



Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213
Tel 601-368-5138

Ron Gaston
Director, Nuclear Licensing

10 CFR 50.90

1CAN102002

October 5, 2020

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

Subject: Additional Information Related to License Amendment Request to Revise Loss of Voltage Relay Allowable Values

Arkansas Nuclear One, Unit 1
NRC Docket No. 50-313
Renewed Facility Operating License No. DPR-51

By letter dated January 24, 2020 (Reference 1), as supplemented by letter dated March 19, 2020 (Reference 2), Entergy Operations, Inc. (Entergy), requested NRC approval of a proposed change to the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TSs) that would revise the 4160 volt switchgear Loss of Voltage relay setpoints. During the course of review, the NRC determined additional information was required to complete the acceptance review process.

The NRC issued a draft request for additional information (RAI) on August 5, 2020. A clarification call was held with the NRC staff at 1330 eastern time on August 10, 2020. A revised final version of the RAI was issued on September 9, 2020 (Reference 3). The requested additional information is included in the attached enclosure. This information does not impact the no significant hazards consideration provided in the original amendment request (Reference 1).

No new regulatory commitments are included in this submittal.

In accordance with 10 CFR 50.91, Entergy is notifying the State of Arkansas of Entergy's supplemental information by transmitting a copy of this letter and enclosure to the designated State Official.

If there are any questions or if additional information is needed, please contact Riley Keele, Manager, Regulatory Assurance, Arkansas Nuclear One, at 479-858-7826.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on October 5, 2020.

Respectfully,

ORIGINAL SIGNED BY RON GASTON

Ron Gaston

RWG/dbb

Enclosure: Additional Information Related to Revising the Loss of Voltage Relay Allowable Values

- References:
1. Entergy Operations, Inc. (Entergy) letter to U. S. Nuclear Regulatory Commission (NRC), "License Amendment Request to Revise Loss of Voltage Relay Allowable Values," Arkansas Nuclear One, Unit 1 (1CAN012002) (ML20024E639), dated January 24, 2020.
 2. Entergy letter to NRC, "Supplemental Information Related to License Amendment Request to Revise Loss of Voltage Relay Allowable Values," Arkansas Nuclear One, Unit 1 (1CAN032001) (ML20079K973), dated March 19, 2020.
 3. NRC email to Entergy, "ANO-1 Final RAI RE: License Amendment Request to Revise LOV Relay Allowable Values (EPID L-2020-LLA-0013)," (1CNA092001) (ML20260H476), dated September 9, 2020.

cc: NRC Region IV Regional Administrator
NRC Senior Resident Inspector – Arkansas Nuclear One
NRC Project Manager – Arkansas Nuclear One
Designated Arkansas State Official

Enclosure

1CAN102002

Additional Information Related to Revising the Loss of Voltage Relay Allowable Values

ADDITIONAL INFORMATION RELATED TO REVISING THE LOSS OF VOLTAGE RELAY ALLOWABLE VALUES

By letter dated January 24, 2020 (Reference 1), as supplemented by letter dated March 19, 2020 (Reference 2), Entergy Operations, Inc. (Entergy), requested NRC approval of a proposed change to the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TSs) that would revise the 4160 volt (V) switchgear Loss of Voltage (LOV) relay setpoints. The NRC issued a final request for additional information on September 9, 2020 (Reference 3), with a required response due October 26, 2020. The requested supplemental information is included below.

Background/Discussion

As discussed in the LAR, SAR Section 8.3.1.2, related to conformance to GDC 17, and SAR section 8.3.1.5, "Grid Undervoltage Protection (Millstone 2 and ANO Events)," the current licensing basis of ANO-1 includes requirements for protection of safety-related equipment in the event of sustained degraded voltage conditions.

In the LAR, the licensee stated, "The most recent offsite power grid study (completed in 2017) supports the assumption that sustained voltage degradation below the DV setpoint is not credible for the ANO-1 unit." The licensee further stated, "Because the current ANO-1 design and licensing basis does not assume a sustained undervoltage condition as described above [i.e., at a voltage below the current DV setpoint in the TSs], Entergy does not intend to include the new additional DV relays within the TSs. The relays will be controlled and tested, however, consistent with requirements for Class 1E devices."

ANO-1 SAR Section 8.3.1.5.1, "NRC Positions/ANO Responses," Position 1, "Second Level of Under- or Over-Voltage Protection With a Time Delay," describes requirements for a second level of voltage protection for the onsite power system. Position 1, item C.3 states, "The allowable time duration of a degraded voltage condition at all distribution system levels should not result in failure of safety systems or components."

In the LAR, the licensee stated, "The MSP [motor start protection] relays will be set at a slightly lower voltage than the DV relays and will ensure that 480 V motor voltage is maintained above the 80% start voltage. No change is proposed for the existing DV relays or associated TS allowable voltage and time delay values." The licensee further stated that reducing the time delay of the existing DVRs could increase the potential of inadvertent separation from operable offsite power sources. The licensee noted that this would be contrary to the intent of RIS 2011-12.

Request for Additional Information (RAI)

Request for Additional Information (RAI) EEOB-1

The existing DV and LOV relays perform certain safety functions and, in conformance with requirements of 10 CFR 50.36, are included in TS 3.3.8, "Diesel Generator (DG) Loss of Power Start (LOPS)." In the LAR, the licensee provided an overview of the functions of the MSP relays. In order to understand all the safety functions performed by MSP relays in combination with DV and LOV relays for conformance with requirements of GDC 17, the NRC staff is

requesting additional information. Specifically, the information in the LAR does not make it sufficiently clear that the protection afforded by the proposed LOV relays and existing DV relays meet the current licensing basis without the proposed new MSP relays.

Therefore, the NRC staff requests the licensee to confirm whether the MSPs provide part of the protection needed to meet the current licensing basis for the ANO grid undervoltage protection scheme described in Section 8.3.1.5 of the ANO UFSAR.

Entergy Response

With respect to the NRC Position quoted in the NRC Background/Discussion section above and in the ANO-1 Safety Analysis Report (SAR) Section 8.3.1.5.1,

The allowable time duration of a degraded voltage condition at all distribution system levels should not result in failure of safety systems or components.

The ANO-1 post-Millstone event design met the intent of this position for credible degraded voltage scenarios. As stated in this SAR section in response to the above NRC position and in the Reference 1 license amendment request (LAR), the ANO-1 degraded voltage protection was designed as follows:

Under the conditions identified by the system analysis, the safety related equipment will function satisfactorily.

The SAR does not state in this section or any other section that the design accommodated a "sustained" undervoltage condition. This is because the "system analysis" on which the design is based indicates that a sustained undervoltage relevant to the 2016 NRC violation described in the Reference 1 LAR (voltage drop below the Degraded Voltage (DV) relay setpoints but holding above the LOV relay setpoints up to the 9-second time delay of the DV relays) is not credible. Voltage may drop during a large motor start, following a fault on the grid, or a generator trip but recovers before the DV relay time delay is reached. This voltage drop is also analyzed to not prevent other safety-related equipment from responding or operating as needed during transient or accident scenarios.

As is generically the case with NRC regulation and guidance, each commercial nuclear facility is responsible for assessing the conditions at the specific plant site and presenting a design to the NRC (when required) that addresses the requirements based on credible events. The design of structures, systems, and components (SSCs) normally do not accommodate those events that are deemed reasonably unlikely. As stated in the Reference 1 LAR, ANO-1 submitted information to the NRC in letter dated August 23, 1978 (Reference 2 of the LAR enclosure) detailing plant modifications and controls addressing the 1976 Millstone event. The NRC accepted the ANO-1 response in letter dated December 17, 1979 (Reference 3 of the LAR enclosure), including the studies performed to determine the settings for undervoltage protection devices. Appendix I of the 1978 LAR began by stating:

Based on the results of a grid system stability analysis, the following discussion provides the nominal, maximum, and minimum values of voltage and frequency of the offsite power source that assures satisfactory operability of all electrical equipment of the station during all modes of plant operation.

The 1978 correspondence and the Reference 1 LAR do not discuss a design assuming a sustained undervoltage below the DV relay setpoints but above the LOV relay setpoints. The Reference 1 LAR provides a summary of the offsite grid configuration assumed in the analysis, which alone are reasonably considered incredible and unlikely to exist simultaneously. Appendix I of the aforementioned 1978 correspondence contains additional information. While Entergy concludes that the analysis is reasonably bounding (as accepted by the NRC in 1979), further discussion in this respect is provided in response to RAIs EEOB-2 and EEOB-3 below. Based on the above, the ANO-1 licensing basis does not assume the DV relays were needed to protect against a sustained undervoltage condition as described herein. Nevertheless, the DV relays were installed as a 2nd level of protection consistent with the generic industry response to the NRC position related to the 1976 Millstone event.

In light of the above, the MSP relays are not required to meet the ANO-1 design or licensing basis but are intended to accommodate the subject sustained degraded voltage scenario when an Engineered Safeguards (ES) signal is present (accident condition). Entergy plans to install the MSPs as an enhancement at considerable cost even though the assumed scenario is not reasonably considered credible. Entergy considers this approach similar to plant modifications made in response to the Anticipated Transient Without Scram and Station Blackout rules, which added SSCs that were not required to be controlled by the plant TSs. In conclusion, because the MSP relays are not required to meet the existing ANO-1 design or licensing basis, Entergy proposes that the relays are not required to be controlled by the TSs.

RAI EEOB-2

The NRC staff needs additional information to verify the licensee's conclusion in the LAR that, "...instantaneous voltage drop below the DV relay setpoint which remains above the LOV relay setpoint is not considered credible...." Therefore, the NRC staff requests the licensee to provide details of (or excerpts from) the technical justification contained in the system analysis (as defined by Section 8.3.1.5.1, Position 1: Response 1, Item C.3, of the ANO-1 SAR) for ANO-1 that forms the basis of the above conclusion.

Entergy Response

As stated in the LAR, the ANO-1 degraded voltage protection is based on the assumption that the offsite power grid voltage is at the "minimum expected value" as opposed to a transient voltage that is not supported by grid analysis. At ANO, the minimum predicted grid voltage from grid stability analysis (load flow studies) is the most restricting when considering the guidance in Generic Letter (GL) 79-36, "Adequacy of Station Electric Distribution Systems Voltages." The minimum acceptable grid voltage is determined on the Entergy System by modeling the system in the configuration that would result from the loss through a single event of critical equipment on the transmission system, including the most critical transmission line, loss of multiple transmission lines on a common transmission tower, loss of the largest generating station on the grid, or removal of the largest load from the system. Applying that methodology, ANO uses the data provided in the grid analysis to evaluate the offsite power system's ability to power the safety equipment at ANO during nuclear accident conditions (ensures compliance with 10 CFR 50, Appendix A, General Design Criteria (GDC-5) and GDC-17). These evaluations demonstrate that there is adequate voltage to the Class 1E loads during load sequencing and subsequent steady-state conditions for the worst-case accident loading when the offsite power supply is at minimum expected conditions. These evaluations also demonstrate that when bus

voltages drop below the DV, MSP, or LOV relay maximum dropout voltages due to starting of loads, the bus voltages recover above the maximum reset voltage of the relay prior to the actuation of the relay, assuming the minimum time delay of each relays. These evaluations show that when the offsite power supply is at minimum expected conditions there is no sustained voltage degradation below the DV relay setpoint.

In addition to the grid analysis discussed above, ANO also evaluates the results of the grid transient stability analysis. The grid transient stability analysis determines the degree of generator stability of the ANO and other nearby generators following major system disturbances in and around the ANO area. Stability of the ANO offsite power system must be maintained following these major disturbances to ensure that the offsite power requirements of the ANO nuclear power plants are maintained. Additionally, these studies provide the recommended restricted power levels for the ANO generators following the loss of major transmission facilities. These generator power level restrictions ensure that damage to the ANO generators is avoided and unacceptable low voltage levels to the ANO plant auxiliaries are minimized. The results of the transient stability plots in the latest ANO Grid Stability Analysis determined that there is adequate offsite power capability to avoid actuation of the LOV and DV relaying at ANO.

RAI EEOB-3

In its LAR, the licensee stated, "The most recent offsite power grid study (completed in 2017) supports the assumption that sustained voltage degradation below the DV setpoint is not credible for the ANO-1 unit." The NRC staff requests the licensee to clarify if the offsite power grid study accounts for equipment malfunctions or failures, electrical faults, or human performance issues similar to those discussed in Licensee Event Reports and/or identified by the ANO corrective action program.

Entergy Response

The grid analysis discussed above in response to RAI EEOB-2 accounts for specific conditions that could occur from equipment malfunctions or failures, electrical faults, or human performance issues similar to those discussed in Licensee Event Reports (LERs) and/or identified by the ANO corrective action program (CAP). Any event that results in an ANO or ANO system grid related LER is entered into the CAP. The CAP drives actions to assess the events or adverse conditions affecting ANO (whether internal or external) impact on other SSCs or design/licensing basis assumptions. The CAP is expected to identify if the event/condition requires review of the grid and site electrical analyses and document the results of such a review accordingly, including assigning corrective action if analyses require update to address the event/condition.

The CAP is effective in ensuring events and adverse conditions are appropriately evaluated against the assumptions in the ANO onsite and offsite electrical power calculations/studies where applicable. To validate this conclusion, a search of the ANO CAP and LERs over the previous 20 years was performed using 14 keywords/phrases (i.e., 14 separate searches using terms such as "lightning", "grid disturbance", "degraded voltage", "offsite grid", etc.). The results included not only events on the Entergy power grid (or local to ANO) but also the portion of the grid controlled by Oklahoma Gas & Electric (where ANO was impacted). While there were several grid related events including events due to personnel error, system/component failures, weather, etc., none of the events involved a sustained undervoltage condition as subject to this correspondence. Based on the above, the offsite power grid study accounts for equipment malfunctions or failures, electrical faults, or human performance issues identified in the CAP.

REFERENCES

1. Entergy Operations, Inc. (Entergy) letter to U. S. Nuclear Regulatory Commission (NRC), "License Amendment Request to Revise Loss of Voltage Relay Allowable Values," Arkansas Nuclear One, Unit 1 (1CAN012002) (ML20024E639), dated January 24, 2020.
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3. NRC email to Entergy, "ANO-1 Final RAI RE: – License Amendment Request to Revise LOV Relay Allowable Values (EPID L-2020-LLA-0013)," (1CNA092001) (ML20260H476), dated September 9, 2020.