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SUBJECT: Application for amend to Licenses DPR-58 & DPR-316,
 increasing trip setpoint.

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AEP:NRC:1063

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
REVISED ENGINEERED SAFETY FEATURE 4 KV BUS
LOSS OF VOLTAGE AND DEGRADED VOLTAGE TRIP
SETPOINTS AND ALLOWABLE VALUES - TECHNICAL
SPECIFICATION CHANGE REQUEST

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Attn: T. E. Murley

November 29, 1988

Dear Dr. Murley:

This letter and its attachments constitute an application for amendment to the Technical Specifications (T/Ss) for the Donald C. Cook Nuclear Plant Units 1 and 2. Specifically, we are proposing to raise the trip setpoints and increase the span of allowable values for the 4 KV Bus Loss of Voltage and 4 KV Bus Degraded Voltage engineered safety feature actuation instrumentation. The trip setpoints and allowable values for these safety features are specified in Technical Specification 3/4.3.2, "Engineered Safety Feature Actuation System Instrumentation," Table 3.3-4. The 4 KV Bus Loss of Voltage trip setpoint and allowable values are listed in Sections 6b and 8a of Table 3.3-4, while those for the 4 KV Bus Degraded Voltage appear in Section 8b.

The actuation signals for the 4 KV Bus Loss of Voltage and 4 KV Bus Degraded Voltage engineered safety features are provided by undervoltage relays. On March 11, 1988, an equipment trend investigation performed on these relays revealed that the "as found" trip setpoints have generally been found to be beyond the Technical Specification allowable values. Licensee Event Report (LER) Number 88-003-00, "Repetitive Violation of ESF Instrumentation Limiting Conditions for Operation Tolerances Due to Highly Restrictive Allowable Values," was submitted to the NRC on April 11, 1988 in accordance with the reporting requirements specified in 10 CFR 50.73, "Licensee Event Report System."

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Licensee Event Report Number 88-003-00 stated that an engineering review was in progress to evaluate the maximum allowable voltage tolerances, acceptable Technical Specification trip setpoints, and allowable values for the type of relay being used. We committed to submit a Technical Specification change request upon completion of the evaluation. This letter is submitted to fulfill this commitment.

Attachment 1 to this letter contains a description of the proposed changes, historical background, the reasons and justifications for the proposed changes, and our analysis concerning significant hazards. Attachment 2 contains the proposed revised Technical Specification pages.

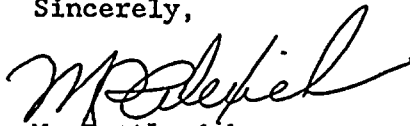
We believe that the proposed amendment will not result in (1) a significant change in the types of effluents or a significant increase in the amounts of any effluent that may be released offsite, or (2) a significant increase in individual or cumulative occupational radiation exposure. The proposed amendment has been reviewed by the Plant Nuclear Safety Review Committee and will be reviewed by the Nuclear Safety and Design Review Committee at their next regularly scheduled meeting.

In compliance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to Mr. R. C. Callen of the Michigan Public Service Commission and Mr. G. Bruchmann of the Michigan Department of Public Health.

Pursuant to 10 CFR 170.12(c), we have enclosed an application fee of \$150.00 for the proposed amendments.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,



M. P. Alexich
Vice President

MPA/eh

Dr. T. E. Murley

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AEP:NRC: 1063

Attachments

cc: D. H. Williams, Jr.
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman
A. B. Davis - Region III

ATTACHMENT 1 TO AEP:NRC:1063
DESCRIPTION OF THE PROPOSED CHANGES,
HISTORICAL BACKGROUND, REASONS AND JUSTIFICATIONS
FOR THE PROPOSED CHANGES, AND
SIGNIFICANT HAZARDS
EVALUATION FOR THE PROPOSED TECHNICAL SPECIFICATION CHANGES

Description of the Proposed Changes

We are proposing the following changes to the Technical Specifications for the 4 KV Bus Loss of Voltage and 4 KV Bus Degraded Voltage trip setpoints and allowable values for the Donald C. Cook Nuclear Plant Units 1 and 2. These trip setpoints and allowable values are specified in Technical Specification 3/4.3.2, "Engineered Safety Feature Actuation System Instrumentation," Table 3.3-4. The 4 KV Bus Loss of Voltage trip setpoint and allowable values are listed in Sections 6b and 8a of Table 3.3-4, while those for 4 KV Bus Degraded Voltage appear in Section 8b. The existing and proposed trip setpoints and allowable values are presented in the following table. We are not proposing to change the time delay specifications. Therefore, time delays are not included below.

<u>Function</u>	<u>Trip Setpoint</u>		<u>Allowable Values</u>	
	<u>Existing</u>	<u>Proposed</u>	<u>Existing</u>	<u>Proposed</u>
4 KV Bus Loss of Voltage	3196 volts (79.9%)	3280 volts (82%)	+18, -36 volts (79%-80.35%)	+120 volts (79%-85%)
4 KV Bus Degraded Voltage	3596 volts (89.9%)	3638 volts (90.95%)	+36, -18 volts (89.45%-90.8%)	+60 volts (89.45%-92.45%)

Historical Background

Mr. Don K. Davis, Acting Chief of Operating Reactors Branch No. 2 - Division of Operating Reactors, in a letter dated June 3, 1977 to Mr. John Tillinghast, Vice President of Indiana & Michigan Electric Company, requested our response regarding the susceptibility of the safety-related electrical equipment at Cook Nuclear Plant to (1) sustained degraded voltage conditions at the offsite power systems and (2) interaction between the offsite and onsite emergency power systems. Our response was requested in order to address the concerns identified by the Millstone degraded grid voltage events that occurred in July 1976. This letter contained three NRC staff positions and model technical specifications that were proposed to ensure that nuclear power plants were adequately designed and operated with regard to the two items identified above. The first staff position required that a second level of voltage protection for the onsite power system be provided. The criteria for this second level of voltage protection stated that the selection of voltage setpoints shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels. The criteria further specified that the Technical Specifications

shall include limiting conditions for operation, surveillance requirements, trip setpoints with minimum and maximum limits, and allowable values for the second-level voltage protection monitors.

Finally, the model technical specifications, contained in Enclosure 2 of the letter, included 4.16 KV emergency bus undervoltage (Loss of Voltage) and 4.16 KV emergency bus undervoltage (Degraded Voltage) with variable voltage setpoints and time delays to be specified by individual utilities according to the results of their voltage requirements analysis.

We responded to the concerns identified above in a letter dated July 22, 1977 to Mr. Edson G. Case, Acting Director - Office of Nuclear Reactor Regulation. Our letter referenced our November 17, 1976 response to the Millstone Plant degraded grid voltage event and committed us to submit technical specifications for second level voltage protection monitors. It is noted that our degraded voltage protection system was not tied to the 4 KV buses at the time of this submittal.

On September 16, 1978, Arkansas Nuclear One experienced an unusual sequence of events that culminated in the spurious activation and degraded operation of their Unit 2 Engineered Safety Features. This event and three safety concerns in the electrical distribution system operation and design, identified by analysis, are documented in IE Information Notice No. 79-04, dated February 16, 1979. This notice stated that specific actions to be taken by licensees would be identified after completion of the NRC staff review. A letter dated August 8, 1979 from William Gammill, Acting Assistant Director for Operating Reactors Projects - Division of Operating Reactors, to All Power Reactor Licensees (Except Humboldt Bay) identified those actions to be taken by licensees in response to the safety concerns identified in IE Information Notice No. 79-04. The following responses constitute the bases used in obtaining NRC approval of the undervoltage relay protection scheme and attendant Technical Specifications originally employed at the Donald C. Cook Nuclear Plant:

<u>Letter Date</u>	<u>AEP Letter Number</u>	<u>Brief Description</u>
December 17, 1979	AEP:NRC:0268	Attachments provided information in response to William Gammill's letter dated August 8, 1979. Attachment 7 proposed 4 KV bus undervoltage protection settings of 89.9% and 79.9%.

February 22, 1980 AEP:NRC:0313

Requested several Technical Specification changes. Change No. 6 requested the proposed modification detailed in Attachment No. 7 of AEP:NRC:0268. Proposed Technical Specification pages have the following voltage settings:
4KV Bus Loss of Voltage:
3196 \pm 18 volts
4KV Bus Degraded Voltage:
3596 \pm 18 volts

May 28, 1980 AEP:NRC:0268B

Attachment 2, Item 3 provided additional information to support our Technical Specification change request submitted in AEP:NRC:0313. The request for additional information was received from the NRC and their consultants during telephone conversations held in March 1980.

In summary, the voltage settings and time delays for the undervoltage relay protection scheme were determined using the guidance provided by NRC staff Position 1 as outlined in the letter from Mr. Don K. Davis to Mr. John Tillinghast dated June 3, 1977. Position 1, "Second Level of Under-or-Over Voltage Protection with a Time Delay," contained six criteria that were required to be satisfied. In addition, the letter dated August 8, 1979 from Mr. William Gammill contained thirteen guidelines for voltage drop calculations that were also incorporated in the design of our protection scheme.

NRC approvals of our original undervoltage relay protection scheme and attendant technical specifications are documented in the following NRC Safety Evaluation Reports (SERs) and Technical Evaluation Reports (TERs) prepared by EG&G Idaho, Inc. under contract to the NRC:

<u>Document Date</u>	<u>Description</u>
July 10, 1980	<p>NRC issued Amendment No. 22 to Facility Operating License No. DPR-74 (Unit 2). Conclusions of Safety Evaluation include:</p> <ol style="list-style-type: none">1. Unit 2 design in full conformance with NRC position on degraded grid voltage.2. Amendment does not involve a significant hazards consideration.
July 25, 1980	<p>NRC issued Amendment No. 39 to Facility Operating License No. DPR-58 (Unit 1). EG&G draft, "Technical Evaluation Report on Degraded Grid Voltage Protection for Class 1E Power Systems," is attached to SER. Conclusions of Safety Evaluation include:</p> <ol style="list-style-type: none">1. Proposed modifications will protect the Class 1E equipment and systems from a sustained degraded voltage of the offsite power source.2. Proposed changes to the Technical Specifications meet the criteria for periodic testing of the protection system and equipment and are therefore acceptable.3. Amendment does not involve a significant hazards consideration.
September 10, 1980	<p>NRC replaced the draft TER transmitted with Amendment No. 39 to Unit 1 Technical Specifications with a final TER. Conclusions in SER dated July 25, 1980 remained unchanged because the draft TER and the final TER had no substantive differences.</p>
June 1, 1981	<p>NRC SER and a TER by EG&G Idaho, Inc. were transmitted. Subject to completion of undervoltage relay protection scheme modifications, NRC concluded that the voltage analysis and test results submitted were acceptable for meeting the NRC positions on the adequacy of station electric distribution system voltages.</p>

At this point, the undervoltage relay protection scheme for both units of the Cook Nuclear Plant was governed by the following technical specification trip setpoints and allowable values:

<u>Function</u>	<u>Trip setpoint</u>	<u>Allowable Values</u>
4 KV Bus Loss of Voltage	3196 V with a 2-second delay	3196 \pm 18 V with a 2 \pm .2-second delay
4 KV Bus Degraded Voltage	3596 V with a 2.0-minute time delay	3596 \pm 18 V with a 2.0 minutes \pm 6-second time delay.

Please note that the function of the 4 KV Bus Degraded Voltage relays is to disconnect the plant from the grid for a sustained degraded voltage condition. These relays are armed only when the plant is fed from offsite power and are not normally active during unit operation. A degraded voltage condition that caused 4 KV bus voltage or 600 V bus voltage to drop below 90% of nominal voltage is alarmed by a separate set of relays in the control room to alert the operator of an impending low voltage condition.

Subsequent to the issuance of the technical specifications, attempts to comply with the allowable voltage values were unsuccessful due to the inability of the relays to repeat their settings within the desired tolerance. In order to alleviate technical specification compliance problems with the relays, we submitted a technical specification change request on January 22, 1982 in AEP Letter No. AEP:NRC:0591. The change request proposed changing the allowable values for the loss of voltage relays from 3196 \pm 18 V to 3196, +18, -36 V and changing the allowable values of the degraded grid voltage relays from 3596 \pm 18 V to 3596, +36, -18 V. The bases for making these changes were:

1. The technical specification values for these voltages and their associated tolerance bands were extremely conservative.
2. Motor operation at 79.00% of rated voltage for two minutes is not significantly different from motor operation at 79.45% of rated voltage for the same two-minute period. This decrease in voltage corresponds to the allowable trip setpoint of 3196 -36 volts instead of 3196 -18 volts as a lower limit for the loss of voltage relays.
3. The maximum allowable trip setpoint for the degraded grid voltage relays was increased from 89.45% to 90.80% of rated voltage. Our voltage studies showed that the 4 KV bus voltage would not decrease below 93.3% of rated voltage under postulated worst case degraded grid voltage conditions. Since the new setpoint was still below the worst case degraded grid voltage level, the proposed change was

consistent with our analysis for degraded grid voltage events and would not cause unnecessary and unwanted automatic disconnecting of the safety systems from an acceptable and reliable source of power.

Our technical specification change request to modify the Loss of Voltage and Degraded Grid Voltage trip tolerance bands was accepted by the NRC with the issuance of Amendment No. 76 to Facility Operating License No. DPR-58 (Unit No. 1) and Amendment No. 57 to Facility Operating License No. DPR-74 (Unit No. 2). These technical specification amendments were issued together by the NRC on November 22, 1983. The attached Safety Evaluation Report agreed that the proposed changes were consistent with analyses performed for loss of voltage and degraded grid voltage events.

Reasons And Justifications For The Proposed Changes

We are proposing to change the trip setpoints and ranges of the 4 KV Bus Loss of Voltage and 4 KV Degraded Voltage relays to the widest technically allowable values. The amendments issued in 1983 were a step in the right direction; however, the allowable setpoint values remain arbitrarily restrictive. The proposed undervoltage setpoints and ranges, combined with an increased frequency of relay calibration, will allow our compliance with Technical Specification 3/4.3.2 for the presently installed relays. Furthermore, the proposed values are suitable for the eventual installation of more accurate undervoltage relays.

The proposed setpoints and ranges were compared to our most recent Electrical Auxiliary Bus Voltage Analysis in order to ensure protection of Class 1E equipment and systems while preventing spurious engineered safety feature actuation. Our present voltage analysis considers worst-case bus loading conditions and offsite system voltages. The analysis indicates a minimum possible steady-state bus voltage of 92.7%. Our earlier analysis submitted on December 17, 1979 (AEP:NRC:0268) showed that the minimum possible steady-state and transient bus voltage could be 93.3% and 87.3%, respectively. The difference in the minimum steady-state values is attributed to the method of calculation changing from hand-calculated to a conservative computer modeling technique. The new study also considers the auxiliary system loading for an operating period of 1985-1990 and incorporates the latest transformer impedances and tap settings. The minimum transient bus voltage has not been computer-calculated but is not expected to deviate significantly from the earlier hand-calculated value of 87.3%.

An engineering review was performed that used an empirical assessment of a large number of "as found" undervoltage relay calibration data together with the results of our voltage requirements analysis. The calibration data were collected between June 1981 and June 1988. The results of this engineering review show that the undervoltage relay "as found" trip setpoints have been within $\pm 3\%$ of the nominal trip setpoint in all except a few calibrations. Therefore, the proposed allowable values span of ± 120 V ($\pm 3\%$) for the 4 KV Bus Loss of Voltage relays should preclude the continuance of problems complying with the Technical Specifications for these relays. The proposed allowable values span of ± 60 V ($\pm 1.5\%$) for the 4 KV Bus Degraded Voltage relays will not eliminate all potential for "as found" trip setpoints being outside the range of allowable values over a long-term calibration period. Thus, we will continue using an increased calibration frequency for the present relays until more accurate relays can be installed. We believe that our presently installed 4 KV Bus Degraded Voltage relays will remain within the proposed $\pm 1.5\%$ range with an increased calibration frequency.

The technical specification change we are requesting will result in a maximum 4 KV Bus Degraded Voltage trip setpoint of 3698 V, which is 92.45% of nominal bus voltage. Since this setpoint is below the minimum conservatively calculated steady-state bus voltage of 92.7%, spurious engineered safety feature actuation will not result from this technical specification change. Similarly, our proposal will result in a maximum 4 KV Bus Loss of Voltage trip setpoint of 3400 V, which is 85% of nominal bus voltage. Since this setpoint is below the minimum calculated transient bus voltage of 87.3%, spurious engineered safety feature actuation is precluded.

It is noted that we are not proposing to change the minimum allowable 4 KV Bus Loss of Voltage or 4 KV Bus Degraded Voltage trip setpoints. The present minimum allowable 4 KV Bus Loss of Voltage trip setpoint is 3196 V minus 36 V, or 3160 V. We are proposing a minimum allowable 4 KV Bus Loss of Voltage trip setpoint of 3280 V minus 120 V, or 3160 V. Similarly, the present minimum allowable 4 KV Bus Degraded Voltage trip setpoint is 3596 V minus 18V, or 3578 V. We are proposing a minimum allowable 4 KV Bus Degraded Voltage trip setpoint of 3638 V minus 60 V, or 3578 V. Therefore, the minimum allowable trip setpoints for both functions remain consistent with our approved Auxiliary Bus Voltage analysis.

Analysis of Significant Hazards

Per 10 CFR 50.92, a proposed amendment will involve no significant hazards considerations if the amendment does not:

- (1) involve a significant increase in the probability or consequences of an accident previously analyzed,
- (2) create the possibility of a new or different kind of accident from an accident previously analyzed or evaluated, or
- (3) involve a significant reduction in a margin of safety.

Our evaluation of the proposed change with respect to these criteria is provided below.

Criterion 1

This change involves changing the trip setpoints and allowable values for the 4 KV Bus Loss of Voltage and 4 KV Bus Degraded Voltage engineered safety features. The proposed ranges of allowable trip setpoints are consistent with our analyses for loss of voltage and degraded grid voltage events and have been selected to preclude damage to safety related electric motors operating under degraded voltage conditions. These analyses have been approved by the NRC and meet the NRC positions on the adequacy of station electric distribution system voltages. We therefore conclude that this proposed change does not involve a significant increase in the probability or consequences of an accident previously analyzed.

Criterion 2

This change does not propose to revise the configuration of plant systems. Rather, we propose changing the allowable trip setpoints of engineered safety features designed to respond to degraded grid voltage events. This change in allowable trip setpoints does not significantly affect the function of these engineered safety features, and therefore does not create the possibility of a new or different kind of accident from any accident previously analyzed or evaluated.

Criterion 3

The allowable trip setpoints proposed by this change remain consistent with our analyses for loss of voltage and degraded grid voltage events. These analyses formed the bases for the original

Technical Specification allowable trip setpoints. Since the proposed setpoints remain consistent with these bases, there can be no significant reduction in a margin of safety.

The Commission has provided guidance concerning the determination of significant hazards by providing certain examples (48 FR 14870) of amendments considered not likely to involve significant hazards considerations. We believe the proposed change is less likely than the sixth example in the above guidance to involve a significant hazards consideration. Specifically, we believe the proposed change will not result in an increase in the probability or consequences of a previously analyzed accident or reduce a safety margin, and is within all acceptable criteria with respect to the system design. Therefore, we believe this change does not involve a significant hazards consideration as defined in 10 CFR 50.92.