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ACCESSION NBR:8111100436 DOC.DATE: 81/11/02 NOTARIZED: NO DOCKET #
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Office of Nuclear Reactor Regulation, Director

SUBJECT: Responds to NRC 810828 request for addl info re util 810130 review on adequacy of station electrical distribution sys voltages.Test verified that bus voltages were approx 2% lower than measured values.

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November 2, 1981

Director of Nuclear Reactor Regulation
US Nuclear Regulatory Commission
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MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Additional Information Related to Adequacy of Station Electric Distribution System Voltages

The following is submitted in response to a letter dated August 28, 1981 from Mr Thomas A Ippolito, Chief, Operating Reactors Branch #2, requesting additional information and confirmation of information for review of our January 30, 1981 submittal on the adequacy of station electrical distribution system voltages.

A detailed study of the Monticello Plant electrical distribution system has been completed by our consultant. This study included a walkdown survey of existing loads, measuring running loads where appropriate, and incorporating known future loads for the purposes of evaluating the electrical system. With this information, an independent computer model of our electrical system was developed for analyzing the system as presently configured and for evaluating the effects of system configuration variations.

The results of this computer analysis confirmed our evaluation that the worst case system voltages were encountered with power being supplied by the 1R transformer and the RHR and core spray pumps starting simultaneously. Although many long term alternatives for increasing the electrical system capacity and improving voltage regulation are being evaluated, a short-term alternative to sequence the ECCS pumps when power is being supplied by the 1R transformer will substantially reduce the system voltage droop. This case is shown in Table 1. The data in Table 1 confirms that voltages will be sufficient for starter pickup and motor acceleration using this modification. This modification will be implemented during our current maintenance outage and will utilize the existing ECCS pump sequence logic to sequentially start the pumps whenever power is supplied from the 1R transformer, the 1AR transformer, or the diesel generators. Shedding of cooling tower loads and delayed diesel generator room fan starting will not be implemented.

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To support the analytical methods described above, a test was conducted in accordance with the guidelines of NRC Branch Technical Position PSB-1, Adequacy of Station Electrical Distribution System Voltages, Part B, Section 4. The test verified that the calculated bus voltages were approximately 2% lower than the measured values.

With respect to documenting statements made during our telephone conference call of July 23, 1981, we have the following comments. These are numbered to correspond to the item numbers in Mr Ippolito's letter:

1. Control power for 480V load centers 103 and 104 is D.C.

2. The motors on the 480V MCC's 33 and 43 are, for the most part, rated at 460V. The contactors, i.e., the motor starters on these MCC's are rated at 480V.

3 & 4. Regarding the minimum continuous rated steady-state voltage of the MCC motor starters, the manufacturer's literature on these starters states that when control voltage drops to about 60 percent of normal, standard starters will open. It also states that they can be reclosed when at least 85 percent of normal voltage is available. From actual testing performed on our safety-related motor starters, it has been determined that a wide range of pickup voltages exist for our starters. Some will pick up at as low as 61% of nominal, while others require up to 88%.

5. The taps on the 1AR transformer have been changed from 13.3/4.33 to 14.0/4.33.

6. Tests to verify our analysis have been completed and additional analyses have been performed to determine the effectiveness of the planned modification for voltage improvement.

7. The high side 1R and 1AR transformer voltages were calculated in the same way as bus voltages with the minimum expected system voltages noted on page 5 of our January 30, 1981 submittal used as a starting point.

Please contact us if you have any questions related to our short-term modification or the information we have provided.

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/DMM/bd

cc: J G Keppler
G Charnoff
NRC Resident Inspector

Attachment

## TABLE 1

### Summary of Bus Voltages per Unit at Minimum Voltage

| | 1R Transformer Sequenced ECCS Start, Two Core Spray Pumps Starting |
|---|---|
| 4KV Buses | |
| 13 & 15 | .8615 |
| 14 & 16 | .8625 |
| 480V LC | |
| 103 | .7973 |
| 104 | .8193 |
| 480V MCCS | |
| 133 | .7989 |
| 143 | .8201 |