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Exelon Nuclear

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February 13, 2012

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

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Additional Information Related to License Amendment Request to Modify Technical Specifications Section 3.8.1, "AC Sources – Operating," (TAC NO. ME6876)

References:

1. Letter from D. M. Gullott (Exelon Generation Company, LLC (EGC)) to U. S. NRC, "License Amendment Request to Modify Technical Specifications Section 3.8.1, 'AC Sources – Operating,'" dated August 15, 2011

2. Letter from J. S. Wiebe (U. S. NRC) to Mr. M. J. Pacilio (EGC), "Clinton Power Station, Unit No.1 - Request for Additional Information Related to License Amendment Request to Modify Technical Specifications Sections 3.8.1, 'AC Sources – Operating,' (TAC No. ME6876)" dated January 12, 2012

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-62 for Clinton Power Station, Unit 1 (CPS). The proposed change would modify CPS Technical Specifications (TS) Section 3.8.1, "AC Sources – Operating," through a reduction to the maximum steady state voltage criteria for safety-related 4.16 kV buses from 4580 V to 4300 V in certain TS Section 3.8.1 Surveillance Requirements (SRs). In Reference 2, the NRC requested that EGC provide additional information in support of their review of Reference 1. The information requested in Reference 2 is provided in the Attachment to this letter.

The information provided in this letter does not affect the No Significant Hazards Consideration, or the Environmental Consideration provided in Attachment 1 of the original license amendment request as described in the Reference 1 submittal.

In accordance with 10 CFR 50.91(b), "State consultation," EGC is providing the State of Illinois with a copy of this letter and its attachment to the designated State Official.

This letter contains no new regulatory commitments. If you have any questions concerning this letter, please contact Mr. Mitchel A. Mathews at (630) 657-2819.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 13th day of February, 2012.

Respectfully,

David M. Gullott
Manager – Licensing
Exelon Generation Company, LLC

Attachment: Additional Information Related to License Amendment Request to Modify Technical Specifications Section 3.8.1, "AC Sources – Operating"

**ATTACHMENT**
**Additional Information Related to License Amendment Request to Modify Technical Specifications Section 3.8.1, "AC Sources – Operating"**

***In reviewing the Exelon Generation Company's (Exelon's) submittal dated August 15, 2011, related to the request to revise the Limiting Condition for Operation 3.8.1, "AC Sources Operating," for the Clinton Power Station, Unit No.1 (Clinton), the NRC staff has determined that the following information is needed in order to complete its review:***

***NRC Request No. 1.*** ***Provide a summary of the engineering evaluation which determined that the current maximum steady state voltage limit of 4580 volts (V) for emergency diesel generators (EDGs) specified in Technical Specifications TS 3.8.1, "Surveillance Requirements," is non-conservative with respect to existing design basis analysis for certain 120 VAC [Volt Alternating Current] safety-related components.***

**Exelon Generation Company, LLC (EGC) Response to NRC Request No. 1:**

Exelon Generation Company, LLC (EGC) Engineering Change (EC) 384804, Revision 0, "Maximum Steady State Voltage for TS 3.8.1 Non-Conservative", contains the engineering evaluation that was performed. This EC reviewed Clinton Power Station (CPS) Updated Safety Analysis Report (USAR), Technical Specifications (TS), and calculation 19-AK-13. The calculation stated a maximum steady-state bus voltage of 4300V is required to prevent an over-voltage condition on the 120V equipment. The upper voltage limit calculated on the 4.16kV buses was based on a no-load analysis that would result in the maximum allowable voltage at the 120V devices. The no-load analysis utilized the transformer turns ratio method to calculate these worst case voltages. Additional analysis supports a 30 minute transient voltage of 4454V. With analysis showing that a steady state voltage limit of 4300V is required to prevent overvoltage on 120V components, the TS allowable value of 4580V was found to be non-conservative.

***NRC Request No. 2.*** ***In the submittal, the licensee stated that the voltage regulation and automatic voltage reset (i.e., on startup and the initiation of a loss-of-coolant accident signal), ensure the EDG output voltages are maintained to account for instrument uncertainties during normal conditions and during recovery from transient conditions.***

***Please provide:***

***a. Maximum instrument voltage uncertainty.***

**EGC Response to NRC Request No. 2a:**

The maximum instrument uncertainty for measuring diesel generator output voltage with test equipment was determined using industry standard practices as documented EGC calculations. The uncertainty is the same for Divisions 1, 2, and 3. Specifically, +21V applied to the lower limit of 4084V and -8V applied to the upper limit of 4300V. These uncertainties have been accounted for in CPS TS Surveillance procedures.

For calibration purposes, test equipment uncertainties as well as voltage regulator uncertainties are used to specify the allowable calibration range for diesel generator output voltage. The uncertainty due to the voltage regulators is ±21V. The allowable calibration band for the voltage regulator is 4126V (i.e., 4084V + 21V + 21V) to 4271V (i.e., 4300V – 8V – 21V). This takes into consideration the uncertainties associated with the voltage regulator as well as the test equipment and ensures that the diesel generators are operated within the TS limits.

***b. The voltage profiles(s) at 4160 V safety-related buses when powered by EDGs, during the sequencing of large safety-related loads for a loss of coolant accident signal, based on analysis or test.***

**EGC Response to NRC Request No. 2b:**

The voltage profiles for all three divisions from the integrated tests conducted in December 2011 are shown in Figures 1, 2, and 3 below for the Division 1, 2, and 3 emergency diesel generator (EDG), respectively. These voltage profiles include EDG starting and sequencing of large safety-related loads. As shown on the figures, the Division 1 EDG output voltage stabilized at approximately 4220V, the Division 2 EDG output voltage stabilized at approximately 4230V and the Division 3 EDG output voltage stabilized at approximately 4140V.

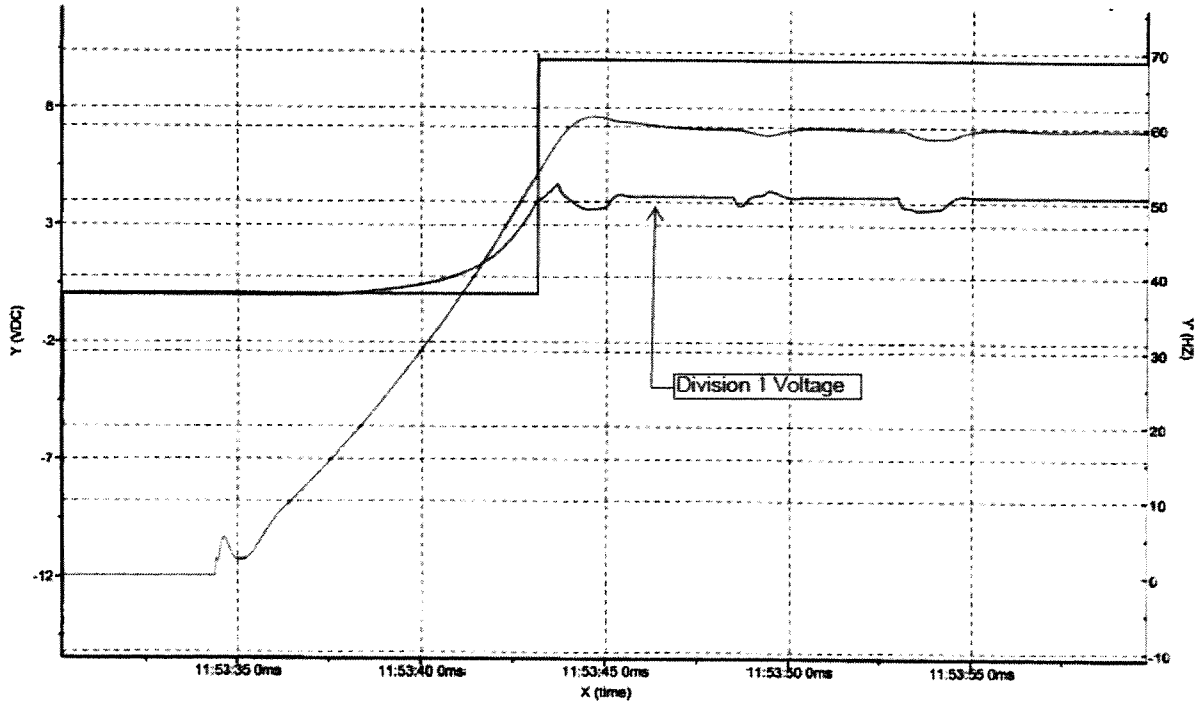


**Figure 1: Voltage Profile for the CPS Division 1 DG from December 2011 Integrated Test**

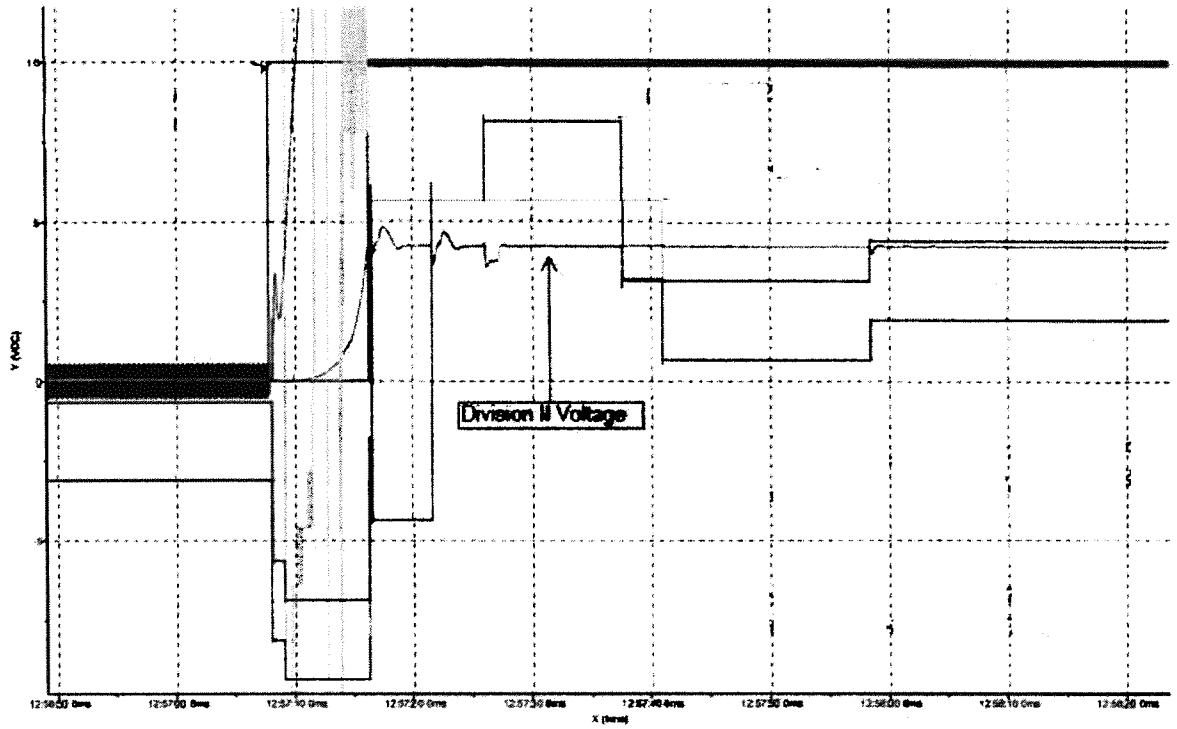


**Figure 2: Voltage Profile for the CPS Division 2 DG from December 2011 Integrated Test**

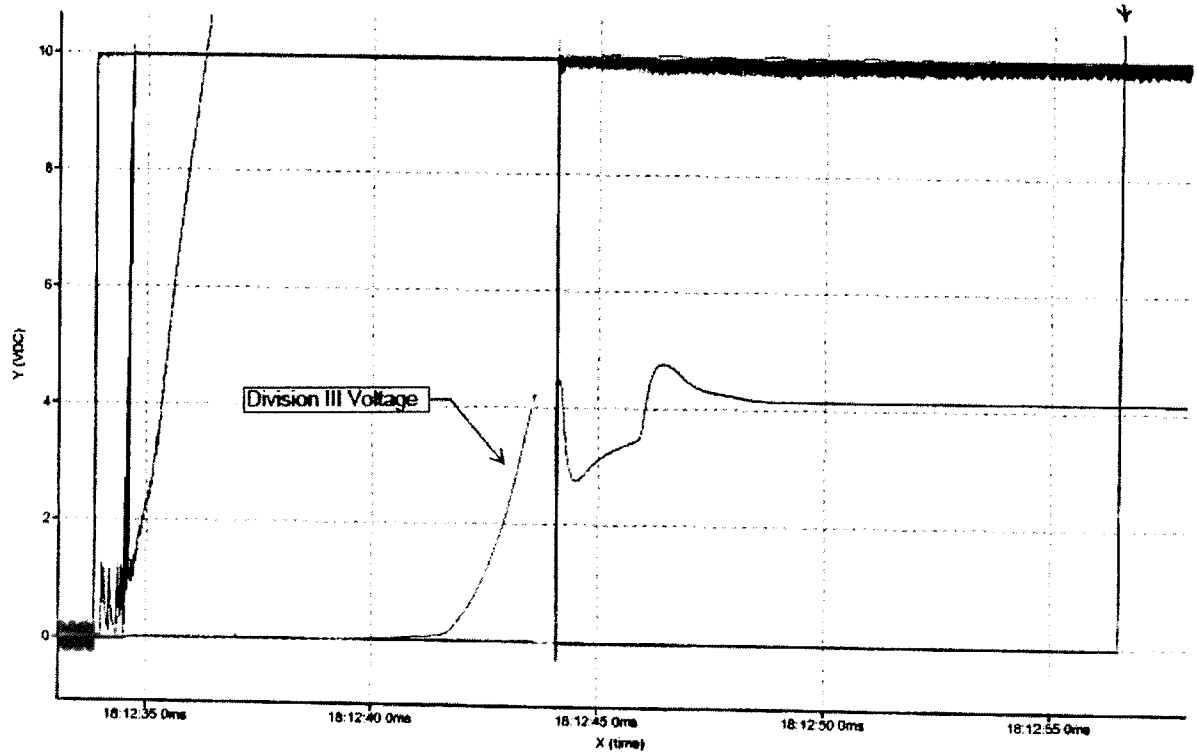


**Figure 3: Voltage Profile for the CPS Division 3 DG from December 2011 Integrated Test**

In summary and as shown on Figures 1, 2, and 3 from the integrated testing, the voltages for all three EDGs stabilized below 4300V on startup and following sequencing of major safety-related loads. When accounting for instrument uncertainties, Figures 1, 2, and 3 demonstrate that all three EDGs are operated below 4300V during normal operation and during recovery from transient conditions.

***NRC Request No. 3.*** ***In the submittal, the licensee stated that analyses in Calculations 19-AK-13, 19-AK-06 and 19-AJ-74, specify that the maximum acceptable voltage on the 4160 V safety-related buses is 4454 V for 30 minutes and 4300 V for continuous operation.***

***Please provide:***

***a. The basis of the maximum acceptable voltage limits, 4454 V for 30 minutes, and 4300 V for continuous operation as described in Calculations 19-AK-13, 19-AK06, and 19-AJ-74.***

**EGC Response to NRC Request No. 3a:**

The maximum voltage for both CPS off-site sources is 105% of rated voltage. One off-site source feeds the Reserve Auxiliary Transformer (RAT), while the other source feeds the Emergency Reserve Auxiliary Transformer. CPS utilizes a Static VAR Compensator (SVC) on the secondary side of each transformer. The SVCs provide voltage support by varying the reactive load on the bus. When off-site source voltage is high, the SVC will be actively maintaining the 4.16kV bus at a lower value than would be expected without the SVC. If the SVC tripped off-line while the 345kV source was at the maximum 105% voltage, the RAT secondary voltage would reach 4454V due to the transformer tap ratio. A 105% voltage on the 138kV off-site source would produce a secondary voltage lower than 4454V; therefore the RAT secondary voltage is the bounding case. The basis for 4454V for 30 minutes is the maximum bus voltage that can be expected if the RAT SVC trips concurrent with 345kV off-site voltage at 105%. It is expected that Operations will perform the necessary actions to reduce the voltage or transfer to the ERAT within 30 minutes.

The maximum steady state voltage allowed on the Class 1E 4.16kV buses is 4300V. As previously discussed, the basis for this value is the transformer turns ratios down to the control power transformers. This steady state limit prevents component damage at the 120V component level at no load or lightly loaded conditions.

***b. A summary of the analysis which confirms that while powered from an offsite power source, the maximum voltage at the safety-related buses can be 4454 V for a maximum of 30 minutes before the voltage is returned to less than 4300 V for continuous operation.***

**EGC Response to NRC Request No. 3b:**

Calculation 19-AK-06 provides the analysis for all motors, non-regulating transformers, heaters, lights, battery chargers, 480V regulating transformers, control devices, and potential transformers connected to the Class 1E 4.16kV buses. Key diagrams were reviewed to identify equipment types fed from the buses for inclusion in the scope of the calculation. Maximum anticipated voltage at the components was calculated based on the maximum voltage at their feeder buses. This was based on transformer ratings without taking into account voltage drop in the feed cables to the equipment. Nominal and maximum rated voltage for the equipment was obtained from the equipment rating and National Electrical Manufacturers Association (NEMA) standards. The calculation compared the maximum anticipated voltage at the components with the device maximum rated voltage. If the maximum anticipated voltage at the device was greater than the device maximum rated voltage, an evaluation of the voltage impact was performed. It was concluded that the short term over-voltage condition evaluated in the calculation does not adversely affect operation or qualification of loads fed from the RAT (i.e., the bounding case) without the support of the SVC.

Calculation 19-AJ-74 provides the analysis for 120V solid state and conventional components fed from Class 1E distribution transformers.

- Solid state devices were evaluated by comparing the maximum anticipated voltage to the maximum rated voltage at the subject device. The maximum anticipated voltage at the components was calculated based on the maximum voltage at the 480V side of the non-regulated distribution transformers and the voltage drop in the non-regulated distribution transformer. Devices that were identified as not meeting the bounding acceptance criteria were further evaluated and determined to be acceptable.

- Conventional control devices such as relays, solenoids, actuators, small motors, lights, and heaters were evaluated on the principal of their design. The evaluation concluded that a relatively small over-voltage condition for short periods will not result in failure in these types of devices.

The analysis performed in calculation 19-AJ-74 concluded that 4454V on the Class 1E 4.16kV buses is acceptable for 30 minutes.