

May 7, 2024

Docket Nos.: 52-025  
52-026NL-24-0194  
10 CFR 50.55aU.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

**Southern Nuclear Operating Company**  
**Vogtle Electric Generating Plant Units 3 and 4**  
**Revised Request for Relief and Alternative Requirements for**  
**Squib Valves First Test Interval (V34-IST-ALT-03-R1)**

On February 15, 2024, Southern Nuclear Operating Company (SNC) requested Nuclear Regulatory Commission (NRC) authorization for relief from, and authorization to use an alternative to, the requirements of Title 10, Code of Federal Regulations (10 CFR) Section 50.55a(f) and the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) testing and replacement interval requirements for the explosively actuated (squib) valves in OM Code Sections ISTC-5260(c) and ISTC-5260(e)(4). The proposed alternative would allow for no testing or replacement of the squib valve pyrotechnic charges during the first refueling outages for Vogtle Electric Generating Plant (VEGP) Unit 3 and Unit 4, with increased testing and replacement during the second refueling outage for each unit. This request was discussed with NRC Staff during the January 24, 2024, pre-submittal public meeting. On April 9, 2024, the NRC Staff requested additional information related to the request.

Upon further review, SNC revises this Alternative to request relief pursuant to 10 CFR 50.55a(z)(2) instead 10 CFR 50.55a(f)(6). In addition, SNC recently identified the need for additional relief beyond what was specified in the initial request. Specifically, in addition to OM Code Sections ISTC-5260(c) and ISTC-5260(e)(4), SNC also requests authorization for relief from, and authorization to use an alternative to, the requirements of the ASME OM Code regarding ISTC-5260(e)(2) and ISTC-5260(e)(3). ISTC-5260(e)(2) requires disassembly of one valve of each size for internal examination of the valve and actuator assembly at least once every 2 years, and ISTC-5260(e)(3) requires the operational readiness of the actuation logic and associated electrical circuits to be verified for each valve selected for ISTC-5260(c) requirements, including confirmation that sufficient electrical parameters (voltage, current, resistance) are available for each actuation circuit. The proposed alternative would allow for no testing of explosive charges or their associated electrical circuitry, disassembly for internal examination, or replacement of the squib valve pyrotechnic charges during the first refueling outages for VEGP Unit 3 and Unit 4, with increased testing, disassembly for examination, and replacement during the second refueling outage for each unit.

Enclosure 1 provides responses to the requests for additional information (RAIs) based on the original request.

Enclosure 2 incorporates the RAI responses into the request for relief provided with the original request. This revised request completely supersedes the original request.

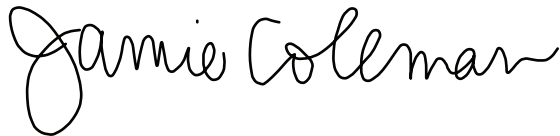
Enclosure 3 provides the associated markups of the Inservice Testing Program Plan. An additional change is included with the markups as a result of the RAI responses.

SNC continues to request the NRC authorize this proposed relief by August 31, 2024, which is prior to the first refueling outage for Vogtle Unit 3.

This letter contains no regulatory commitments. This letter has been reviewed and confirmed to contain no security-related information.

Should you have any questions, please contact Mr. Ryan Joyce at (205) 992-6468.

Respectfully submitted,



Jamie M. Coleman  
Director, Fleet Regulatory Affairs  
Southern Nuclear Operating Company

- Enclosure 1: Responses to Request for Additional Information
- Enclosure 2: Revised Request for Relief and Alternative Requirements for Squib Valves First Test Interval (V34-IST-ALT-03-R1)
- Enclosure 3: Markup of VEGP Units 3 and 4 Inservice Testing Program Plan – 1<sup>st</sup> Interval (For Information)

cc: Regional Administrator, Region II  
VPO Project Manager  
Senior Resident Inspector – Vogtle 3&4  
Document Services RTYPE: VND.LI.L00

**Southern Nuclear Operating Company**

**NL-24-0194  
Enclosure 1**

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

**Responses to Request for Additional Information**

(This enclosure consists of 6 pages, including this cover page.)

Requests for Additional Information and Responses

1. Justify that the alternative request satisfies the provisions of 10 CFR 50.55a(z)(2), which are as follows:

*Hardship without a compensating increase in quality and safety.* Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Describe the hardship associated with satisfying the ASME OM Code requirements as incorporated by reference in 10 CFR 50.55a at the next RFO for Vogtle, Units 3 and 4, and justify that meeting those ASME OM Code requirements at that time will not provide a compensating increase in the level of quality and safety.

**Response**

The hardship associated with satisfying the ASME OM Code requirements associated with firing and replacing 20% of the charges for these explosively actuated valves is the resulting shutdown until replacement charges could be obtained and installed to provide the required operable equipment for operation of Vogtle, Units 3 and 4. Since SNC does not currently have means to obtain replacements for these squib valve charges and testing the charges is destructive, the required testing would render the valve and thus the associated system inoperable. Technical Specification (TS) 3.4.11, Automatic Depressurization System – Operating and TS 3.5.6, In-containment Refueling Water Storage Tank – Operating, require these valves to be operable in Modes 1 through 4. Thus, a return to power operation would not be allowed.

Similar concerns exist with verification of the operational readiness of the actuation logic and associated electrical circuits, since there is potential for misfiring during this verification. With no replacement charges available, such a misfiring of the charge would result in valve inoperability which would also prevent a return to power operation.

Similar concerns also exist with disassembly (which includes removal of the explosive charge) for internal examination of the squib valves. While many practices can reduce the potential for mishandling of the explosive charges, the potential for mishandling cannot be fully eliminated. Any mishandling which might occur during the removal of the explosive charges could result in damage that would render the charge and the squib valve inoperable. With no replacement charges available, such an inoperability would also prevent a return to power operation.

The qualified in-service life for these squib valve charges is eight years. The Code requires only 20% of the charges in explosively actuated valves to be tested at each refueling outage, and only one valve of each size to be disassembled for internal examination, and thus acknowledges a service life of several cycles. With such a service life, testing at the first cycle is expected to show the valves continue to be operable. Thus, meeting the ASME OM Code testing requirements at the first refueling outage (RFO1) does not provide an increase in the level of quality and safety that compensates for the lost operation of the power plant.

Thus, the alternative request satisfies the provisions of 10 CFR 50.55a(z)(2).

2. Describe the plan to meet the other requirements of ASME OM Code, Subsection ISTC, paragraph ISTC- 5260(e), and any adjustments related to compliance with those requirements that might be necessary from a plant and personnel safety perspective in light of the request to not remove and test any charges in the squib valves in the first RFO for each unit.

### **Response**

As required by paragraph ISTC-5260(e) of the Code, each valve will undergo a visual examination of external surfaces and internal surfaces and parts that can be accessed without valve disassembly, any identified fluids or other contaminants found during these examinations will be removed and their presence evaluated, internal actuating mechanisms will be verified to be in their initial operating position and remote position indicators, if so equipped, will be confirmed to be operating properly. Note that, for valves that would normally have been selected to have their charges tested, the operational readiness of the actuation logic and associated electrical circuits will not be verified, including confirmation that sufficient electrical parameters (voltage current, resistance) are available for each actuation circuit, in order to remove any potential for damage to the charges. As such, the revised relief request also requests relief from ISTC-5260(e)(3) along with the relief from ISTC-5260(e)(4).

Valve disassembly for examination required by ISTC-5260(e)(2) is also identified for relief from, and authorization to use an alternative to, the requirements of 10 CFR 50.55a(f) and the ASME OM Code regarding disassembly for internal examination interval requirements.

No adjustments are needed related to compliance with those requirements from a plant and personnel safety perspective in light of the request to not remove and test any charges in the squib valves in the first RFO for each unit.

3. The first IST Program interval for Vogtle, Units 3 and 4, began on April 1, 2023, and is scheduled to end on March 30, 2033. For this first IST Program interval, the applicable IST Code of Record for Vogtle, Units 3 and 4, is ASME OM Code, 2012 Edition, as incorporated by reference in 10 CFR 50.55a.

The ASME OM Code, Subsection ISTC, paragraph ISTC-5260(c), "Explosively Actuated Valves," states:

At least 20% of the charges in explosively actuated valves shall be fired and replaced at least once every 2 years.

The ASME OM Code, Subsection ISTC, paragraph ISTC-5260(e)(4), states:

For the valves selected in the test sample for subparagraph ISTC-5260(c), the sampling must select at least one explosively actuated valve from each redundant safety train every 2 yr. Each sampled pyrotechnic charge shall be tested in the valve or a qualified test fixture to confirm the capability of the

charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping.

In its letter dated February 15, 2024, SNC said that it plans to test and replace 100 percent of the squib valve explosive charges within the second 2 years of the First IST Program Interval, and SNC plans to test and replace 50 percent of the charges following the second two-year period.

SNC stated that the duration of the proposed alternative request is from initial reactor criticality through the end of the second RFO for Vogtle, Units 3 and 4.

The ASME OM Code, Subsection ISTC, paragraph ISTC-5260(c), requires at least 20 percent of the charges in explosively actuated valves shall be fired and replaced at least once every 2 years.

Justify requesting an alternative for the second RFO to perform 100-percent testing and replacement of the charges when SNC plans to perform 50-percent testing and replacement during the third and fourth RFOs at Vogtle, Units 3 and 4. Clarify if SNC is not requesting an alternative for those RFOs?

**Response**

As noted in the RAI, the Code requires that at least 20% of the charges in explosively actuated valves shall be fired and replaced at least once every 2 years. Per this request, the ISTC-5260 requirements will be met for each RFO other than RFO1. RFO2 is included in the justification of the request since during RFO2, the squib valves that would have tested during RFO1 will be tested to get back on the required testing frequency. For RFO3, RFO4 and all that follow, the Code requirement of “at least 20%” will be met and no relief or alternative is needed or requested following RFO2.

4. The specific valves within the scope of this request are as follows:

VALVE NUMBER	VALVE NAME
RCS-V004A	Automatic Depressurization System (ADS) Stage 4 Valves
RCS-V004B	ADS Stage 4 Valves
RCS-V004C	ADS Stage 4 Valves
RCS-V004D	ADS Stage 4 Valves
PXS-V118A	Containment Recirculation Sumps to Reactor Coolant System (RCS) Actuation Squib Valves
PXS-V118B	Containment Recirculation Sumps to RCS Actuation Squib Valves
PXS-V120A	Containment Recirculation Sumps to RCS Actuation Squib Valves
PXS-V120B	Containment Recirculation Sumps to RCS Actuation Squib Valves
PXS-V123A	In-Containment Refueling Water Storage Tank (IRWST) Injection Isolation Valves
PXS-V123B	IRWST Injection Isolation Valves
PXS-V125A	IRWST Injection Isolation Valves
PXS-V125B	IRWST Injection Isolation Valves

For each charge in the above valves for Vogtle, Units 3 and 4,

- What is the date of manufacture?
- What is the batch number?
- What is the installation date?
- What is the date when the service life expires?

**Response**

Charge cartridge manufacturing took place from 25 September 2020 to 23 February 2021. For conservatism, each cartridge is shown in the tables below as manufactured in September of 2020. The cartridges are tested by lot (i.e., batch) acceptance testing which occurred during March of 2021. The tables below provide the requested information of each individual valve cartridge by Unit.

<b>Unit 3 Valve Number</b>	<b>Date of Manufacture</b>	<b>Cartridge Lot (Batch) Number</b>	<b>Install Date</b>	<b>Service Life Expires</b>
RCS-V004A	Sept. 2020	UCO20J001-006	10/23/2022	Oct. 2030
RCS-V004B	Sept. 2020	UCO20J001-006	10/22/2022	Oct. 2030
RCS-V004C	Sept. 2020	UCO20J001-006	10/22/2022	Oct. 2030
RCS-V004D	Sept. 2020	UCO20J001-006	10/22/2022	Oct. 2030
PXS-V118A	Sept. 2020	UCO20J001-006	11/16/2022	Nov. 2030
PXS-V118B	Sept. 2020	UCO20J001-006	10/13/2022	Oct. 2030
PXS-V120A	Sept. 2020	UCO20J001-007	01/04/2023	Jan. 2031
PXS-V120B	Sept. 2020	UCO20J001-007	10/20/2022	Oct. 2030
PXS-V123A	Sept. 2020	UCO20J001-007	11/16/2022	Nov. 2030
PXS-V123B	Sept. 2020	UCO20J001-007	10/20/2022	Oct. 2030
PXS-V125A	Sept. 2020	UCO20J001-007	10/13/2022	Oct. 2030
PXS-V125B	Sept. 2020	UCO20J001-007	10/20/2022	Oct. 2030

<b>Unit 4 Valve Number</b>	<b>Date of Manufacture</b>	<b>Cartridge Lot (Batch) Number</b>	<b>Install Date</b>	<b>Service Life Expires</b>
RCS-V004A	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
RCS-V004B	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
RCS-V004C	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
RCS-V004D	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
PXS-V118A	Sept. 2020	UCO20J001-006	8/10/2023	Aug. 2031
PXS-V118B	Sept. 2020	UCO20J001-006	8/11/2023	Aug. 2031
PXS-V120A	Sept. 2020	UCO20J001-007	8/10/2023	Aug. 2031
PXS-V120B	Sept. 2020	UCO20J001-007	8/11/2023	Aug. 2031

PXS-V123A	Sept. 2020	UCO20J001-007	8/10/2023	Aug. 2031
PXS-V123B	Sept. 2020	UCO20J001-007	8/11/2023	Aug. 2031
PXS-V125A	Sept. 2020	UCO20J001-007	8/10/2023	Aug. 2031
PXS-V125B	Sept. 2020	UCO20J001-007	8/11/2023	Aug. 2031

5. When did the charge manufacturer, Collins Aerospace, notify SNC that it would no longer supply explosive charges to the nuclear industry? Was this notification directly to SNC or a concurrent with industry-wide notice to other AP1000 plant owners/operators? Please specify plant specific SNC notification and any separate industry notices.

**Response**

Westinghouse Electric Company LLC (WEC) was notified that the charge manufacturer, Collins Aerospace, would no longer supply explosive charges on November 23, 2022, and WEC then notified SNC as the explosive charge squib valves are provided to SNC by WEC. Once it was determined that efforts to provide replacement cartridges would not meet the required schedule, SNC began to consider and draft a relief request. There are currently no other AP1000 plants in the United States nuclear industry utilizing these valves.

6. Has SNC contracted with a supplier to manufacture and supply charges for Vogtle, Units 3 and 4? What is the name of the supplier? Is the vendor qualified to supply to the nuclear industry? If not, how long does SNC estimate that it will take for the supplier to be qualified to supply to the nuclear industry? How long does SNC estimate it will take the supplier to manufacture the charges needed for Vogtle, Units 3 and 4? What is SNC's contingency plan if the supplier cannot manufacture charges in time for the second RFO at Vogtle, Unit 3?

**Response**

SNC is working with WEC to provide a qualified supply of charges for Vogtle, Units 3 and 4 replacement charges for the squib valves. Regardless of the identified vendor, qualifications to supply to the nuclear industry are included in the contract. WEC is working toward delivery of the first batch of qualified replacement squib valve charges in time for installation during RFO2. Should complications arise in providing qualified replacement squib valves in time to complete the testing and replacement identified above during RFO2, SNC will need to engage NRC and pursue appropriate actions per the ASME Code requirements.



**Southern Nuclear Operating Company**

**NL-24-0194  
Enclosure 2**

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

**Revised Request for Relief and Alternative Requirements  
for Squib Valves First Test Interval  
(V34-IST-ALT-03-R1)**

(This enclosure consists of 11 pages, including this cover page.)

Revised Request for relief and Alternative Requirements for Squib Valves First Test Interval

<b>Plant Site-Unit:</b>	Vogtle Electric Generating Plant (VEGP) – Unit 3 and Unit 4
<b>Interval-Interval Dates:</b>	Applies to the initial inservice test (IST) interval for Unit 3 and Unit 4 beginning April 1, 2023, and ending March 30, 2033
<b>Requested Date for Approval:</b>	Authorization is requested by August 31, 2024
<b>ASME Code Components Affected:</b>	<p>Automatic Depressurization System (ADS) Stage 4 Valves 3/4-RCS-V004A, B, C &amp; D</p> <p>Containment Recirculation Sumps to Reactor Coolant System (RCS) Actuation Squib Valves 3/4-PXS-V118A &amp; B</p> <p>Containment Recirculation Sumps to RCS Actuation Squib Valves 3/4-PXS-V120A &amp; B</p> <p>In-Containment Refueling Water Storage Tank (IRWST) Injection Isolation Valves 3/4-PXS-V123A &amp; B</p> <p>IRWST Injection Isolation Valves 3/4-PXS-V125A &amp; B</p>
<b>Applicable Code Edition and Addenda:</b>	ASME Operation and Maintenance of Nuclear Power Plants (OM) Code, 2012 Edition for 1 <sup>st</sup> Inservice Test Interval
<b>Applicable Code Requirements:</b>	<p>OM Code ISTC-5260(c), "Explosively Actuated Valves," states: "At least 20% of the charges in explosively actuated valves shall be fired and replaced at least once every 2 years."</p> <p>OM Code ISTC-5260(e)(2), states: "At least once every 2 yr, one valve of each size shall be disassembled for internal examination of the valve and actuator.  <i>(a)</i> This examination will verify the operational readiness of the valve assembly by evaluating the internal components for their operational functionality, ensuring the integrity of individual components, and removing any foreign material, fluid, or corrosion in accordance with the Owner's examination procedures.  <i>(b)</i> All valves shall be disassembled for internal examination at least once every 10 yr."</p> <p>OM Code ISTC-5260(e)(3), states: "For the valves selected in the test sample for subpara. ISTC-5260(c), the operational readiness of the actuation logic and associated electrical circuits must be verified for each sampled valve following removal of its charge. This verification must include confirmation that sufficient</p>

	<p>electrical parameters (voltage, current, resistance) are available for each actuation circuit.”</p> <p>OM Code ISTC-5260(e)(4), states: “For the valves selected in the test sample for subparagraph ISTC-5260(c), the sampling must select at least one explosively actuated valve from each redundant safety train every 2 yr. Each sampled pyrotechnic charge shall be tested in the valve or a qualified test fixture to confirm the capability of the charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping.”</p>
<p><b>Reason for Request:</b></p>	<p>Currently, all known charges used in explosively actuated (“squib”) valves in post-2000 Generation III+ nuclear power facilities are sole sourced from a single company. Westinghouse Electric Company LLC (WEC) was notified that the charge manufacturer, Collins Aerospace, would no longer supply explosive charges on November 23, 2022, and WEC then notified SNC as the explosive charge squib valves are provided to SNC by WEC. There are currently no other AP1000 plants in the United States nuclear industry utilizing these valves.</p> <p>SNC does not maintain an inventory of spare charges as they are used infrequently and have a short shelf life and an in-service life of 8 years. In addition, they are hazardous and require special handling and storage requirements. As a result, SNC elected not to keep extra charges in inventory at Vogtle Units 3 &amp; 4 but decided instead to order additional charges through WEC as needed as the time to replace some of them for testing purposes came near. SNC will therefore not have spare charges available to replace those that are removed from valves currently in service at Vogtle to be test fired to meet OM Code requirements for Inservice Testing (IST) during the first refueling outage of each unit unless a manufacturer that can manufacture and supply charges prior to the first refueling outage for each unit is identified.</p> <p>Similar concerns also exist with disassembly (which includes removal of the explosive charge) for internal examination of the squib valves. While many practices can reduce the potential for mishandling of the explosive charges, the potential for mishandling cannot be fully eliminated. Any mishandling which might occur during the removal of the explosive charges could result in damage that would render the charge and the squib valve inoperable. With no replacement charges available, such an inoperability would also prevent a return to power operation.</p> <p>The hardship associated with satisfying the ASME OM Code requirements associated with firing and replacing 20% of the charges for these explosively actuated valves is the resulting shutdown until replacement charges could be obtained and installed to provide the required operable equipment for operation of Vogtle, Units 3 and 4. Since SNC does not have replacements for these squib valve charges and testing the charges is destructive, the required testing would render the valve and thus the associated system inoperable. The Technical Specifications require these valves to operable in modes 1 through 4. Thus, a return to power operation would not be allowed.</p> <p>Similar hardship concerns exist with verification of the operational readiness of the actuation logic and associated electrical circuits, since there is potential for misfiring</p>

	<p>during this verification. With no replacement charges available, such a misfiring of the charge would result in valve inoperability which would also prevent a return to power operation.</p> <p>Similar hardship concerns also exist with disassembly (which includes removal of the explosive charge) for examination of the squib valves. Any mishandling which might occur during the removal of the explosive charges could result in damage that would render the charge and the squib valve inoperable. With no replacement charges available, such an inoperability would also prevent a return to power operation.</p> <p>SNC has made efforts to identify a replacement vendor authorized by the appropriate authorities to manufacture explosive material, qualify the material for use in squib valve charges, and produce replacement charges. A supplier was recently identified to manufacture and supply charges in the near term, however, due to the length of manufacturing time, the charges will not be available for use during the first refueling outages for Vogtle Units 3 &amp; 4. SNC has made every effort to confirm the necessary charges will be available for the second refueling outages and beyond to complete the required testing.</p> <p>SNC has contracted with WEC to provide a qualified supply of charges for Vogtle, Units 3 and 4 replacement squib valves. Regardless of the identified vendor, qualifications to supply to the nuclear industry are included in the contract. WEC has identified the first batch of qualified replacement squib valves are to be delivered in time for installation during RFO2. SNC will notify the NRC of any complications that may arise in providing qualified replacement squib valves in time to complete the testing and replacement identified above during RFO2.</p>
<p><b>Proposed Alternative and Basis for Use:</b></p>	<p><b>Proposed Alternative:</b></p> <p>SNC proposes to modify the requirement to test and replace at least 20% of the pyrotechnic charges used in explosively actuated valves at least once every two years for the first refueling outage for Units 3 &amp; 4 by requesting an allowance to skip the first refueling outage occurrence of testing and increase the number of test and replacements that would occur at the second occurrence. In addition, SNC proposes to similarly modify the requirement to disassemble for examination one squib valve of each size during the first refueling outage for Units 3 &amp; 4 by requesting an allowance to skip the first refueling outage occurrence of disassembly for internal examination and increase the number of disassembly for internal examination that would occur at the second refueling outage. This would result in zero explosive charge tests, disassembly for internal examination, and replacements taking place during the first two years of the First IST Interval for Units 3 &amp; 4, which would include the first refueling outage for each unit but SNC would then test and replace 100% of the squib valve explosive charges, and disassemble two valves of each size for internal examination, within the second 2 years of the First IST Interval.</p> <p>Further, since no charges would be removed under the proposed alternative, the verification of operational readiness of the actuation logic and associated electrical circuits “for each sampled valve following removal of its charge” would also not be performed pursuant to ISTC-5260(e)(3).</p> <p>Following the second two-year period, testing and replacement of the charges would resume at a normal rate of approximately 50% within each two-year period as</p>

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originally required per ASME OM Code subparagraph ISTC-5260(c), ISTC-5260(e)(3) and ISTC-5260(e)(4). In addition, following the second two-year period, disassembly for internal examination, would resume at a normal rate of one valve of each size as originally required per ASME OM Code subparagraph ISTC-5260(e)(2).

Charge cartridge manufacturing took place from 25 September 2020 to 23 February 2021. For conservatism, each cartridge is shown in the tables below as manufactured in September of 2020. The cartridges are tested by lot (i.e., batch) acceptance testing which occurred during March of 2021. The tables below provide additional information for each individual valve cartridge by Unit.

<b>Unit 3 Valve Number</b>	<b>Date of Manufacture</b>	<b>Batch Number</b>	<b>Service Life Begins (Install Date)</b>	<b>Service Life Expires</b>
RCS-V004A	Sept. 2020	UCO20J001-006	10/23/2022	Oct. 2030
RCS-V004B	Sept. 2020	UCO20J001-006	10/22/2022	Oct. 2030
RCS-V004C	Sept. 2020	UCO20J001-006	10/22/2022	Oct. 2030
RCS-V004D	Sept. 2020	UCO20J001-006	10/22/2022	Oct. 2030
PXS-V118A	Sept. 2020	UCO20J001-006	11/16/2022	Nov. 2030
PXS-V118B	Sept. 2020	UCO20J001-006	10/13/2022	Oct. 2030
PXS-V120A	Sept. 2020	UCO20J001-007	01/04/2023	Jan. 2031
PXS-V120B	Sept. 2020	UCO20J001-007	10/20/2022	Oct. 2030
PXS-V123A	Sept. 2020	UCO20J001-007	11/16/2022	Nov. 2030
PXS-V123B	Sept. 2020	UCO20J001-007	10/20/2022	Oct. 2030
PXS-V125A	Sept. 2020	UCO20J001-007	10/13/2022	Oct. 2030
PXS-V125B	Sept. 2020	UCO20J001-007	10/20/2022	Oct. 2030

<b>Unit 4 Valve Number</b>	<b>Date of Manufacture</b>	<b>Batch Number</b>	<b>Service Life Begins (Install Date)</b>	<b>Service Life Expires</b>
RCS-V004A	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
RCS-V004B	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
RCS-V004C	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031
RCS-V004D	Sept. 2020	UCO20J001-006	10/31/2023	Oct. 2031

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PXS-V118A	Sept. 2020	UCO20J001-006	8/10/2023	Aug. 2031
PXS-V118B	Sept. 2020	UCO20J001-006	8/11/2023	Aug. 2031
PXS-V120A	Sept. 2020	UCO20J001-007	8/10/2023	Aug. 2031
PXS-V120B	Sept. 2020	UCO20J001-007	8/11/2023	Aug. 2031
PXS-V123A	Sept. 2020	UCO20J001-007	8/10/2023	Aug. 2031
PXS-V123B	Sept. 2020	UCO20J001-007	8/11/2023	Aug. 2031
PXS-V125A	Sept. 2020	UCO20J001-007	8/10/2023	Aug. 2031
PXS-V125B	Sept. 2020	UCO20J001-007	8/11/2023	Aug. 2031

Thus, ISTC-5260(c) related testing, and logic and circuit verification, in accordance with the proposed alternative would include:

Type	Tag	3R1	3R2	3R3	3R4
14"	RCS-PL-V004A	0	1	1	
14"	RCS-PL-V004B	0	1	1	
14"	RCS-PL-V004C		1		1
14"	RCS-PL-V004D		1		1
8" HP	PXS-PL-V123A		1		1
8" HP	PXS-PL-V123B	0	1	1	
8" HP	PXS-PL-V125A	0	1	1	
8" HP	PXS-PL-V125B		1		1
8" HP	PXS-PL-V120A		1		1
8" HP	PXS-PL-V120B	0	1	1	
8" LP	PXS-PL-V118A	0	1	1	
8" LP	PXS-PL-V118B		1		1
	Count per Outage	0	12	6	6

Row Labels	Sum of 3R1	Sum of 3R2	Sum of 3R3	Sum of 3R4
Schedule	F2024	S2026	F2027	S2029
14"	0	4	2	2
8" HP	0	6	3	3
8" LP	0	2	1	1
<b>Total</b>	<b>0</b>	<b>12</b>	<b>6</b>	<b>6</b>

Revised Request for Relief and Alternative Requirements for Squib Valves First Test Interval (V34-IST-ALT-03-R1)

Type	Tag	4R1	4R2	4R3	4R4
14"	RCS-PL-V004A	0	1	1	
14"	RCS-PL-V004B	0	1	1	
14"	RCS-PL-V004C		1		1
14"	RCS-PL-V004D		1		1
8" HP	PXS-PL-V123A		1		1
8" HP	PXS-PL-V123B	0	1	1	
8" HP	PXS-PL-V125A	0	1	1	
8" HP	PXS-PL-V125B		1		1
8" HP	PXS-PL-V120A		1		1
8" HP	PXS-PL-V120B	0	1	1	
8" LP	PXS-PL-V118A	0	1	1	
8" LP	PXS-PL-V118B		1		1
	Count per Outage	0	12	6	6

Row Labels	Sum of 4R1	Sum of 4R2	Sum of 4R3	Sum of 4R4
Schedule	F2025	S2027	F2028	S2030
14"	0	4	2	2
8" HP	0	6	3	3
8" LP	0	2	1	1
<b>Total</b>	<b>0</b>	<b>12</b>	<b>6</b>	<b>6</b>

Similarly, ISTC-5260(e)(2) related disassembly and inspection in accordance with the proposed alternative would include:

Type	Tag	3R1	3R2	3R3	3R4	3R5	3R6
14"	RCS-PL-V004A	0	1			1	
14"	RCS-PL-V004B		1				1
14"	RCS-PL-V004C			1			
14"	RCS-PL-V004D				1		
8" HP	PXS-PL-V123A	0	1				
8" HP	PXS-PL-V123B					1	
8" HP	PXS-PL-V125A						1
8" HP	PXS-PL-V125B	0	1				
8" HP	PXS-PL-V120A				1		
8" HP	PXS-PL-V120B			1			
8" LP	PXS-PL-V118A			1			
8" LP	PXS-PL-V118B				1		
	Count per Outage	0	4	3	3	2	2

Type	Tag	4R1	4R2	4R3	4R4	4R5	4R6
14"	RCS-PL-V004A	0	1			1	
14"	RCS-PL-V004B		1				1
14"	RCS-PL-V004C			1			
14"	RCS-PL-V004D				1		
8" HP	PXS-PL-V123A	0	1				
8" HP	PXS-PL-V123B					1	
8" HP	PXS-PL-V125A						1
8" HP	PXS-PL-V125B	0	1				
8" HP	PXS-PL-V120A				1		
8" HP	PXS-PL-V120B			1			
8" LP	PXS-PL-V118A			1			
8" LP	PXS-PL-V118B				1		
	Count per Outage	0	4	3	3	2	2

SNC would also test, complete the associated verification of operational readiness of the actuation logic and associated electrical circuits, disassemble for internal examination, and replace the charges not tested, verified, or disassembled for internal examination during an unplanned outage should the unplanned outage occur following receipt of acceptable replacement changes and prior to the second refueling outage and if there is sufficient time for planning and completing the replacement such that it would not extend the unplanned outage. The replaced charges would then be tested and examined as required.

During RFO1, as required by paragraph ISTC-5260(e) of the Code, each valve will undergo a visual examination of external surfaces and internal surfaces and parts that can be accessed without valve disassembly, any identified fluids or other contaminants found during these examinations will be removed and their presence evaluated, internal actuating mechanisms will be verified to be in their initial operating position and remote position indicators, if so equipped, will be confirmed to be operating properly. Note that, for valves that would normally have been selected to have their charges tested, the operational readiness of the actuation logic and associated electrical circuits will not be verified, including confirmation that sufficient electrical parameters (voltage current, resistance) are available for each actuation circuit, in order to remove any potential for damage to the charges. As such, the revised relief request also requests relief from ISTC-5260(e)(3) along with the relief from ISTC-5260(e)(4).

Valve disassembly for examination required by ISTC-5260(e)(2) is also identified for relief from, and authorization to use an alternative to, the requirements of 10 CFR 50.55a(f) and the ASME OM Code disassembly for internal examination requirements.

No adjustments are needed related to compliance with the requirements to be performed during RFO1 from a plant and personnel safety perspective in light of the requested relief related to charges in the squib valves in the first RFO for each unit.



	<p>The Code requirements for explosively actuated valves will be met for each RFO other than RFO1. RFO2 is included in the justification of the request since during RFO2, the squib valves that would have been tested during RFO1 will be tested to get back on the required testing frequency. For RFO3, RFO4 and all that follow, the Code requirement of “at least 20%” will be met and no relief or alternative is needed or requested following RFO2.</p> <p><b>Basis for Use:</b></p> <p>Post-2000 plants that use pyrotechnically actuated valves all use similar valve designs. In these designs, a chemical charge is ignited within the valve’s actuator and the rapid expansion of the chemical reaction increases pressure within the actuator ultimately leading to failure of a retention pin causing, and allowing, the actuator to shear a cap within the valve body. The process depends upon the reliability of the chemical charge. Testing of these chemical charges found that, while chemical charges may degrade over time, they would not degrade to the point of unviability within the inservice life of the charge. Periodic testing of the charges only confirms that no other degradation mechanisms are in play, which could not be simulated and tested during equipment qualification. However, the alternative testing schedule would result in testing of all squib valves within approximately 6 yrs of installation (May 2021 to spring 2027), i.e., within the manufacturer’s recommendations for the service life of the explosive charges.</p> <p>During the Preservice Testing (PST) period at Vogtle Units 3 &amp; 4, SNC had submitted VEGP 3&amp;4-PST-Alt-01, “Alternative Requirements for Preservice Testing of Explosively Actuated Valves”, as a proposed alternative to the PST requirements of the above listed explosively actuated valves in lieu of the requirements in paragraph ISTC-3100(d)(2) of the 2012 Edition of the ASME OM Code for performing PST activities on Category D explosively actuated valves. This proposed alternative requested that SNC be permitted to “Select a sample of pyrotechnic charges, following fabrication for testing; this may include charges used for qualification of the batch. The sample shall include a quantity of charges equal to at least 20% of the number of charges of each size installed in the plant and shall include at least one from each manufacturer batch.” It was also proposed that “Each selected charge shall be tested in a qualified test fixture to confirm the capability of each sampled charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping.” The proposed alternative also included a table that outlined the number of charges that would be tested, which resulted in a much larger percentage of charges (approximately 40%) than would have been tested under ISTC-3100(d)(2) requirements.</p> <p>In the NRC Safety Evaluation response to the request for alternative requirements, the NRC noted that “With respect to the provision in paragraph ISTC-3100(d)(2) of the OM Code for pyrotechnic charge sampling, SNC’s alternative identified three batches of pyrotechnic charges: one batch for each of the three sizes of the pyrotechnic charges specified as the 14-inch squib valve, 8-inch squib valve - high energy, and 8-inch squib valve - low energy. SNC states that the number of charges to be tested from each of the three batches will exceed the number that would be required based on provisions paragraph ISTC-3100(d)(2) of the OM Code for 20 percent sampling and redundant safety trains. In particular, SNC will test half of the pyrotechnic charges in Batch A (14-inch squib valves), almost half of the pyrotechnic</p>
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charges in Batch B (8-inch squib valves – high energy), and more than half of the pyrotechnic charges in Batch C (8-inch squib valves – low energy)”. The NRC Staff also noted that “In comparison to paragraph ISTC-3100(d)(2) of the OM Code provisions, SNC will perform significant percentage test sampling (equal to or greater than 40 percent) of the total charges in the specific batch for each squib valve charge size. Based on the significant percentage of sample testing of the pyrotechnic charges, the staff considers SNC’s proposed alternative to provide an acceptable level of sample testing of the pyrotechnic charges for squib valves in the ADS and PXS safety trains.”

The testing that was proposed by SNC to be performed in lieu of PST in accordance with the 2012 Edition of the ASME OM Code was later performed by UTC Aerospace Systems – Interiors (UPCO) during the period of March 9 – 16, 2021. The charges had initially been manufactured between September of 2020 and February of 2021. All completed testing of the charges in March 2021 yielded satisfactory results (one charge did not fire during the testing due to a loose wire on a firing initiator). The results of the testing activities are documented and available on site.

Due to the amount of testing that was performed on charges from the same batches that are currently installed in the explosively actuated valves at Vogtle Units 3 & 4, and the successful results of those tests, there is reasonable assurance that the installed charges would actuate as required if called upon to do so by the circuitry of the valves.

SNC is therefore requesting that the OM Code requirement to test 20% of the installed charges and associated electrical circuitry for the explosively actuated valves at Vogtle Units 3 & 4 within 2 years as specified in ISTC-5260(c), ISTC-5260(e)(3) and ISTC-5260(e)(4), as well as the requirement to disassemble and internally examine at least one valve of each size as specified in ISTC-5260(e)(2), be waived until the second refueling outage for each unit. During the second refueling outage for each unit, SNC proposes to test and replace 100% of the charges in the explosively actuated valves as well as verify the electrical circuitry of the valves and would then continue testing and electrical circuitry verification on the schedule prescribed by ISTC-5260(c), ISTC-5260(e)(3) and ISTC-5260(e)(4) of the 2012 Edition of the OM Code, until the end of the First IST Interval. In addition, during the second refueling outage for each unit, SNC proposes to disassemble and internally examine at least two valves of each size as specified in ISTC-5260(e)(2). This would provide SNC sufficient time to identify a new supplier for the charges and purchase, receive and stock enough charges to build a sufficient inventory for charges that have to be replaced due to scheduled testing or unexpected failure. In addition, the other IST requirements for explosively actuated valves will be performed at the Code required intervals.

The qualified in-service life for these squib valves is eight years. The Code requires only 20% of the charges in explosively actuated valves to be tested at each refueling outage, and only one valve of each size to be disassembled for internal examination, and thus acknowledges a service life of several cycles. With such a service life, testing at the first cycle is expected to show the valves continue to be operable. Thus, meeting the ASME OM Code testing and disassembly for internal examination requirements at the first refueling outage (RFO1) does not provide an increase in the level of quality and safety that compensates for the lost operation of the power plant.

Revised Request for Relief and Alternative Requirements for Squib Valves First Test Interval  
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	Thus, the alternative request satisfies the provisions of 10 CFR 50.55a(z)(2).
<b>Duration of Proposed Alternative:</b>	Initial reactor criticality through the end of the second refueling outage (RFO2) for each unit
<b>Precedent:</b>	Operating Experience searches were performed on the INPO website and in the NRC ADAMS database using terms such as “squib” and “explosively actuated”, instances of charges failed to fire during testing were noted, mostly in the 1970s, 1980s and 1990s, the number of test firing failures has dropped dramatically over the past decade and there was no reporting of situations involving the inability to obtain spare charges for explosively actuated valves.
<b>References:</b>	<ol style="list-style-type: none"> <li>1. ASME Operation and Maintenance of Nuclear Power Plants (OM) Code, 2012 Edition</li> <li>2. Letter ND-18-1401 from Brian H. Whitley of Southern Nuclear Operating Company to U.S. Nuclear Regulatory Commission dated November 29, 2018, and titled “Vogtle Electric Generating Plants Units 3 and 4 Request for Alternative: Alternative Requirements for Preservice Testing of Explosively Actuated Valves (VEGP 3&amp;4-PST-Alt-01)” [ML18333A356]</li> <li>3. Letter from Peter C. Hearn of the United States Nuclear Regulatory Commission to Brian H. Whitley of Southern Nuclear Operating Company dated March 26, 2019, and titled “Vogtle Electric Generating Plant Units 3 and 4 – Request for Alternative: Alternative Requirements for Preservice Testing of Explosively Activated Valves (VEGP 3 &amp; 4-PST-Alt-01) (EPID NO. L-2018-LLA-0498)</li> <li>4. United States Nuclear Regulatory Commission Safety Evaluation by the Office of New Reactors Related to Request for Alternative Requirements for Preservice Testing of Explosively Actuated Valves (VEGP 3&amp;4-PST-ALT-01) [ML19071A237]</li> <li>5. Vogtle Units 3 and 4 Inservice Testing Program Plan [ML22102A114]</li> <li>6. Vogtle Units 3 and 4 Updated Final Safety Analysis Report Subsection 6.3.2.2.8.9, Explosively Opening (Squib) Valves [ML23165A215]</li> </ol>
<b>Status:</b>	Awaiting NRC authorization

**Southern Nuclear Operating Company**

**NL-24-0194  
Enclosure 3**

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

**Markup of VEGP Units 3 and 4  
Inservice Testing Program Plan – 1<sup>st</sup> Interval  
(For Information)**

(This enclosure consists of 5 pages, including this cover page.)

NL-24-0194

Enclosure 3

Markup of VEGP Units 3 and 4 Inservice Testing Program Plan – 1<sup>st</sup> Interval (For Information)

Section 3.1, Alternatives, will be revised to include a discussion of the alternative schedule and the Alternative will be included following Section 3.2, Code Cases, along with other approved alternatives.

Section 6. Revise Valve Note 2 and add new Note 12.

1. For all active...
2. Squib valve charges, a minimum of 20% are tested every outage (2y), with a minimum of one from each safety train. Circuit testing to verify proper electrical parameters (voltage, current) to actuate squib charge to be performed on valves selected for squib testing. [Also see Note 12.](#)
3. Squib valves disassembly/inspection is performed on one valve of each size each outage (2y), but each valve must be disassembled/inspected every 10 years. [Also see Note 12.](#)
- ...
11. For ...
12. Squib valve charge tests, electrical circuitry verification, and disassembly that would normally be required for the first refueling outage are deferred until the second refueling outage. For valves PXS-V118A/B, PXS-V120A/B, PXS-V123A/B, PXS-V125A/B and RCS-V004A/B/C/D, there will be no tests or replacements of pyrotechnic charges, electrical circuit verifications or valve disassembly performed during the first refueling outage of Unit 3 or Unit 4. Vogtle Units 3 & 4 will test and replace 100% of the total number of pyrotechnic charges during the second refueling outage of each unit.

**Unit 3 IST Program Plan markups shown – Unit 4 markups are identical except for SV3 is replaced with SV4.**

No actual change in Section 7 tables. Table entries provided for information and context only.

Section 7. Notes revised for following PXS squib valve testing:

**PXS**

Valve ID Description	Class	Aug	Cat	A/P	Valve Size	Valve Type	Act. Type	Drawing & Coord	Normal	Safety	Fail-Safe	Required Test	Freq	Code Dev.	Plan Notes
SV3-PXS-PL-V118A	3	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 E-7	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
Containment Recirc Sump A to RCS Actuation Squib Valve															
SV3-PXS-PL-V118B	3	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 E-5	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
Containment Recirc Sump B to RCS Actuation Squib Valve															
...															
SV3-PXS-PL-V120A	3	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 E-7	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
Containment Recirc Sump A to RCS Actuation Squib Valve															
SV3-PXS-PL-V120B	3	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 E-5	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
Containment Recirc Sump B to RCS Actuation Squib Valve															
...															

Markup of VEGP Units 3 and 4 Inservice Testing Program Plan – 1<sup>st</sup> Interval (For Information)

<b>SV3-PXS-PL-V123A</b>	1	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 C-7	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y	Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
IRWST Injection A Isolation Valve														
<b>SV3-PXS-PL-V123B</b>	1	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 C-5	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y	Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
IRWST Injection B Isolation Valve														
...														
<b>SV3-PXS-PL-V125A</b>	1	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 C-7	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y	Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
IRWST Injection A Isolation Valve														
<b>SV3-PXS-PL-V125B</b>	1	N	D	A	8"	SQ	SQ	SV3-PXS-M6-002 C-5	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y	Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
IRWST Injection B Isolation Valve														

Markup of VEGP Units 3 and 4 Inservice Testing Program Plan – 1<sup>st</sup> Interval (For Information)

Notes revised for following RCS squib valve testing:

**RCS**

Valve ID Description	Class	Aug	Cat	A/P	Valve Size	Valve Type	Act. Type	Drawing & Coord	Normal	Safety	Fail-Safe	Required Test	Freq	Code Dev.	Plan Notes
<b>SV3-RCS-PL-V004A</b>	1	N	D	A	14"	SQ	SQ	SV3-RCS-M6-001 G-6	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
ADS Stage 4 Valve															
<b>SV3-RCS-PL-V004B</b>	1	N	D	A	14"	SQ	SQ	SV3-RCS-M6-001 F-3	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
ADS Stage 4 Valve															
<b>SV3-RCS-PL-V004C</b>	1	N	D	A	14"	SQ	SQ	SV3-RCS-M6-001 F-6	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
ADS Stage 4 Valve															
<b>SV3-RCS-PL-V004D</b>	1	N	D	A	14"	SQ	SQ	SV3-RCS-M6-001 F-3	C	O	AI	Remote Insp Charge Circuit Disass. Insp	2y 2y/10y 2y/10y 10y		Note 2, <a href="#">Note 12</a> Tested when testing charge Note 3, <a href="#">Note 12</a>
ADS Stage 4 Valve															