert all reactor trip and ESFAS actuation functions to a 2-out-of-3 coincident logic. Bypassing the channel would only revert the safety function associated with the setpoint change to a 2-out-of-3 coincidence configuration, with the remaining safety functions maintaining a 2-out-of-4 coincidence configuration. This is preferable from a system reliability perspective. Bypassing a channel for setpoint changes is consistent with WCAP-16675, Section 2.2.6.1, "Setpoint and Calibration Constant Changes."~~

When reactor trip (RT) or Engineered Safety Features (ESF) actuation setpoints are being changed via the MTP, the instrument channel involved in the setpoint change is declared inoperable and not relied upon to perform its intended safety function. The Technical Specifications establish the actions that must be taken when an instrument channel is inoperable. Alternatively, setpoint changes can be made when the plant is in a condition where the associated channel is not required to be operable.

Declaring an entire PMS division inoperable to make a setpoint change is unnecessary. Since the PMS division will remain operational (i.e., the remaining channels are required to be operable and they are not bypassed or tripped) during setpoint changes for reactor trip and ESFAS actuation functions, ~~as described above,~~ the PMS division room environment needs to be considered when opening the MTC door to make setpoint changes. Therefore, administrative controls will be developed so that the division room environment does not interfere with PMS equipment when plant personnel are making setpoint changes to reactor trip and ESFAS actuation functions. The administrative controls will account for local emissions from nearby equipment and activities (e.g., welding) while the MTC door is open.

~~The permissive setpoints for blocks and resets (e.g., P-10) can also be changed. However, there is no associated maintenance bypass associated with these setpoints and they affect multiple safety functions in a division. Therefore, administrative controls will be developed to declare the affected division of the PMS inoperable prior to changing permissive setpoints.~~

#### Proposed Licensing Basis Changes

A change is proposed to add Tier 2 UFSAR Subsection 7.1.2.14.3, "Operational Process" to require that the PMS and its division room are in the appropriate configuration prior to making setpoint changes, as described above.

#### Technical Evaluation

The proposed text captures the licensing basis changes necessary to satisfy this PSAI and is consistent with WCAP-16097, Revision 3. In addition, in reviewing WCAP-16675, the NRC previously approved the use of the MTP as a dedicated display interface for each division and to bypass the channel before any to make any setpoint alterations. The staff evaluated the access controls per IEEE 603-1991, Clause 5.9. See NUREG-1793, Supplement 2, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design, Docket Number 52-006."

- The following change to UFSAR Section 7.1.2.14.3 is proposed:

#### 7.1.2.14.3 Operational Process

A software operations plan includes administrative controls for changing setpoints in the PMS, to require that the PMS and its division room are in the appropriate configuration prior to making setpoint changes. The controls include declaring the channel associated with the setpoint change inoperable and not relying on its function until declared operable again. The controls for an inoperable channel would then comply with any applicable Technical Specification action. A software operations plan also includes administrative controls to require that the PMS is in the proper configuration and room environmental conditions are acceptable for cabinet access prior to making setpoint changes. This includes requiring a channel to be bypassed prior to making setpoint changes for reactor trip or ESFAS functions. In addition, the PMS division is declared inoperable prior to making setpoint changes for blocks and resets. The administrative controls prevent the protection and safety monitoring system division room environment from interfering with protection and safety monitoring system equipment when plant personnel are making setpoint changes. The administrative controls account for local emissions from nearby equipment and activities (e.g., welding) while the maintenance test cabinet (MTC) door is open.

#### **NRC Question:**

#### **2. WCAP-16097, PSAI 6.18 (Pages 5-6 of Enclosure 2):**

WCAP-16097, "Common Qualified Platform Topical Report," Plant-Specific Action Item (PSAI) 6.18, states that, "...*administrative controls must be in place to ensure that changes to setpoints are only performed while the system is not being relied upon to perform its safety functions. In addition, the affected division of the Common Q safety system must be declared inoperable prior to implementation of setpoint changes.*"

In reviewing Section 2.2.6, Maintenance and Test Panel Subsystem of WCAP-16675, "AP1000™ Protection and Safety Monitoring System," Revision 5, the NRC staff understands there is one 'Function Enable' switch within each of the divisionally based Maintenance and Test Panels (MTPs). Section 2.2.6 of WCAP-16675 states, in part, that:

When the Function Enable keyswitch is disabled, all surveillance test conditions are removed and all external inputs to the safety system functions are restored.

In using this statement as a basis, it appears that when the "Function Enable keyswitch" is taken to the "Enable" position that surveillance test conditions for both sub-channels have the potential to be inserted and all, or many, of the external inputs to the division have been disabled. The NRC staff requests the Licensee to:

- (1) Describe how the voting logic in the other Protection and Safety monitoring System (PMS) divisions (e.g. one sub-channel bypassed, the other sub-channel fully operational, while the remainder of the safety divisions are operational etc.) would be affected for all reactor trip and engineered safety features actuation functions while implementing setpoint changes under all different operating conditions.

- (2) Describe actions that the License has taken to ensure that in the presence of a system designed for division-based maintenance (as evidenced by a singular Function Enable keyswitch per division and not two separate switches) that at least one sub-channel within the given division will remain operational.

Update the requested amendment accordingly.

**SNC Response:**

- (1) When reactor trip (RT) or Engineered Safety Features (ESF) actuation setpoint changes are implemented, both sub-channels for the function within that division will be declared inoperable and will not be relied upon for any safety function. The safety function will be appropriately implemented by the remaining operable redundant channels, as limited by applicable Technical Specification actions. All automatic RT and most automatic ESF actuations have four redundant channels, one for each PMS division, that are inputs to two out-of-four (2/4) voting logic. A setpoint change (actuators and permissives) would impact one channel in one division leaving 3 operable channels. If the inoperable channel undergoing the setpoint change is bypassed, the logic would become 2/3 in all divisions for the given RT or ESF actuation. For all other voting logic configurations (1/2, 2/2, 2/3), the design prohibits both sub-channels from being simultaneously bypassed in order to remain single-failure tolerant. In all cases (1/2, 2/2, 2/3, and 2/4), whether or not the inoperable channel is bypassed or tripped (for the time allowed by Technical Specifications, as described in response to RAI 1) its capability is not relied upon (due to declaring it inoperable) even though it could function to trip at either the old or the new setpoint if process conditions reached that setpoint.

Alternatively, setpoint changes can be made when the plant is in a condition where the associated channel is not required to be operable.

- (2) The Function Enable Keyswitch does not impact the capability of the safety system from performing its safety function, because it only enables / disables the soft buttons used to perform maintenance activities and provides a hardwired interlock to allow Manual Partial Actuators (MPAs) or Manual Partial Bypasses (MPBs). When the Function Enable Keyswitch is in the DISABLED position, actions at the MTP (e.g., setpoint changes, MPBs, MPAs, Test Injections) are not permissible (i.e., the soft buttons that are used to perform the actions at the MTP are disabled). Upon turning the Function Enable Keyswitch to the ENABLED position, actions at the MTP are permitted by enabling the soft buttons that control these actions. Placing the Function Enable Keyswitch into the ENABLED position does not prohibit any safety system function. Additionally, for MPB and MPA functions, the Function Enable Keyswitch is used as a hardwired interlock in the Bistable Processing Logic (BPL) for permitting these functions.

As noted in the RAI, WCAP-16675 states “When the Function Enable keyswitch is disabled, all surveillance test conditions are removed and all external inputs to the safety system functions are restored.” This statement means the following: When the Function Enable Keyswitch is DISABLED, all surveillance test conditions that were initiated at the MTP are removed and all external (e.g., sensor) inputs to the safety system that were replaced with surveillance test conditions initiated at the MTP are restored. MPBs and MPAs are not automatically reset when the Function Enable is placed in the DISABLED position. They remain in the last state entered by the maintenance (e.g., bypassed or unbypassed). The Function Enable keyswitch does not cause any sub channels within the division to be non-operational. It only provides an interlock at the display level (BPL level for MPAs/MPBs) to allow maintenance activities. All channels can be operational when the Function Enable Keyswitch is in the ENABLED position. However, when making setpoint changes, both sub-channels would be declared inoperable and not relied on to be operational.

**NRC Question:**

**3. WCAP-16097, PSAI 6.20 (Page 6 of Enclosure 2)**

WCAP-16097 PSAI 6.20 states that “A Licensee implementing an application based upon the Common Q platform that utilizes fiber optic cables to connect HSL’s between safety divisions shall ensure that all plant specific environmental qualification requirements for this cabling are met.” The disposition of WCAP-16097 PSAI 6.20 states:

For the AP1000, this issue was already included in the scope of the WCAP-16097 PSAI 6.4 disposition in APP-GW-GLR-017.

In the PSAI 6.4 Resolution in APP-GW-GLR-017 states:

The AP1000 temperature and humidity conditions for qualification of protection and safety monitoring system equipment are presented in DCD Appendix 3D (Reference 1). Temperature and humidity qualification of the protection and safety monitoring system equipment is covered by DCD Tier 1 (ITAAC) 2.5.2, Item 4 (Reference 1).

From the information contained in the disposition for WCAP-16097 PSAI 6.4 at APP-GW-GLR-017, it is not clear to the NRC staff how the plant specific environmental qualification requirements for the fiber optic cables are met. The NRC staff request the Licensee to describe how the plant specific environmental qualification shown above will bound the fiber optic cables. Update the requested amendment accordingly.

**SNC Response:**

WCAP-16097, Revision 3, PSAI 6.20 requires a plant-specific environmental qualification (EQ) for fiber optic cables used to connect High Speed Links (HSLs) between safety divisions. The PSAI response states that the AP1000 design is already committed to this requirement via PMS ITAAC, as noted in the response to WCAP-16097, Revision 1, PSAI 6.4 documented in APP-GW-GLR-017.

Specifically, according to WCAP-16097, Revision 1, PSAI 6.4:

“Each licensee implementing a Common Q application must verify that its plant environmental data (i.e., temperature, humidity, seismic, and electromagnetic compatibility) for the location(s) in which the Common Q equipment is to be installed are enveloped by the environment considered for the Common Q qualification testing, and that the specific equipment configuration to be installed is similar to that of the Common Q equipment used for the tests.”

The environmental qualification and seismic ITAAC for the PMS (i.e., plant-specific Tier 1 Table 2.5.2-8 Items 2 (i, ii, and iii), 3, and 4) referenced in the response to WCAP-16097, Revision 1, PSAI 6.4 is also applicable to HSLs used in the PMS and, therefore, WCAP-16097, Revision 3, PSAI 6.20. These ITAAC require the AP1000 PMS design (including HSLs) to meet environmental qualification and seismic requirements. Therefore, the fiber optic cables used to connect HSLs between PMS safety divisions must receive plant-specific environmental qualification and seismic tests before the associated ITAAC can be closed and fuel loaded into the plant.

In accordance with the ITAAC identified above, PMS equipment was subjected to seismic, environmental, and EMC tests as documented in the EQ summary report. Representative PMS hardware/equipment and associated communication cables (including fiber optic cables) are included as part of the equipment under test. HSL modems are mounted through the HSL termination unit to horizontal Deutsches Institut für Normung (DIN) [German Institute for Standardization] rails in the lower third of the front of the EQ cabinet. This is the equipment and cable configuration used for electromagnetic compatibility (EMC), seismic, and environmental tests.

- Environmental Tests:
  - Electromagnetic Interference (EMI) / Radio Frequency Interference (RFI) Tests - Fiber optic cables are not subject to EMI/RFI testing because they carry no electrical current or electrical load (light only) and, thus, they are immune to EMI/RFI phenomena. Therefore, fiber optic cables are not specifically identified as cable to be tested during EMC testing. However, these cables were installed and the interfacing hardware was exercised during the qualification tests (seismic, environmental, and EMC).
  - Normal and abnormal environmental Tests - The environmental test (which verifies the equipment can withstand normal and abnormal room temperature and humidity) included testing the functionality of the signal processing across fiber-optic cables.
- Seismic Testing - The fiber optic cabling was included as an interface between the PMS test cabinets and the monitoring equipment, as well as communications between PMS test cabinets. For seismic testing, the AP1000 PMS EQ communication cable configuration is detailed in the EQ summary report.

The functional monitoring equipment used to monitor PMS equipment during the testing described above detects if a loss of HSL communication was experienced during the testing, which was an acceptance criteria used during each phase of testing.

The operability of the following communication schemes are demonstrated during EQ testing:

- Intra-divisional HSL communication, via the connections between the Local Coincidence Logic (LCL) ESF Processor Modules (PMs) and the Integrated Logic Processor (ILP) PMs, as well as the ILP PMs and the Safety Remote Node Controller (SRNC).
- Inter-divisional HSL communication, via the Bistable Processor Logic (BPL) PM and the LCL PMs. The BPL PM HSL output is sent through a Fiber Optic Modem (FOM)-to-FOM fiber loop to simulate one division's BPL being transmitted to another division's LCL.

### **License Amendment Request update**

The disposition for PSAI 6.20 is updated for clarification purposes, as follows:

#### PSAI 6.20 Disposition

For the AP1000, this issue was already included in the scope of the WCAP-16097, PSAI 6.4 disposition in APP-GW-GLR-017. According to WCAP-16097, Revision 1, PSAI 6.4:

“Each licensee implementing a Common Q application must verify that its plant environmental data (i.e., temperature, humidity, seismic, and electromagnetic compatibility) for the location(s) in which the Common Q equipment is to be installed are enveloped by the environment considered for the Common Q qualification testing, and that the specific equipment configuration to be installed is similar to that of the Common Q equipment used for the tests.”

The response to this PSAI takes credit for DCD Tier 1 Table 2.5.2-8, ITAAC Items 2 (i, ii, iii), 3 and 4, which are included in the AP1000 certified design and is incorporated in the plant-specific Tier 1. These ITAAC require the verification of the environmental and seismic data for the actual location of the PMS equipment. The AP1000 fiber optic cables used to connect HSLs between safety divisions is already included in the scope of the original PSAI (i.e., WCAP-16097, Revision 1, PSAI 6.4).

#### **NRC Question:**

##### **4. WCAP-16097, PSAI 6.24 (Page 8)**

WCAP-16097 PSAI 6.24 states that *“A licensee implementing an application based upon the Common Q platform that relies on the FPDS to perform safety critical functions shall perform an evaluation to address the added reliance on the FPDS to accomplish the required safety functions. The affects of not having the necessary information available on the FPDS during the design basis event should be considered and addressed in this evaluation.”* The disposition of WCAP-16097, PSAI 6.24 states, in part, that:



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The evaluation concluded that the only safety critical functions based on the Common Q platform that rely on the Flat Panel Display System (FPDS) are those design basis events (DBE) that require operator action. The DBE are for Anticipated Operational Occurrences. No DBEs are limiting Design Basis Accidents. For these three DBEs, the information necessary for the operator to take action is captured on the FPDS and on alternate, non-safety related sources.

The NRC staff requests the Licensee to identify the three design basis events (DBE) that require operator action. In addition, please identify the alternate non-safety related sources and describe the effects of not having the necessary information available on the Flat Panel Display System during the DBEs. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

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**Enclosure 3, “Common Q Platform Software Program Manual and Topical Report Alternatives and Justification”**

**WCAP-16096: Common Q Software Program Manual Alternatives**

**NRC Question:**

**1. Common Q SPM Sections, “Glossary of Terms: Project Quality Plan,” and 4.3.2.1, “Initiation (Concept) Phase – (Page 2 of Enclosure 3)**

The Licensee proposes an alternative to Common Q SPM Sections, “Glossary of Terms: Project Quality Plan,” and 4.3.2.1, “Initiation (Concept) Phase.” The alternative proposes to delete the following text from the Common Q SPM:

Any alternatives to the SPM processes or additional project specific information for the SQAP, SVVP, SCMP or SOMP shall be documented and justified in the PQP.

The justification of the alternative states:

The Project Plan identifies the Software Development Plan as the location for the SPM alternatives and justifications. The Software Development Plan also identifies itself as the companion document to the Project Plan. Both of these documents are approved by the Quality Organization.

The Licensee proposes to use the Software Development Plan as the location for the SPM alternatives to the SPM processes or additional project specific information for the SQAP, SVVP, SCMP or SOMP. The NRC staff requests the Licensee to:

- (1) Provide the relationship of the Project Plan and the Software Development Plan. Are these two documents at the same hierarchy level?
- (2) Demonstrate why it is acceptable to use Software Development Plan instead of the Project Plan as the location for the SPM alternatives to the SPM processes and/or additional project specific information.

Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**NRC Question:**

**2. Common Q SPM Section 4.3.1, “Organization” / Exhibit 2-1 – Design/IV&V Team Organization (Page 3 of Enclosure 3)**

The Licensee proposes an alternative to Common Q SPM Section 4.3.1, “Organization.” Section 4.3.1 of the SPM states, in part, that:

The NA organization includes an Operations group and an Engineering group. The design team is organized within the Engineering group and the IV&V team is organized within the Operations Organizations group.

The alternative proposes to update Exhibit 2-1 – Design/IV&V Team Organization to show that design team and the Independent Verification & Validation (IV&V) team are in separate organizations at least to the Director level. The justification of the alternative states:

The IV&V team and the design team are not under the same organization to maintain independence. This level of independence exceeds the criteria in the SPM.

The NRC staff requests the Licensee to describe how the proposed alternative to Exhibit 2-1 “exceeds the criteria in [Section 4.3.1 of] the SPM,” actually meets the site-specific requirements in the WCAP. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**NRC Question:**

**3. Common Q SPM Section 4.3.2.6, “Site Installation and Checkout Phase” – (Page 3 of Enclosure 3)**

The Licensee proposes an alternative to Common Q SPM Section 4.3.2.6, “Site Installation and Checkout Phase.” The alternative proposes to develop the site test plan in accordance with the overall digital I&C test strategy to support installation testing and the Initial Test Program. The justification of the alternative states:

A separate schedule is developed that governs the overall scheduling of AP1000 site testing. Site test planning is initiated during PMS development, but independent of any particular PMS development phase. This is an appropriate approach for a new build project.

The preparation of the site test plan is initiated during the requirements phase to support evaluation of requirement testability on-site. Demonstrate why the site test planning is independent of any particular PMS development phase. Update the requested amendment accordingly.

**SNC Response:**

A schedule is developed that governs the overall planning of AP1000 new build site testing. The planning for AP1000 site testing started early and included the development of testing methodology documents for instrumentation and controls (I&C), including the PMS. The methodology document describes different levels of testing starting with lower level testing at the component level, to site installation, and acceptance of the system. The site test team uses the outputs of the Requirements (i.e., Definition) phase and the Design and Implementation (i.e., Development) phase for actual development of the site testing specifications and procedures. Requirements traceability also provides assurance that the PMS requirements are tested prior to and post-installation, as appropriate.

The software verification and validation plan for PMS identifies the activities that the PMS Independent Verification & Validation (IV&V) organization performs should any anomalies be identified during the site testing. It is recognized, however, that the software verification and validation program (SVVP) did not map the acceptance test related activities to the appropriate site testing document. Therefore, the SVVP was updated to point to the appropriate site testing documents to show where activities associated with the acceptance test are fulfilled.

**License Amendment Request update**

The justification for the WCAP-16096 alternative to Section 4.3.2.6 is updated as follows:

**Justification**

A separate schedule is developed that governs the overall scheduling of AP1000 site testing. Site test planning is initiated during PMS development, but is independent of the timing of any particular PMS development phase. The site test planning uses the outputs of the Requirements (i.e., Definition) phase and the Design and Implementation (i.e., Development) phase to support the development of the site testing used in the Installation phase. Therefore, the products of these phases need to be available prior to the finalization of site PMS test planning. This is an appropriate approach for a new build project.

**NRC Question:**

**4. Common Q SPM Section 4.3.2.10, “Post Mortem Review” – (Page 4 of Enclosure 3)**

The Licensee proposes to use the Corrective Action, Prevention and Learning (CAPAL) system instead of Westinghouse Corrective Actions Process (CAP). The justification of the alternative to Section 4.3.2.10, “Post Mortem Review,” states:

Suggestions for improvement and best practices are captured in the CAPAL system. Therefore, the required content is still captured and intent of this commitment is still met.

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The NRC staff requests the Licensee to document in the requested amendment how the CAPAL system meets the processes in the CAP system.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**NRC Question**

**5. Common Q SPM Section 6.3.2, “Configuration Change Control” – (Page 5 of Enclosure 3)**

The Licensee proposes to use of Westinghouse Design Change Proposals (DCPs), Engineering & Design Coordination Reports (E&DCRs), the Westinghouse Level 3 Request for Engineering Change (REC) process, and the Westinghouse Level 3 Configuration Management (CM) procedure instead of Software Change Request (SCR) form. The justification of the alternative to Section 4.3.2.10, “Post Mortem Review,” states:

The Software Change Request (SCR) form is inadequate for tracking changes for a complex system. The use of Westinghouse DCP, E&DCR, REC, and CM processes is an appropriate, comprehensive approach to capturing plant-wide I&C system baseline changes. Westinghouse processes exceed this requirement by using an enhanced process.

The NRC staff requests the Licensee to document in the requested amendment how the use of Westinghouse DCP, E&DCR, REC, and CM processes documentation for tracking changes meets to the tracking documentation in the SCR form. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**NRC Question:**

**6. Common Q SPM Section 9.2.3, “Control” – (Page 6 of Enclosure 3)**

In the alternative to Common Q SPM Section 9.2.3, “Control,” the Licensee proposes to designate the Software Lead to confirm the AP1000 PMS software changes. Section 5.4.3.1.5, “Engineering Project Manager,” of the SPM states that EPs and Platform Leads may delegate the performance of necessary tasks to other persons but remain responsible for their execution.

The alternative states, in part, that:

The Software Lead shall confirm that the approved SCR is entered into this log.

In the alternative to SPM Section 6.3.2, the Licensee states that the SCR form is inadequate for tracking changes for a complex system and instead proposes the use of Westinghouse DCP, E&DCR, REC, and CM processes. This information appears to be contradictory to the proposed alternative. The NRC staff requests the Licensee to:

- (1) Describe how the Platform Lead will remain responsible for the execution of the AP1000 PMS software changes.
- (2) Describe how the Westinghouse processes will be used to track changes instead of the SCR log.

Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**NRC Question:**

**7. SPM Section 11.4, “Corrective Action” – (Page 7 of Enclosure 3)**

In the alternative to Common Q SPM Section 11.4, “Corrective Action,” the Licensee proposes to document the corrective actions in the Common Q Automation Issue Tracking System (RITS), and for the independent RITS reviewer to close out the report. The NRC staff requires additional information in order to determine if an adequate level of independence has been established. Please provide a complete listing of the reporting relationships established to demonstrate that an adequate level of separation exists between the design team and the independent RITS reviewer. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**NRC Question:**

**8. Common Q SPM Section 12, “Secure Development and Operational Environment Plan” – (Page 8 of Enclosure 3)**

10 CFR 50.55a(h), “Protection and Safety Systems,” requires compliance with the requirements of IEEE Std. 603-1991, which is a system-level standard that contains requirements related to access controls. IEEE Std. 603-1991, Clause 5.9, provides access control requirements for safety systems.

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The Licensee proposes to exclude WCAP-16096, Section 12, "Secure Development and Operational Environment Plan," from being incorporated by reference into the UFSAR. The justification of the alternative to Section 12, "Secure Development and Operational Environment Plan" states:

The AP1000 PMS Computer Security Plan is specific for AP1000 and has been determined to be an acceptable method used to demonstrate how computer security is incorporated into the design and development of AP1000 safety systems. The AP1000 PMS Computer Security Plan is consistent with the Common Q SPM incorporated by reference information and, therefore, should be used in place of any Section 12 references made within the Common Q SPM.

The NRC staff requests the Licensee to describe in the requested amendment how the AP1000 PMS Computer Security Plan meets or exceeds the criteria in WCAP-16096, Section 12. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**WCAP-16097: Common Q Topical Report Alternatives**

**NRC Question:**

**1. Table A3-2, "Common Q Topical Report Alternatives" – (Page 10 of Enclosure 3)**

The Licensee proposes to remove the revision number for the WCAP-17266 reference from the TR Section, "Reference." The justification of the alternative states:

Removing the revision number for the WCAP-17266 reference is consistent with how the Common Q SPM references this document. WCAP-17266 is not an input into WCAP-16097, but a lower-level process document. Therefore, identifying a revision number is unnecessary. This document will continue to meet the commitment in WCAP-16097, Revision 3, Section 12 which requires it to describe the screening and evaluation process for determining what Common Q platform changes are available for audit, and which changes require re-submission to the NRC.

The NRC staff requests the Licensee to describe the configuration controls for WCAP-17266 to ensure errors the document is properly identified, captured, tracked, resolved and placed into a records management system to ensure the issue is available for historical reference. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

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**Enclosure 5, “Resolution of Common Q NRC Items”**

**NRC Question:**

In the Record of Changes for Revision 2 of APP-GW-GLR-017, the Licensee states that DCD markups were updated to reference Revisions 1 and 2 of APP-GW-GLR-017. However, the NRC staff found changes to Sections 7.1.2.3, 7.1.2.8, “Communication Functions,” 7.1.6, “Combined License Information”; 9A3.1.2.5.2, “Safe Shutdown Evaluation”; and the newly added Subsection 9A.3.1.2.8.4, “Safe Shutdown Evaluation.” These DCD markups were not discussed in Enclosure 1 of the letter. The NRC staff requests the Licensee to describe the nature of the DCD markups. Update the requested amendment accordingly.

**SNC Response:**

SNC response provided in LAR-15-017S1 submitted on August 19, 2016.

**Additional Information from Common Q LAR Audit conducted on August 2-3, 2016.**

**Clarification of compliance with BTP 7-14**

The text provided below was included to satisfy WCAP-16096, Revision 4, PSAI 4, which requires a software operations plan to meet BTP 7-14, Section B.3.1.8.4. However, to demonstrate compliance with BTP 7-14 the following addition (first paragraph below) is made to the UFSAR Section 7.1.2.14.3.

[Note that the second paragraph below captures a change already discussed in WCAP-16097, PSAI 6.18. The new text below represents the final proposed version of UFSAR Section 7.1.2.14.3.]

7.1.2.14.3 Operational Process

The protection and safety monitoring system has a software operations plan or procedure. The software operations plan addresses the secure operating environment of the protection and safety monitoring system. This includes precluding unauthorized changes to hardware, software, and system parameters. The software operations plan requires monitoring to detect penetration, or attempted penetration, of the system. There are also provisions on how to respond to unauthorized access.



~~A The software operations plan includes administrative controls for changing setpoints in the PMS. to require that the PMS and its division room are in the appropriate configuration prior to making setpoint changes. The controls include declaring the channel associated with the setpoint change inoperable and not relying on its function until declared operable again. The controls for an inoperable channel would then comply with any applicable Technical Specification action. A software operations plan also includes administrative controls to require that the PMS is in the proper configuration and room environmental conditions are acceptable for cabinet access prior to making setpoint changes. This includes requiring a channel to be bypassed prior to making setpoint changes for reactor trip or ESFAS functions. In addition, the PMS division is declared inoperable prior to making setpoint changes for blocks and resets. The administrative controls prevent the protection and safety monitoring system division room environment from interfering with protection and safety monitoring system equipment when plant personnel are making setpoint changes. The administrative controls account for local emissions from nearby equipment and activities (e.g., welding) while the maintenance test cabinet (MTC) door is open.~~

UFSAR Chapter 17 references to Licensee's Vendor Oversight Responsibilities (WCAP-16096, PSAI 3)

The following information is provided in response to an NRC Staff question raised in regards to the licensee's vendor oversight responsibilities. A request was made to provide the specific sections within UFSAR chapter 17 that describe the licensee's vendor oversight responsibilities. The response provided below is in fulfillment of that request.

UFSAR Section 17.1, "Quality Assurance During the Design and Construction Phases," states in part that Southern Nuclear Operating Company (SNC) is responsible for the establishment and execution of quality assurance program requirements during the design, construction and operations phases of VEGP Units 3 and 4. SNC may delegate elements associated with the establishment and execution of the quality program, but retains responsibility for the quality assurance program. Oversight is provided through review and approval of vendor Quality Assurance (QA) plans, by conducting QA audits and surveillances, and by direct participation in and oversight of the COL application development activities.

UFSAR Section 17.3, "Quality Assurance During Design, Procurement, Fabrication, Inspection, and/or Testing of Nuclear Power Plant Items," states in part that activities affecting quality items and services for the AP1000 during design, procurement, fabrication, inspection, and/or testing will be performed as described in the "Westinghouse Electric Company Quality Management System (QMS)." While Westinghouse retains the overall responsibility for the AP1000 design, portions of the design are developed by external organizations. Each organization maintains a quality assurance program that meets the NQA-1 criteria that apply to its work scope. In accordance with the QMS, Westinghouse performs an initial evaluation of these programs and monitors their continued effective implementation through audits, surveillance, and evaluation of the performance of external organizations.

**Additional LAR Updates for WCAP-15927**

WCAP-15927 also captures the Common Q alternatives. Therefore, it is also updated. The revision number for WCAP-15927 is updated throughout the license amendment request, as follows [Note: Red strikeouts are provided to more clearly identify deleted material.]:

- Section 2.1: “Change WCAP-15927, “Design Process for Common Q Safety Systems,” from Revision 2 to Revision ~~4~~ 5.”
- Section 2.1.2: “The Licensee proposes to update WCAP-15927 from Revision 2 to Revision ~~4~~ 5 to address the following:”
- Section 2.1.4.1: “The reference section of WCAP-15775 is updated by replacing WCAP-13383 and CE-CES-195 with WCAP-16096-P-A, Revision 4 and WCAP-15927, Revision ~~4~~ 5.” and “Referencing the DCD Section 7.1.2.14\*, WCAP-16096-P-A, Revision 4, and WCAP-15927, Revision ~~4~~ 5 instead of CE-CES-195 and WCAP-13383 is consistent with the change and technical evaluation in Section 2.1.1 above.”
- Section 2.1.4.2: “The Reference section of WCAP-17184 is updated to reference WCAP-15927, Revision ~~4~~ 5.” and “Referencing WCAP-15927, Revision ~~4~~ 5 (alternate document number APP-GW-J1R-001) is consistent with the proposed change and technical evaluation in Section 2.1.2 above.”
- Section 2.5: “3. WCAP-15927 is updated from Revision 2 to Revision ~~4~~ 5.” and “Update revision level of WCAP-15927 (Reference 20) from Revision 2 to Revision ~~4~~ 5.” and “2. Revise Section 7A.3 for WCAP-17184 to reference APP-GW-J1R-001 (alternate document number for WCAP-15927), Revision ~~4~~ 5.”
- Section 4.1: “The Common Q portion of the protection and safety monitoring system described in WCAP-16096 (Revision 4), including the proposed alternatives in Appendix 2, WCAP16097 (Revision 3), and WCAP-15927 (Revision ~~4~~ 5) continues to meet the requirements in IEEE Standard 603-1991 and, therefore, satisfies 10 CFR 50.55a(h).”
- UFSAR Table 1.6-1 (for WCAP-16096): “Software Program Manual for Common Q™ Systems, Revision 4, February 2013(1) (Note: as modified by the Software Program Manual alternatives in WCAP-15927, Revision ~~4~~ 5)]\*”
- UFSAR Table 1.6-1 (for WCAP-16097): “Common Qualified Platform Topical Report, Revision 3, February 2013 (Note: as modified by the Topical Report alternatives in WCAP-15927, Revision ~~4~~ 5)]\*”
- UFSAR Table 1.6-1 (for WCAP-15927): “WCAP-15927 (Non-Proprietary), “Design Process for AP1000 Common Q Safety Systems,” Rev ~~4~~ 5”
- UFSAR Appendix 1A (for Regulatory Guide 1.152): “The Common Q portion of the protection and safety monitoring system is developed using the Common Q Software Program Manual (SPM), (as modified by the SPM alternatives in WCAP-15927, Revision ~~4~~ 5) and Common Q Topical Report (as modified by the Topical Report alternatives in WCAP-15927, Revision ~~4~~ 5). The Common Q SPM and Topical Report were reviewed and approved by the NRC. The Common Q SPM and Topical Report

meet the criteria of IEEE 7-4.3.2-2003 as endorsed by Regulatory Guide 1.152, Revision 3.”

- UFSAR Appendix 1A (for Regulatory Guide 1.168): “The Common Q portion of the protection and safety monitoring system is developed using the Common Q SPM (as modified by the SPM alternatives in WCAP-15927, Revision 4 5). The Common Q SPM was reviewed and approved by the NRC using the criteria of IEEE 1012-1998 and IEEE 1028-1997 as endorsed by Regulatory Guide 1.168, Revision 1.”
- UFSAR Appendix 1A (for Regulatory Guide 1.169): “Westinghouse uses the Common Q SPM (as modified by the SPM alternatives in WCAP-15927, Revision 4 5) to develop and maintain the Common Q portion of the protection and safety monitoring system. The Common Q SPM was reviewed and approved by the NRC using the criteria of Regulatory Guide 1.169, Revision 0 and IEEE 828-2005.”
- UFSAR Appendix 1A (for Regulatory Guide 1.170): “The Common Q portion of the protection and safety monitoring system is developed using the Common Q SPM (as modified by the SPM alternatives in WCAP-15927, Revision 4 5). The Common Q SPM was reviewed and approved by the NRC using the criteria of Regulatory Guide 1.170, Revision 0 and IEEE 829-1998.”
- UFSAR Appendix 1A (for Regulatory Guide 1.172): “The Common Q portion of the protection and safety monitoring system is developed using the Common Q SPM (as modified by the SPM alternatives in WCAP-15927, Revision 4 5). The Common Q SPM was reviewed and approved by the NRC using the criteria of Regulatory Guide 1.172, Revision 0 and IEEE 830-1998.”
- UFSAR Appendix 1A (for Regulatory Guide 1.173): “Westinghouse uses the Common Q SPM (as modified by the SPM alternatives in WCAP-15927, Revision 4 5) to develop and maintain the Common Q portion of the protection and safety monitoring system. The Common Q SPM was reviewed and approved by the NRC using the criteria of IEEE 1074-1995 as endorsed by Regulatory Guide 1.173, Revision 0.”
- UFSAR Section 7.1.7: “8. [WCAP-16097-P-A (Proprietary) and WCAP-16097-NP-A (Non-Proprietary), Revision 3, “Common Qualified Platform Topical Report,” February 2013. (Note: as modified by the Topical Report alternative in WCAP-15927, Revision 4 5)]\*\*”
- UFSAR Section 7.1.7: “9. [WCAP-16096-P-A (Proprietary) and WCAP-16096-NP-A (Non-Proprietary), Revision 4, “Software Program Manual for Common Q™ Systems,” February 2013. (Note: as modified by the Software Program Manual alternatives in WCAP-15927, Revision 4 5)]\*\*”
- UFSAR Section 7.1.7: “20. [WCAP-15927, Revision 4 5 (Non-proprietary), “Design Process for AP1000 Common Q Safety Systems.”]\*\*”
- UFSAR Section 7A.1 (WCAP-15775 Section 6): “11. WCAP-15927, Rev. 4 5, “Design Process for AP1000 Common Q Safety Systems,” Westinghouse Electric Company LLC.”

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- UFSAR Section 7A.3 (WCAP-17184 References section): “13. APP-GW-J1R-001 (Proprietary), Rev. 2 ~~4~~ 5“Design Process for AP1000 Common Q Safety System,” Westinghouse Electric Company LLC.”

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**Enclosure 12**

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

**WCAP-15927, Revision 5**

**Design Process for AP1000 Common Q Safety Systems**

**(LAR-15-017S3)**

**(Enclosure 12 consists of 30 pages, plus this cover page.)**

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INSERT WCAP-15927 R5 (Replace this page with WCAP-15927)