UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 21, 2021

Mr. David P. Rhoades
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO)
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 241 RE: REVISION OF DEGRADED VOLTAGE RELAY ALLOWABLE VALUES (EPID L-2021-LLA-0005)

Dear Mr. Rhoades:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 241 to Facility Operating License No. NPF-62 for the Clinton Power Station, Unit No. 1. The amendment is in response to your application dated January 20, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21020A053) as supplemented by letter dated August 31, 2021 (ADAMS Accession No. ML21243A546).

The amendment revises Technical Specifications 3.3.8.1, “Loss of Power (LOP) Instrumentation,” Table 3.3.8.1-1, “Loss of Power Instrumentation” degraded voltage relay allowable values.

A copy of the Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission’s next monthly *Federal Register* notice.

Sincerely,

/RA/

Joel S. Wiebe, Senior Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures:
1. Amendment No. 241 to NPF-62
2. Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 241
License No. NPF-62

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Exelon Generation Company, LLC (EGC, or the licensee), dated January 20, 2021, as supplemented by letter dated August 13, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-62 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 241, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert F. Kuntz

Digitally signed by Robert F. Kuntz
Date: 2021.12.21 08:32:47 -05'00'

Nancy L. Salgado, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility Operating License and Technical Specifications

Date of Issuance: December 21, 2021

ATTACHMENT TO LICENSE AMENDMENT NO. 241

FACILITY OPERATING LICENSE NO. NPF-62

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

Replace the following pages of the Facility Operating License No. NPF-62 and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
Page 3	Page 3

Technical Specifications

REMOVE	INSERT
3.3-81	3.3-81

(4) Exelon Generation Company, pursuant to the Act and to 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(6) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility. Mechanical disassembly of the GE14i isotope test assemblies containing Cobalt-60 is not considered separation; and

(7) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, to intentionally produce, possess, receive, transfer, and use Cobalt-60.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

Exelon Generation Company is authorized to operate the facility at reactor core power levels not in excess of 3473 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 241, are hereby incorporated into this license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER DIVISION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Divisions 1 and 2 – 4.16 kV Emergency Bus Undervoltage			
a. Loss of Voltage – 4.16 kV basis	6	SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 2345 V and ≤ 3395 V
b. Loss of Voltage – Time Delay	6	SR 3.3.8.1.3 SR 3.3.8.1.4	≤ 5.0 seconds
c. Degraded Voltage Reset - 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 4087 V and ≤ 4113.4 V
d. Degraded Voltage Drop-out - 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 4038 V
e. Degraded Voltage-Time Delay	1	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 14 seconds and ≤ 16 seconds
2. Division 3 – 4.16 kV Emergency Bus Undervoltage			
a. Loss of Voltage – 4.16 kV basis	4	SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 2345 V and ≤ 2730 V
b. Loss of Voltage – Time Delay	1	SR 3.3.8.1.3 SR 3.3.8.1.4	≤ 3.0 seconds
c. Degraded Voltage Reset - 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 4087 V and ≤ 4113.4 V
d. Degraded Voltage Drop-out - 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 4038 V
e. Degraded Voltage – Time Delay	1	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 13.2 seconds and ≤ 16.8 seconds

UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 241 TO

FACILITY OPERATING LICENSE NO. NPF-62

EXELON GENERATION COMPANY, LLC

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By letter dated January 20, 2021, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21020A053), and as supplemented by letter dated August 31, 2021 (ADAMS Accession No. ML21243A546), Exelon Generation Company (EGC, or licensee) submitted a license amendment request (LAR) for the Clinton Power Station, Unit 1 (CPS) to revise the degraded voltage reset and dropout allowable values that are listed in Technical Specifications (TS) 3.3.8.1, “Loss of Power (LOP) Instrumentation,” Table 3.3.8.1-1, “Loss of Power Instrumentation.”

The supplement dated August 31, 2021, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC, or the Commission) staff’s original proposed no significant hazards consideration determination as published in the *Federal Register* on March 23, 2021 (86 FR 15505).

2.0 REGULATORY EVALUATION

2.1 Description of System

The licensee provided a description of the system in Attachment 1, Section 3.0 of its January 20, 2021, letter. A summary of the description is provided below.

CPS’s power to safety-related equipment is provided by three divisional load groups (Divisions 1, 2, and 3). These divisions are powered by an independent Class 1E 4.16 kV engineered safety feature (ESF) bus. Each ESF bus has two separate and independent offsite sources of power and a dedicated onsite diesel generator (DG). The ESF systems of any two of the three divisions provide for the minimum safety functions necessary to shut down the unit and maintain it in a safe shutdown condition.

The CPS LOP instrumentation is required for the ESF to function in any accident with a loss of offsite power analyzed in the Updated Safety Analysis Report (USAR), including a loss-of-coolant accident (LOCA), to ensure that the emergency core cooling systems (ECCSs) and other assumed systems are supplied power at an acceptable voltage for plant protection. The LOP instrumentation monitors the 4.16 kV emergency buses.

Each CPS 4.16 kV emergency bus has its own independent LOP instrumentation and associated trip logic. The voltage for the Division 1, 2, and 3, buses is monitored at two levels of LOP, which can be considered as two different undervoltage functions (i.e., loss of voltage and degraded voltage).

If the LOP instrumentation determines that insufficient power is available for a period of time longer than a predetermined time delay, the buses are disconnected from the offsite power sources and connected to the respective onsite DG power source.

The operability of the LOP instrumentation is dependent upon the operability of the individual instrumentation channel Functions 1 and 2, "4.16 kV Emergency Bus Undervoltage" (Function 1 for the Divisions 1 and 2 and Function 2 for Division 3) specified in CPS TS Table 3.3.8.1-1.

In its August 31, 2021, letter the licensee clarified that the existing Analytical Limits (defined in Section 3.3 of this Safety Evaluation (SE)) for the degraded voltage relay dropout and reset are not changed. Based on the information in the LAR the NRC staff verified that the operation of the degraded voltage relay (DVR) system and the setpoint Analytical Limits are unchanged and therefore are not within the NRC staff's scope of review.

2.2 Proposed TS Changes

In its LAR, the licensee proposed changes to the CPS, TS Table 3.3.8.1-1 requirements. Specifically, the licensee proposed changes to the Allowable Values of Functions 1.c, 1.d, 2.c, and 2.d. The proposed changes are described as below:

Function		Allowable Values	
		Current	Proposed
1. Divisions 1 and 2 - 4.16 kV Emergency Bus Undervoltage	c. Degraded Voltage Reset - 4.16 kV basis	≥ 4102.2 V and ≤ 4109.3V	≥ 4087 V and ≤ 4113.4V
	d. Degraded Voltage Dropout - 4.16 kV basis	≥ 4051 V	≥ 4038 V
2. Division 3 - 4.16 kV Emergency Bus Undervoltage	c. Degraded Voltage Reset - 4.16 kV basis	≥ 4102.2 V and ≤ 4109.3V	≥ 4087 V and ≤ 4113.4V
	d. Degraded Voltage Dropout - 4.16 kV basis	≥ 4051 V	≥ 4038 V

2.3 Regulatory Requirements and Guidance

Regulatory Requirements

Title 10 of the *Code of Federal Regulations* (10 CFR) 50.36, "Technical Specifications," paragraph (a)(1) states, in part, "Each applicant for a license authorizing operation of a

production or utilization facility shall include in this application proposed technical specifications (TSs) in accordance with the requirements of this section."

10 CFR 50.36(c)(1)(ii)(A) states, in part, "Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. If, during operation, it is determined that the automatic safety system does not function as required, the licensee shall take appropriate action, which may include shutting down the reactor."

10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," specifically, Appendix A, "General Design Criteria (GDC) for Nuclear Power Plants," provides the minimum necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety.

GDC 13, "Instrumentation and control," states, in part, "Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges."

GDC 17, "Electric power systems," states, in part, "An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents."

Regulatory Guidance

Regulatory Guide (RG) 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation," dated December 1999 (ADAMS Accession No. ML993560062), describes a method acceptable to NRC staff to ensure that setpoints for safety-related instrumentation are initially within and remain within the TS limits. RG 1.105 endorsed Part I of Instrument Society of America (ISA) Standard (S) 67.04-1994, "Setpoints for Nuclear Safety-Related Instrumentation." The NRC staff used this guide to establish the adequacy of the licensee's setpoint calculation methodologies and the related plant surveillance procedures. RG 1.105 states, in part, "Section 4.3 of ISA-S67.04-1994 states that the limiting safety system setting (LSSS) may be the trip setpoint, an allowable value, or both. For the standard technical specifications, the staff designated the allowable value as the LSSS. In association with the trip setpoint and limiting conditions for operation (LCOs), the LSSS establishes the threshold for protective system action to prevent acceptable limits being exceeded during design basis accidents. The LSSS therefore ensures that automatic protective action will correct the abnormal situation before a safety limit is exceeded. A licensee, with justification, may propose an alternative LSSS based on its particular setpoint methodology or license."

Regulatory Issue Summary (RIS) 2011-12, Revision 1, “Adequacy of Station Electric Distribution System Voltages," Revision 1, dated December 29, 2011 (ADAMS Accession No. ML113050583). The RIS clarifies voltage studies necessary for Degraded Voltage Relays (DVR) (second level undervoltage protection) setting bases and transmission network/offsite/station electric power system design bases for meeting the regulatory requirements specified in GDC 17, “Electric Power Systems,” of Appendix A to 10 CFR Part 50. The RIS states, in part, “Licensee voltage calculations should provide the basis for their DVR settings, ensuring safety-related equipment is supplied with adequate voltage (dependent on equipment manufacturers design requirements), based on bounding conditions for the most limiting safety-related load (in terms of voltage) in the plant.”

RIS 2006-17, “NRC Staff Position on the Requirements of 10 CFR 50.36, ‘Technical Specifications,’ Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels,” dated August 24, 2006 (ADAMS Accession No. ML051810077), discusses issues that could occur during testing of limiting safety system settings and therefore may have an adverse effect on equipment operability. The RIS also represents an approach that is acceptable to the NRC staff for addressing these issues for use in licensing actions.

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the LAR and its attachments to verify that the proposed control and monitoring setpoint values were established and maintained in a manner consistent with regulatory requirements and guidance. The NRC staff evaluated these values to verify that they were consistent with the required plant safety functions assuring that protective actions will be initiated before the associated plant process parameter exceeds its analytical limit.

The NRC staff evaluated the proposed amendment by using the guidance of RG 1.105, Revision 3, and Part I of ISA-S67.04-1994. The NRC staff verified: (1) whether the proposed setpoints for degraded voltages of the safety-related instrumentation were established within the TS limits; and (2) whether the safety-related equipment was supplied with adequate voltage based on the bounding conditions for the most limiting safety-related load of the plant.

As part of its evaluation, the NRC staff performed an independent confirmatory evaluation to:

- Verify the licensee’s setpoint calculation methodology, using the square root of the sum of the squares (SRSS), as the means of combining normally distributed and independent uncertainty terms and algebraic summation as the means of combining uncertainty terms that are not random, not normally distributed or are dependent, to assure that control and monitoring setpoints are established and maintained in a manner consistent with plant safety function requirements.

- Verify the licensee’s setpoint calculation values are adequate to assure, with a high confidence level, that required protective actions are initiated before the associated plant process parameters exceed their analytical limits.

3.1 Licensee Methodology

In Attachment 1 of the LAR, the licensee described the methodology used to determine the proposed degraded voltage (DV) setpoints and allowable values (AVs). The licensee’s

methodology determines the trip setpoints (Limiting Trip Setpoints (LTSPs) and Nominal Trip Setpoints (NTSPs) as well as Actual Trip Setpoints (ATSPs)) from the analytical limits (ALs) based on the combination of all errors. Then the AVs are determined from the ATSPs by application of those errors present during calibration.

In Calculation No. IP-E-0032 (Attachment 4 of LAR), the licensee determined the instrument uncertainties, AVs, Setpoints, Reset, As-Found Tolerance (AFT) and As-Left Tolerance (ALT) for the second level undervoltage relays for 4.16 kV Buses 1A1, 1B1 and 1C1 in Divisions 1, 2, and 3. The licensee stated that the setpoints and AVs were previously determined in Calculation No. 19-AN-19 (Attachment 5 of LAR), but are now moved to Calculation No. IP-E-0032.

The NRC staff confirmed that the licensee's setpoint calculation methodology included the following:

- Equations used in the calculations were consistent with the guidance in RG 1.105.
- Total Loop Error (Z) and Calibration Equipment Error (CAL) were calculated using the SRSS plus algebraic approaches.
- Setting Tolerance to establish an acceptable As-Found setpoint range was calculated using SRSS.
- If specific values for drift were not provided by the vendor, for the DVR, drift was taken as 0.5% of dropout span for 30 months (24 month x 125% of 24 months (refueling cycle plus 25%)).

The NRC staff found that the SRSS methodology used to calculate the proposed AVs was consistent with the methodology in Section 4.4 "Combination of uncertainties," of Part I of ISA-S67.04-1994 and RG 1.105, Revision 3 and provides reasonable assurance that the proposed setpoints were established and maintained in a manner consistent with plant safety function requirements.

3.2 Summary of the Licensee's Setpoint Calculations in Calculation No. IP-E-0032

- Section 4.1.7, "Analytical Limits," of Calculation No. IP-E-0032:

  In the supplement dated August 31, 2021, the licensee verified that the existing ALs for the DVR dropout and reset were not changed. The licensee stated, in part:

  > Using the existing Analytical Limits from 19-AK-13 which were previously utilized in 19-AN-19, the revised IP-E-0032 now determines new Allowable Values and setpoints for the degraded voltage relay dropout and reset.

  The summary of AL values on the primary (4.16 kV) bus (in Section 4.1.7 of this calculation), are described in Table 1 below:

Table 1: Analytical Values in Calculation IP-E-00-32

	Voltage at Primary Bus
AL_{RU} (maximum relay reset voltage)	4118 V
AL_{RL} (minimum relay reset voltage)	4084 V
AL_{DO} (minimum relay reset voltage)	4035 V

- In Section 7.4, "Determination of Uncertainties," of Calculation No. IP-E-0032, the licensee stated that the relay is the only instrument in the loop, so the relay uncertainties equate to the loop uncertainties. The licensee calculated the relay uncertainties as follows:

  The total error for each relay is the combination of the random and non-random errors.

  The Random Errors

  The random errors that were considered include: RA (Reference Accuracy); ATE (Accuracy Temperature Effect); SE_A (Accident Seismic Effect); PSE (Power Supply Effect); (±)ST (Setting Tolerance 1σ); (±) CAL (Calibration Equipment Error 1σ); D (Drift); and σ_{in} (Random Input Error).

  In Section 4.1, of Calculation No. IP-E-0032, the licensee provided the loop element data by using the manufacturer's published tolerances of the ABB, Style 27N, Model No. 410T6375-HF-L. In Section 7.4, the licensee used this data to calculate the RA, ATE, and PSE.

  The Non-Random Errors

  The licensee determined that there is no non-random error present during relay calibration. Therefore, the total relay error applicable for AV determination is equal to the random error discussed above.

- In Section 7.6, "Evaluation of Setpoints," of Calculation No. IP-E-0032, the licensee converted the ALs on the primary bus (as shown in Table 1 above) to the voltage on the relay bus by Equation 1 below:

  $$V_R = [\, V_{4K} / (RCF \times VT_{NR})] - \Delta V$$

  Where: V_{4K} is the voltage at the 4160 V; V_R is the voltage at the relay in the 120V bus; Δ V is the voltage drop from the voltage transformer to the relay; RCF is transformer ratio correction factor; and VT_{NR} is voltage transformer nominal ratio (35).

  The licensee used the ALs summarized in Table 1 of this SE to calculate the: 1) Reset Upper NTSP ($NTSP_{Ru}$); 2) Reset Lower NTSP ($NTSP_{RL}$); 3) Reset Actual Trip Setpoint ($ATSP_R$); 4) Dropout NTSP ($NTSP_{DO}$); and 5) Dropout ATSP ($ATSP_{DO}$).

  Where: $ATSP_R = (NTSP_{Ru} + NTSP_{RL})/2$ and
  $ATSP_{DO} = NTSP_{DO} \times 0.993$

- In Section 7.7, "Evaluation of Allowable Value," of Calculation No. IP-E-0032, the licensee used the equation "AV = NTSP ± applicable uncertainty" to calculate: Reset Upper AV (AV_{RU}), Reset Lower AV (AV_{RL}), and Dropout AV (AV_{DO}) in 120V at the relay bus.

The relationship between the AV and the LTSP is in the equation:

AV = NTSP ± applicable uncertainty

The licensee noted that "NTSP is the actual plant value for the trip setpoint and may be more conservative than the LTSP . . .. Reference 6.1.1 [Reference of Attachment 4 of LAR] uses the term NTSP (Nominal Trip Setpoint) for the calculated limiting setpoint . . .."

The licensee converted the AVs on the relay bus to the equivalent primary bus voltages.

- In Section 7.8, "Determination of As-Found Tolerance (AFT)," of Calculation No. IP-E-0032, the licensee calculated the AFT by using SRSS of the ST, D, and CAL terms.

Table 2: Results of ST and AFT

Setting Tolerance (ST) (±)1σ	±0.04 Vac (3 σ)/3 = ±0.0133 Vac
AFT	±0.1768 Vac = ±0.17 Vac (conservatively rounded down)

- The licensee calculated the AVs by utilizing the equations in Sections 7.5 - 7.8 of Calculation No. IP-E-0032. The results of the calculation of AVs of voltages on Buses A1_AB; A1_BC; B1_AB; B1_BC; C1_AB; and C1_BC at the 120V bus relay is provided in Section 8.2 of Calculation No. IP-E-0032.

- From the results of the DV setpoints calculation, the licensee selected the most conservative AV_{RU}, AV_{RL}, and AV_{DO} for the DV setpoints from the results of Calculation No. IP-E-0032, as shown in Table 3 below:

Table 3: AV Setpoints at Primary (4160 V) Bus

	Division 1		Division 2		Division 3	
	1A1_AB	1A1_BC	1B1_AB	1B1_BC	1C1_AB	1C1_BC
AV_{RU} (V)	≤ 4113.5	≤ 4113.5	≤ 4113.6	≤ 4113.5	≤ 4113.5	≤ 4113.4
The lowest value (4113.4V) is farthest from the AL_{RU} (4118 V) and so is conservatively selected as the new AV_{RU}.						
AV_{RL} (V)	≥ 4086.9	≥ 4086.9	≥ 4086.7	≥ 4087.0	≥ 4086.9	≥ 4086.9
The highest value (4087 V) is farthest from the AL_{RL} (4084 V) and so is conservatively selected as the new AV_{RL}.						
AV_{DO} (V)	≥ 4037.7	≥ 4037.7	≥ 4037.8	≥ 4037.7	≥ 4037.9	≥ 4037.9
A value of 4038.0 V is selected to conservatively bound all these values.						

3.3 Evaluation

The NRC staff evaluated the proposed amendment using guidance of RG 1.105, Revision 3, and Part I of ISA-S67.04-1994 to verify (a) whether the proposed setpoints for degraded

voltages of safety-related instrumentation were established within the TS limits; and (b) the safety-related equipment was supplied with adequate voltage based on bounding conditions for the most limiting safety-related load of the plant.

For the purpose of this SE, the following terms are used:

- Analytical Limit (AL) – Limit of a measure or calculated variable established by the safety analysis to ensure that a safety limit is not exceeded.

- Allowable Value (AV) – A limiting value that the trip setpoint may have when tested periodically, beyond which appropriate action shall be taken.

- Trip Setpoint – A predetermined value for actuation of the final setpoint device to initiate a protective action.

Section 4.3.1 and Figure 1 of ISA-S67.04-1994 identify allowances for offsetting the trip setpoint from the AL, and for ensuring that the allowance used shall account for all applicable design basis events and the following process instrument uncertainties unless they were included in the determination of the analytical limit.

- Trip Margin – an allowance provided between the trip setpoint and the analytical limit to ensure a trip before the analytical limit is reached.

- Actual Trip Setpoint (ATSP) Margin ($Margin_{ATSP}$) - An allowance provided between the ATSP and the AL (Region A in Figure 1 of ISA-S67.04-1994).

- AV Margin ($Margin_{AV}$) - The margin between the Maximum AV and the AL that is observable during TS surveillances where the channel may be determined inoperable (Region C in Figure1 of ISA-S67.04-1994).

In addition, the NRC evaluated the proposed changes for consistency with RIS 2011-12 and RIS 2006-17 regarding whether the licensee properly used the NRC staff's guidance in establishing AVs to be applied to the Functions 1.c, 1.d, 2.c, and 2.d in TS Table 3.3.8.1-1.

The NRC staff reviewed the proposed AVs for the DV relay settings associated with Functions 1.c, 1.d, 2.c, and 2.d in TS Table 3.3.8.1-1 and performed an independent verification to confirm whether there were adequate allowances for instrument channel performance uncertainty between the ALs, Reset Actual Trip Setpoint ($ATSP_R$)[1], and associated AVs of DV to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A). The NRC staff's evaluation is discussed in more detail below.

NRC staff Evaluation of Proposed AV Settings

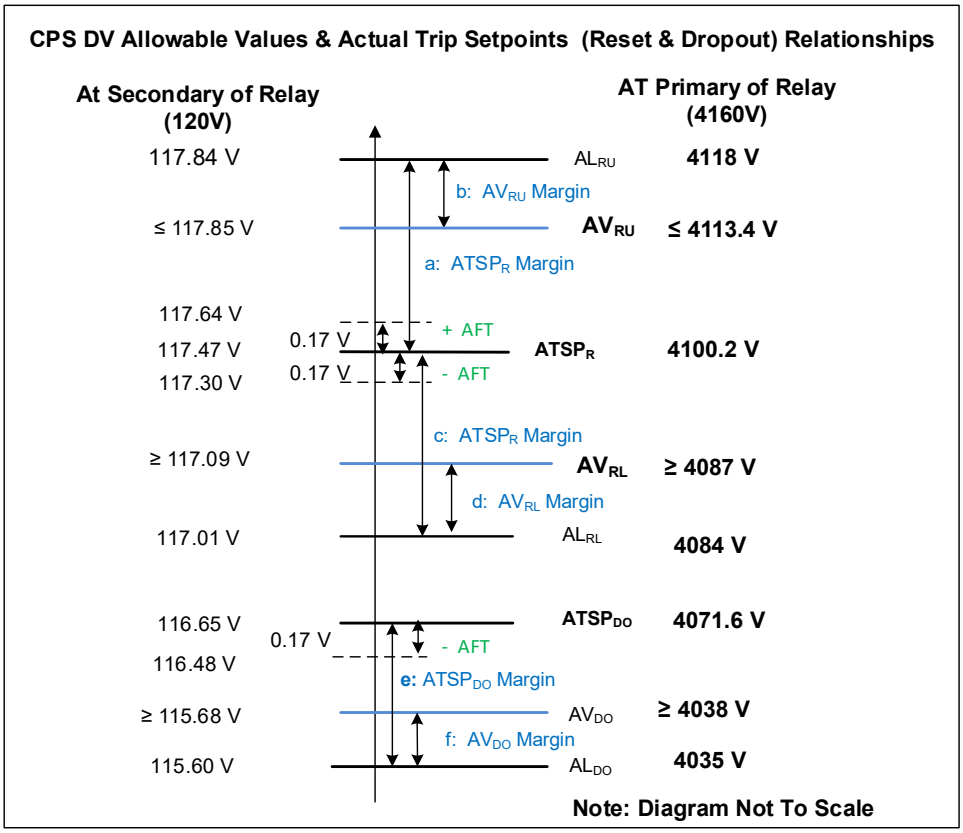
The NRC staff used the results of the Calculation No. IP-E-0032 to evaluate the proposed AV settings of Functions 1.c, 1.d, 2.c, and 2.d in TS Table 3.3.8.1-1. Calculation No. IP-E-0032 includes the setpoints of time delay. However, the LAR proposed the AV voltage changes only. Therefore, the NRC staff reviewed the calculations for the voltage settings only. The NRC staff

[1] In Section 3.1 of Calculation No. IP-E-0032, the licensee stated, in part, "The acceptance criteria for this calculation is such that the Calibration Setpoints (ATSP) associated with the subject instrument loops are bounded by the Calculated Setpoint (NTSP)."

reviewed Calculation No. 19-AN-19 for information only because the licensee noted that these setpoints and AVs were previously determined in Calculation No. 19-AN-19 but are now moved to Calculation No. IP-E-0032.

The NRC staff established the relationships between the DV ALs, NTSP, ATSP, and associated AVs of Buses A1_AB; A1_BC; B1_AB; B1_BC; C1_AB; and C1_BC. These relationships are reflected in Figure 1 below:

Figure 1: DV ALs & ATSP with associated AVs (Reset & Dropout) relationships



The NRC staff used the information in Table 1 through Table 3, Figure 1, and the guidance in RG 1.105, Revision 3, to independently calculate the margins between:

- AL_{RU} and $ATSP_R$ ($a = AL_{RU} - ATSP_R$)
- AL_{RU} and proposed AV_{RU} ($b = AL_{RU} - AV_{RU}$)
- AL_{RL} and $ATSP_R$ ($c = |AL_{RL} - ATSP_R|$) Absolute value
- AL_{RL} and proposed AV_{RL} ($d = |AL_{RL} - AV_{RL}|$) Absolute value
- AL_{DO} and $ATSP_{DO}$ ($c = |AL_{DO} - ATSP_{DO}|$) Absolute value
- AL_{DO} and proposed AV_{DO} ($d = |AL_{DO} - AV_{DO}|$) Absolute value

The margins calculation's results are shown in Table 4 below:

Table 4: Margins Calculations Results Between ALs to Proposed AVs and ATSPs

Row	(in V)	1A1_AB	1A1_BC	1B1_AB	1B1_BC	1C1_AB	1C1_BC
1	a	17.8	17.8	17.7	17.8	17.8	17.8
2	b	4.6					
3	c	16.2	16.2	16.3	16.2	16.2	16.2
4	d	3.0					
5	e	36.6	36.6	36.7	36.6	36.5	36.5
6	f	3.0					
		%					
7	(b/a)*100	25.8	25.8	26.0	25.8	25.8	25.8
8	(d/c)*100	18.5	18.5	18.4	18.5	18.5	18.5
9	(f/e)*100	8.2	8.2	8.2	8.2	8.2	8.2

The NRC staff compared the existing DV settings with the proposed DV settings. The comparison is shown in Table 5 below:

Table 5: Existing DV Settings and Proposed DV Settings Comparison

Row	(in V)	Existing DV Settings	Proposed DV Settings	Notes
1	AL_{RU}	4118.0	4118.0	
2	AV_{RU} (max)	4109.3	4113.4	Proposed AV_{RU} > Existing AV_{RU}
3	$ATSP_R$	4107*	4100.2**	
4	AV_{RL} (min)	4102.2	4087.0	Proposed AV_{RL} < Existing AV_{RL}
5	AL_{RL}	4084.0	4084.0	
6	$ATSP_{DO}$	4078*	4071.6**	
7	AV_{DO} (min)	4051.0	4038.0	Proposed AV_{DO} < Existing AV_{DO}
8	AL_{DO}	4035.0	4035.0	

* The existing $ATSP_R$ and $ATSP_{DO}$ are the same for six relays.

** The proposed $ATSP_R$ and $ATSP_{DO}$ in this table are the values of Relay 1A1_AB. The proposed individual relay settings of ATSP vary slightly for each of the six relays, as shown below:

(in V)	1A1_AB	1A1_BC	1B1_AB	1B1_BC	1C1_AB	1C1_BC
$ATSP_R$	4100.2	4100.2	4100.3	4100.2	4100.2	4100.2
$ATSP_{DO}$	4071.6	4071.6	4071.7	4071.6	4071.5	4071.5

Based on the information in Tables 2 through 5 and Figure 1, the NRC staff has determined the following with respect to the proposed AV settings of the DV Relay of the CPS TS 3.3.8.1, “Loss of Power (LOP) Instrumentation”, Functions 1.c, 1.d, 2.c, and 2.d in TS Table 3.3.8.1-1:

- Based on the information in Figure 1, the NRC staff verified that:

  $ATSP_R + AFT < AV_{RU}$
  $ATSP_R – AFT > AV_{RL}$
  $ATSP_{DO} – AFT > AV_{DO}$

Therefore, the proposed AVs would assure that the trip signals will be initiated before $ATSP_{RU}$ and $ATSP_{DO}$ reach their AV values.

- Table 4, Rows 7, 8, and 9 of this SE, show the margin ratio percentage between the ATSPs and AVs margins. These margins ensure that the trip setpoints have been chosen to assure that a trip or safety actuation will occur before the measured process reaches the Upper AL_{RU} (maximum equipment acceptable voltage), AL_{RL}, and AL_{DO} (minimum equipment acceptable voltage). The NRC staff finds that the proposed AV settings ensure that an automatic protective action will correct the abnormal situation before a safety limit is exceeded. Therefore, the margin ratio percentage between ATSPs and AVs are adequate.

- Table 2 of this SE shows the AFT value is greater than the ST value. The AFT is greater than or equal to the as-left, or setting, tolerance and the application of the AFT does not result in a violation of an applicable limit. The nearest applicable limit to the ATSP is the AV. Figure 1 shows that the ATSPs ± AFT do not reach the applicable AV. Therefore, this AFT is acceptable.

- Table 5, Rows 2 and 9 of this SE, show the proposed AV_{RU} and AV_{DO}. The values indicate that these proposed AVs will reduce their margins to the AL_{RU} and AL_{DO}. To determine the acceptability of this change, the NRC staff reviewed the uncertainty calculations in Section 7.5.2, “Relay Total Error for Allowable Value (AV) Determination,” of the Calculation No. IP-E-0032 and found that the uncertainties were appropriately accounted for in the proposed AVs. Furthermore, as shown in Rows 7, 8, and 9 of Table 4, the proposed AV settings have adequate margins that provide assurance that ALs will not be exceeded. Based on the NRC staff’s review of the uncertainty calculations and the adequate margins the NRC staff finds that the proposed AVs will continue to support the automatic protection function and therefore the reduction in margin is acceptable.

- Table 3 shows that the differences between the AVs settings of the Buses A1_AB; A1_BC; B1_AB; B1_BC; C1_AB; and C1_BC are very small (around 0.1 V to 0.2 V). The small differences allow selection of a single AV that bounds all buses. Table 3 also shows that the licensee’s selected AV_{RU}, AV_{RL}, and AV_{DO} bound the AVs for all six DV buses. Based on the above the NRC staff finds the selected AVs to be acceptable.

- The licensee determined the second level undervoltage relay’s uncertainties by using the input elements in Section 4.1 of Calculation No. IP-E-0032, which are consistent with the data in the manufacturer’s published of ABB, Style 27N, Model No. 41 OT6375-HF-L.

- The proposed maximum and minimum TS AVs of the DV relay (as shown in Table 3 of this SE) are higher than the minimum allowable motor terminal momentary voltage of 75% of the motor voltage rating of 4000 V. The TS AVs therefore ensure that 4160 V motors will not stall. The NRC staff therefore finds the AVs acceptable with respect to operation of 4160 V motors.

Based on the above evaluations, the NRC staff finds that the licensee’s methodology, analysis, and assumptions used in this application are consistent with the regulatory requirements and the guidance identified in Section 2.3 of this SE. The proposed changes maintain adequate AV margins to the ATSPs, consistent with RG 1.105, and continue to satisfy the requirements of GDC 13. The NRC staff further finds that the requirements of 10 CFR 50.36(c)(1)(ii)(A) will

continue to be met, because the automatic protective action will continue to correct an abnormal situation before a safety limit is exceeded.

Therefore, the proposed revision of the CPS TS regarding the AV settings of the degraded voltages reset and dropout are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment on November 1, 2021. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility's components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational or public radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration (86 FR 15505, March 23, 2021), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: H. Vu
R. Stattel

Date of issuance: December 21, 2021

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 241 RE: REVISION OF DEGRADED VOLTAGE RELAY ALLOWABLE VALUES (EPID L-2021-LLA-0005) DATE DECEMBER 21, 2021

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