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April 13, 2016

10 CFR 50.90

Serial: BSEP 16-0014

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

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324
Request for License Amendment – Reactor Protection System (RPS) Electrical
Protection Assembly (EPA) Electric Power Monitoring Surveillance Requirements
(SRs) 3.3.8.2.2 and 3.3.8.2.3

Ladies and Gentlemen:

Pursuant to the provisions of the Code of Federal Regulations (CFR), Title 10, Part 50.90, Duke Energy Progress, Inc. (Duke Energy), hereby requests a revision to the Technical Specifications (TS) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2.

The proposed amendment would revise the Allowable Values of Surveillance Requirements (SR) contained in TS 3.3.8.2, "RPS Electric Power Monitoring." Specifically, the TS change proposes to amend the Reactor Protection System (RPS) electric power monitoring assembly Allowable Values for overvoltage and undervoltage contained within SR 3.3.8.2.2 and SR 3.3.8.2.3.

Further discussion of the proposed change is provided in Enclosure 1.

Duke Energy has evaluated the proposed change in accordance with 10 CFR 50.91(a)(1), using the criteria in 10 CFR 50.92(c), and determined that there are no significant hazards considerations associated with the proposed TS changes. Additionally, Duke Energy has determined the proposed TS changes qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

In accordance with 10 CFR 50.91(b)(1), Duke Energy is providing the State of North Carolina with a copy of the proposed license amendment.

Duke Energy requests approval for the proposed amendment by April 13, 2017, with a 120-day implementation period.

ADD
WRR

This document contains no regulatory commitments.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager – Regulatory Affairs, at (910) 457-2487.

I certify under penalty of perjury that the foregoing is true and correct. Executed on April 13, 2016.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. R. Gideon', written over a horizontal line.

William R. Gideon

WRG/mkb

Enclosures:

1. Evaluation of the Proposed Change
2. Proposed BSEP TS and TS Bases (Markup)
 - A. Proposed Unit 1 BSEP TS (Markup)
 - B. Proposed Unit 2 BSEP TS (Markup)
 - C. Proposed Unit 1 BSEP TS BASES (Markup) (For Information Only)
3. Proposed BSEP TS (Retyped Pages)
 - A. Proposed Unit 1 BSEP TS (Retyped Pages)
 - B. Proposed Unit 2 BSEP TS (Retyped Pages)

cc (with enclosures):

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Evaluation of the Proposed Change

Subject: Request for License Amendment – Changes to Reactor Protection System (RPS) Electrical Protection Assembly (EPA) Electric Power Monitoring Surveillance Requirements (SRs) 3.3.8.2.2 and 3.3.8.2.3

1. Summary Description

Duke Energy Progress, Inc. (Duke Energy), is requesting Nuclear Regulatory Commission (NRC) approval of this proposed revision to the Technical Specifications (TS) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed amendment would revise the Allowable Values of Surveillance Requirements (SR) contained in TS 3.3.8.2. Specifically, the TS change proposes to amend the Reactor Protection System (RPS) electric power monitoring assembly Allowable Values for overvoltage and undervoltage contained within SR 3.3.8.2.2 and SR 3.3.8.2.3.

2. Detailed Description

2.1. Proposed Change

The proposed change revises the Allowable Values (AVs) for SR 3.3.8.2.2 and SR 3.3.8.2.3 contained within TS 3.3.8.2. The new overvoltage AV is conservative relative to the existing AVs, as listed in TS 3.3.8.2, for all the EPAs. The new undervoltage AV is conservative relative to the existing AV, as listed in SR 3.3.8.2.2 for EPA 1 through 4, however, the new undervoltage AV for EPA 5 and 6 is lower than the existing AV as listed in SR 3.3.8.2.3. The two SRs are split based on either the normal or alternate power supply (i.e., EPA 1 thru 4 and EPA 5 and 6, respectively).

Parameter	Current EPA 1 thru 4 SR 3.3.8.2.2	New EPA 1 thru 6	Current EPA 5 & 6 SR 3.3.8.2.3
Overvoltage AV	≤ 129.00 VAC	≤ 127.00 VAC	≤ 132.00 VAC
Undervoltage AV	≥ 105.00 VAC	≥ 107.00 VAC	≥ 108.00 VAC

New AVs are being adopted to enhance the long term scram solenoid pilot valve (SSPV) performance by ensuring they operate within their design voltage ratings. The TS Bases will be revised to merge the descriptions of the Allowable Values between the Normal and Alternate power supplies.

In summary, Duke Energy is proposing a revision to the Technical Specifications for BSEP Units 1 and 2 that would revise the Allowable Values of Surveillance Requirements contained in Technical Specifications 3.3.8.2 to enhance the long term SSPV performance by ensuring they operate within design voltage ratings.

2.2. Background

The RPS EPAs provide overvoltage and undervoltage protection at all times for the loads connected to the RPS 120 VAC power busses by disconnecting the loads from the power sources whenever the voltage for the Class 1E loads is outside its limits.

The actual setpoints for the voltage parameters are based on the voltage drops in the cables between the EPAs and the loads. This prevents operation outside the limits within which the equipment being powered from the power supply has been designed and qualified to operate continuously and without degradation.

The changes are in accordance with TS Bases B 3.3.8.2 which states, "The most limiting voltage requirement and associated line losses determine the settings of the electric power monitoring instrument channels. The settings are calculated based on the line resistance losses at the downstream locations of the solenoids and relays."

An Engineering Change (EC) was initiated to evaluate the need to rebuild or replace the existing ASCO SSPVs based on them approaching the end of their qualified life. It was determined the best solution was to replace the SSPVs with AVCO solenoid valves during the Unit 1 outage in 2012 and the Unit 2 outage in 2013. During the review of the EC, issues were identified with the current RPS EPA setpoints that could potentially allow the SSPV coils to operate above their design maximum voltage rating and below their minimum design voltage rating based on worst case conditions and when calculated voltage drops are taken into account.

Based on the field measurements and calculations, the AVCO SSPVs became the most limiting voltage requirement for determining the settings of the RPS EPAs. As a result of this change, the TS Allowable Values are revised based on the new calculation.

3. Technical Evaluation

Power to each of the two reactor protection trip systems is supplied, via a separate bus, by its own high inertia AC motor-generator (MG) set. High inertia is provided by a flywheel. The inertia is sufficient to maintain voltage and frequency within five percent of rated values for at least one second following a total loss of power to the drive motor.

Alternate power is available to either reactor protection system bus from an electrical bus that can receive standby electrical power. The alternate power switch prevents simultaneously feeding both busses from the same source. The switch also prevents paralleling a motor-generator set with the alternate supply.

Two seismically and environmentally qualified Class 1E electrical protection assemblies are in series between each MG set and its respective bus, and between the alternate power source and the RPS buses. Each EPA includes a circuit breaker and associated overvoltage, undervoltage, and underfrequency protective circuits. The EPAs provide redundant protection against electrical perturbations which could damage RPS components.

In the event of an undervoltage condition for an extended period of time, the scram solenoids can chatter and potentially lose their pneumatic control capability.

In the event of an overvoltage condition, the RPS logic relays and scram solenoids may experience a voltage higher than their design voltage. If the overvoltage condition persists for an extended period of time, it may cause equipment degradation.

The EPAs are set to trip, accounting not only for instrument drift and inaccuracies, but also specifically accounting for the resistance drops to the most limiting loads. The settings are calculated based on the line resistance losses at the downstream locations of the solenoids and

relays. The final nominal trip setpoints of the EPAs for overvoltage and undervoltage conditions were determined from measurements and calculations made in the field after final wiring and cabling were installed.

The current AV for the instrument settings of the normal power supply electrical power monitoring assembly (i.e., EPA 1 thru 4) is based on the RPS MG sets providing ≥ 57 Hz and $117 \text{ V} \pm 10\%$. The AV for the instrument settings of the alternate power supply electrical power monitoring assembly (i.e., EPA 5 and 6) is based on the alternate power supply providing ≥ 57 Hz and $120 \text{ V} \pm 10\%$. This difference in voltage and AV settings created the perception of different setpoints being required when powered from the two different sources. When the EPAs were first installed, there was no voltage regulator for the alternate supply. A voltage regulator has since been installed on the alternate supply and it has been set to regulate at 117 VAC. This will allow the normal and alternate sources to be at the same voltage and allow the AVs and setpoints for both the normal and alternate supply to be the same.

4. Regulatory Evaluation

4.1. Applicable Regulatory Requirements/Criteria

10 CFR 50.90 provides direction to licensees seeking to revise their license to file an application for amendment with the NRC. The Technical Specifications constitutes Appendix A to the Operating License for each facility. This would require a license amendment to revise any portion of the Technical Specifications, such as requested here.

10 CFR 50.36(c)(2)(ii) states that a technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one of the listed criteria. Four criteria are listed. Criterion 3 is "a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." RPS electric power monitoring provides protection to the RPS components by acting to disconnect the RPS from the power supply under specified conditions that could damage the RPS equipment. RPS electric power monitoring satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

Due to a problem discovered during the original licensing of Hatch Nuclear Plant Unit 2, and at the direction of the NRC, EPAs were added between the RPS power supplies and the RPS buses they power to prevent occurrence of an undetected single failure that would allow the RPS power supply output voltage to remain outside the voltage rating of the connected Class 1E loads. If this condition persisted for a sufficient time, it could result in damage to the RPS components with the attendant potential loss of scram capability. As stated in the NRC's "Safety Evaluation of the Brunswick Steam Electric Station Units 1 and 2," dated November 1973, BSEP meets the intent of the General Design Criteria (GDC), published in the Federal Register on May 21, 1971, as Appendix A to 10 CFR Part 50. The proposed changes do not affect compliance with the intent of the GDCs. In particular, the intent of GDC 2, "Design bases for protection against natural phenomena," and GDC 21, "Protection system reliability and testability," continue to be met.

Duke Energy has determined that the proposed change does not require an exemption or relief from regulatory requirements and does not affect conformance with any General Design Criteria (GDC) as described in the BSEP Updated Final Safety Analysis Report (UFSAR).

4.2. No Significant Hazards Consideration Determination

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Duke Energy Progress, Inc. (Duke Energy), requests amendment to the Facility Operating License for Brunswick Steam Electric Plant (BSEP) to revise the Allowable Values (AV) of Surveillance Requirements (SR) contained in TS 3.3.8.2. Specifically, the TS change proposes to amend the Reactor Protection System (RPS) electric power monitoring assembly Allowable Values for overvoltage and undervoltage contained within SR 3.3.8.2.2 and SR 3.3.8.2.3.

The proposed change has been reviewed considering applicable requirements of 10 CFR 50.36, 10 CFR 50, Appendix A, and other applicable NRC documents. Duke Energy has evaluated the proposed change to the AVs of SRs contained in TS 3.3.8.2 and determined that the change does not involve a Significant Hazards Consideration. In support of this determination, an evaluation of each of the three standards, set forth in 10 CFR 50.92, is provided below.

1) Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed change to the Allowable Values of Surveillance Requirements contained in Technical Specifications 3.3.8.2 does not impact the physical function of plant structures, systems, or components (SSC) or the manner in which SSCs perform their design function. The proposed change does not authorize the addition of any new plant equipment or systems, nor does it alter the assumptions of any accident analyses. The Electrical Protection Assemblies are not accident initiators. They operate in response to off-normal voltage conditions on Class 1E buses to protect the connected loads. The proposed change does not adversely affect accident initiators or precursors, nor does it alter the design assumptions, conditions, and configuration or the manner in which the plant is operated and maintained.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2) Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed change to the Allowable Values of Surveillance Requirements contained in Technical Specifications 3.3.8.2 does not require any modification to the plant (i.e., other than the setpoint changes) or change equipment operation or testing. The proposed change will not introduce failure modes that could result in a new accident, and the change does not alter assumptions made in the safety analysis. The proposed change will not alter the design configuration, or method of operation of plant equipment beyond its normal functional capabilities. The proposed change does not create any new credible failure mechanisms, malfunctions, or accident initiators.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from those that have been previously evaluated.

3) Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed change to the Allowable Values of Surveillance Requirements contained in Technical Specifications 3.3.8.2 does not alter or exceed a design basis or safety limit. There is no change being made to safety analysis assumptions or the safety limits that would adversely affect plant safety as a result of the proposed change. Margins of safety are unaffected by the proposed change and the applicable requirements of 10 CFR 50.36(c)(2)(ii) and 10 CFR 50, Appendix A will continue to be met.

Therefore, the proposed change does not involve any reduction in a margin of safety.

4.3. Conclusions

In conclusion, and based on the considerations discussed above, the proposed change does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified. Also, there is a reasonable assurance that the health and safety of the public will not be impacted by the proposed change to revise the Allowable Values for SR 3.3.8.2.2 and SR 3.3.8.2.3 contained within TS 3.3.8.2. The change will be in compliance with the NRC regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5. Environmental Consideration

The proposed amendment would change a requirement with respect to installed facility components located within the restricted area of the plant as defined in 10 CFR Part 20. However, the proposed amendment does not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.



Brunswick Steam Electric Plant, Unit Nos. 1 and 2
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Protection Assembly (EPA) Electric Power Monitoring Surveillance Requirements (SR) 3.3.8.2.2
and 3.3.8.2.3

Proposed Unit 1 BSEP TS (Markups)

ACTIONS (continued)



CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met in MODE 3, 4, or 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.	D.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.8.2.1 -----NOTE----- Only required to be performed prior to entering MODE 2 from MODE 3 or 4, when in MODE 4 for ≥ 24 hours. -----</p> <p>Perform CHANNEL FUNCTIONAL TEST.</p>	184 days
<p>SR 3.3.8.2.2 Perform CHANNEL CALIBRATION for each RPS motor generator set electric power monitoring assembly. The Allowable Values shall be:</p> <p>a. Overvoltage ≤ 129 V. </p> <p>b. Undervoltage ≥ 105 V. </p> <p>c. Underfrequency ≥ 57.2 Hz.</p>	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.8.2.3	<p>Perform CHANNEL CALIBRATION for each RPS alternate power supply electric power monitoring assembly. The Allowable Values shall be:</p> <p>a. Overvoltage \leq 132 V.  127 V</p> <p>b. Undervoltage \geq 108 V.  107 V</p> <p>c. Underfrequency \geq 57.2 Hz.</p>	24 months
SR 3.3.8.2.4	Perform a system functional test.	24 months

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Protection Assembly (EPA) Electric Power Monitoring Surveillance Requirements (SR) 3.3.8.2.2
and 3.3.8.2.3

Proposed Unit 2 BSEP TS (Markups)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met in MODE 3, 4, or 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.	D.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.8.2.1 -----NOTE----- Only required to be performed prior to entering MODE 2 from MODE 3 or 4, when in MODE 4 for ≥ 24 hours. -----</p> <p>Perform CHANNEL FUNCTIONAL TEST.</p>	184 days
<p>SR 3.3.8.2.2 Perform CHANNEL CALIBRATION for each RPS motor generator set electric power monitoring assembly. The Allowable Values shall be:</p> <p>a. Overvoltage \leq 129 V. 127 V</p> <p>b. Undervoltage \geq 105 V. 107 V</p> <p>c. Underfrequency ≥ 57.2 Hz.</p>	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.8.2.3 Perform CHANNEL CALIBRATION for each RPS alternate power supply electric power monitoring assembly. The Allowable Values shall be:</p> <p>a. Overvoltage \leq 132 V. 127 V</p> <p>b. Undervoltage \geq 108 V. 107 V</p> <p>c. Underfrequency \geq 57.2 Hz.</p>	24 months
<p>SR 3.3.8.2.4 Perform a system functional test.</p>	24 months

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Protection Assembly (EPA) Electric Power Monitoring Surveillance Requirements (SR) 3.3.8.2.2
and 3.3.8.2.3

Proposed Unit 1 BSEP TS BASES (Markup) (For Information Only)

BASES

LCO (continued)

setpoint, the associated device (e.g., trip unit) changes state. The analytic limits are derived from the limiting values of the process parameters obtained from the safety analysis. The trip setpoints are determined from the analytic limits, corrected for defined process, calibration, and instrument errors. The Allowable Values are then determined, based on the trip setpoint values, by accounting for calibration based errors. These calibration based instrument errors are limited to instrument drift, errors associated with measurement and test equipment, and calibration tolerance of loop components. The trip setpoints and Allowable Values determined in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for and appropriately applied for the instrumentation.

The Allowable Values for the electric power monitoring assembly instrument settings are based on the normal power supply (RPS MG set) or the alternate power supply providing ≥ 57 Hz and $117 \text{ V} \pm 10\%$.

~~The Allowable Values for the instrument settings of the normal power supply (RPS MG set) electric power monitoring assembly are based on the RPS MG sets providing ≥ 57 Hz and $117 \text{ V} \pm 10\%$. The Allowable Values for the instrument settings of the alternate power supply electric power monitoring assembly are based on the alternate power supply providing ≥ 57 Hz and $120 \text{ V} \pm 10\%$. The most limiting voltage requirement and associated line losses determine the settings of the electric power monitoring instrument channels. The settings are calculated based on the line resistance losses at the downstream locations of the solenoids and relays.~~

APPLICABILITY

The operation of the RPS electric power monitoring assemblies is essential to disconnect the RPS components from the MG set or alternate power supply during abnormal voltage or frequency conditions. Since the degradation of a nonclass 1E source supplying power to the RPS bus can occur as a result of any random single failure, the OPERABILITY of the RPS electric power monitoring assemblies is required when the RPS components are required to be OPERABLE. This results in the RPS Electric Power Monitoring System OPERABILITY being required in MODES 1 and 2; and in MODES 3, 4, and 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.

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Brunswick Steam Electric Plant, Unit Nos. 1 and 2
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Protection Assembly (EPA) Electric Power Monitoring Surveillance Requirements (SR) 3.3.8.2.2
and 3.3.8.2.3

Proposed Unit 1 BSEP TS (Retyped Pages)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met in MODE 3, 4, or 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.	D.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.8.2.1 -----NOTE----- Only required to be performed prior to entering MODE 2 from MODE 3 or 4, when in MODE 4 for ≥ 24 hours. -----</p> <p>Perform CHANNEL FUNCTIONAL TEST.</p>	184 days
<p>SR 3.3.8.2.2 Perform CHANNEL CALIBRATION for each RPS motor generator set electric power monitoring assembly. The Allowable Values shall be:</p> <p>a. Overvoltage ≤ 127 V.</p> <p>b. Undervoltage ≥ 107 V.</p> <p>c. Underfrequency ≥ 57.2 Hz.</p>	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.8.2.3	Perform CHANNEL CALIBRATION for each RPS alternate power supply electric power monitoring assembly. The Allowable Values shall be: <ul style="list-style-type: none"> a. Overvoltage ≤ 127 V. b. Undervoltage ≥ 107 V. c. Underfrequency ≥ 57.2 Hz. 	24 months
SR 3.3.8.2.4	Perform a system functional test.	24 months

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and 3.3.8.2.3

Proposed Unit 2 BSEP TS (Retyped Pages)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met in MODE 3, 4, or 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.	D.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.8.2.1 -----NOTE----- Only required to be performed prior to entering MODE 2 from MODE 3 or 4, when in MODE 4 for ≥ 24 hours. -----</p> <p>Perform CHANNEL FUNCTIONAL TEST.</p>	184 days
<p>SR 3.3.8.2.2 Perform CHANNEL CALIBRATION for each RPS motor generator set electric power monitoring assembly. The Allowable Values shall be:</p> <p>a. Overvoltage ≤ 127 V.</p> <p>b. Undervoltage ≥ 107 V.</p> <p>c. Underfrequency ≥ 57.2 Hz.</p>	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.8.2.3	Perform CHANNEL CALIBRATION for each RPS alternate power supply electric power monitoring assembly. The Allowable Values shall be: <ul style="list-style-type: none"> a. Overvoltage ≤ 127 V. b. Undervoltage ≥ 107 V. c. Underfrequency ≥ 57.2 Hz. 	24 months
SR 3.3.8.2.4	Perform a system functional test.	24 months