Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

June 1, 1982

Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. NUCLEAR REGULATORY COMMISSION
Washington, D. C. 20555

Attention: Mr. R. A. Clark, Chief
Operating Reactors Branch 3

Gentlemen:

DOCKET NOS. 50-266 AND 50-301
ADEQUACY OF STATION DISTRIBUTION SYSTEM VOLTAGES
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Your letter dated March 26, 1981 requested additional information regarding the adequacy of the electrical distribution systems at Point Beach Nuclear Plant, Units 1 and 2 (PBNP). In letters to the NRC dated June 1 and December 30, 1981, we responded to paragraphs 2, 3, 4, 5, and 6 of your March 26 letter. Paragraph 1 could not be adequately responded to in our June 1 and December 30 letters because verification tests had not been performed. This letter provides response to paragraph 1 of your March 26 letter, as well as clarification and updating of information previously supplied.

Prior to addressing paragraph 1 of your March 26 letter, additional clarification of the minimum expected voltage values presented in our June 1 and December 30 submittals regarding adequacy of station distribution system voltages is necessary. The minimum voltage values for the 4160V and 480V safety-related systems provided in our June 1 and December 30 letters were calculated based on very conservative assumptions. Furthermore, those analyses were made without taking into account the 2.5% fixed tap voltage boost in the 13.8-4.16kV low voltage station auxiliary transformers. The 2.5% fixed tap voltage buck in the 345-13.8kV high voltage station auxiliary transformers was considered. Accordingly, the previously calculated voltages at the terminals of safety-related equipment supplied by the 4160V and 480V systems were lower than those which actually could occur. The earlier analyses were based upon a minimum 345kV bus voltage of 100%. Recently performed 1982 and 1989 summer peak loadflow studies conducted by the Wisconsin Electric Transmission Planning Division indicate that the lowest Point Beach 345kV bus voltage

A001
S
1/0

would be 101.0% with an intact transmission system and 98.0% with a worst case single transmission system element out of service.

A revised degraded grid voltage analysis was performed with two separate cases to reflect the different conditions of the transmission system. It was assumed that one of the Point Beach 345-13.8kV high voltage station auxiliary transformers was out of service for the case with the transmission system intact (case 1). Both Point Beach 345-13.8kV high voltage station auxiliary transformers were assumed to be in service for the case with the single transmission system element out of service (case 2). Both cases were based upon an accident in one unit coincident with safe shutdown from 100% power for the other unit. Calculated worst case voltages at the terminals of safety-related loads were higher for case 2 than for case 1. Accordingly, the minimum voltage values presented in the table below are from case 1.

Lowest Possible Safety-Related 4kV Bus Voltage	% of 4000V Motor Rating	Lowest Possible Safety-Related 480V Voltage	% of 460V Motor Rating
3920.9V	98.05%	427.5V[(1)]	92.93%

[(1)] This voltage would occur at the terminals of a containment vent fan if the 4kV bus voltage is at lowest possible value as indicated.

Paragraph 1 of your March 26 letter directed us to determine the transient voltages generated during the start-up of Class IE loads and large non-Class IE loads assuming maximum loads and minimum voltages. The worst case voltage transients will occur when a reactor coolant pump is started. This condition is more severe than the starting of any Class IE load. Measurements indicate that the 4kV bus voltage dips to 87% of pre-start voltage when a reactor coolant pump is started from nominal voltage conditions. The revised degraded grid voltage analysis indicates that the 4kV bus voltage will dip to approximately 3412V (85% of the 4000V motor rating) and the lowest 480V safety-related load terminal voltage will drop to 371V (80.6% of the 460V motor rating) when a reactor coolant pump is started with the pre-start voltage at the lowest possible value indicated above. These calculated low voltage values would persist for approximately 28 seconds while the reactor coolant pump is accelerating. In each case voltage values at the terminals of 4kV and 480V safety-related loads are greater than the 75% of rated voltage for which the motors were designed. The safety-related motors are capable of operating at 75% of rated voltage for up to one minute without effect.

In accordance with the results presented above, we intend to propose a modification to the Technical Specification for the degraded grid voltage relay setpoint, Item 9 of Table 15.3.5-1. The proposed setting will be 3875V with a time delay of less than 60 seconds. With this setting, including allowance for 2% relay accuracy, the lowest 4kV safety-related bus voltage which would be allowed is 3797V (94.9% of the 4000V motor rating) and the lowest voltage at the terminals of a safety-related 460V motor would be 414V (90% of the 460V motor rating). This license amendment submittal will be forwarded to the NRC by July 1, 1982.

The loss-of-voltage relays, which are used to isolate safety-related loads and start the emergency diesel generators, are Westinghouse type CV-7 relays. These relays have an inverse time undervoltage characteristic. It is not possible to achieve a setting with the type CV-7 relays which will prevent safety-related motors from operating at voltages less than 75% of rated voltage and still permit starting a reactor coolant pump with the calculated minimum 4kV bus voltage. Use of Brown-Boveri Electric Company type ITE-27D relays which have a definite trip time at 0-100% of trip setting would provide undervoltage protection at the 75% of rated voltage level and permit starting a reactor coolant pump with the worst case calculated 4kV bus voltage. A plant modification change request is being prepared to replace the Westinghouse type CV-7 loss-of-voltage relays with Brown-Boveri Electric Company type ITE-27D relays. After a schedule for procurement and replacement of the CV-7 loss-of-voltage relays is more firmly established, we would propose the necessary Technical Specification changes which would permit placing the ITE-27D relays in service.

Paragraph 1 of your March 26 letter also directed us to perform analyses to determine the nature of voltage transients generated during transfer of auxiliaries. Fast transfer tests on the 13.8kV bus were performed in November 1976 and a fast transfer test of the Unit 2 4kV auxiliaries was performed on April 16, 1982. The results of these tests indicate that during transfer the auxiliary loads are isolated from a source for three to four 60 Hz cycles (50 to 67 milliseconds). During this period, the auxiliary system voltage drops to approximately 87% of the pre-transfer voltage. Similar results would be expected for a Unit 1 fast transfer. This voltage is greater and the lead time is shorter than the setpoint of the proposed ITE-27D loss-of-voltage relays. The duration is sufficiently short to preclude operation of the degraded grid voltage relays.

We believe that the information contained herein, when combined with the information in our June 1 and December 30 submittals, answers all the questions posed by the NRC in your March 26 letter. Should you have any questions concerning the contents of this letter, please notify us so that we may address your concerns.

Very truly yours,

CW Fay

Assistant Vice President

C. W. Fay

Copy to NRC Resident Inspector