UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

August 16, 1979

Docket No.: 50-313

Mr. William Cavanaugh, III
Vice President, Generation
and Construction
Arkansas Power & Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Dear Dr. Cavanaugh:

We have reviewed your submittal of July 12, 1979, in response to our request of June 20, 1979, concerning the degraded grid voltage problem at Arkansas Nuclear One, Unit No. 1 (ANO-1). We have determined that Items 1, 10 and 11 are acceptable. However, we still have a basic concern whether the voltage applied to ESF equipment would be unacceptable. The enclosure provides our detail concerns and request for information regarding each item of your July 12, 1979 letter. We request that these concerns be addressed and information be provided within 15 days on receipt of this letter.

Sincerely,

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosure:
Concerns and Request for
Information

cc w/enclosure: See next page

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CONCERNS AND REQUEST FOR

INFORMATION RELATING TO DEGRADED GRID VOLTAGE PROBLEM AT

ANO-1

Each item relates specifically to the corresponding item of ANO-1 letter of July 12, 1979.

ITEM 2

Provide the 480 volt and 4160 volt AC electrical schematics showing the proposed degraded voltage protection system (both levels of protection).

ITEM 3

The proposed undervoltage relays will have test plug capability. Describe the test plugs, their function, and their effect on the relay. How is the test performed and specifically what is the function which is tested? Provide a schematic which illustrates the function of the test plug on the relay.

ITEM 4

a) We interpret your response to say that a calibration followed by a functional test will be conducted prior to initial operation of this system and during each refueling outage thereafter. While we believe this test interval is appropriate for calibration purposes, operability should be verified by performing a functional test more often, e.g., monthly or quarterly. Propose a suitable test interval for functional testing.

b) We specifically requested a description of the test program which would verify (once prior to initial operation of the protection system) that no unacceptable voltage would be applied to ESF equipment when the grid is at the defined "minimum-normal" level. Describe the test program.

c) We are concerned about the adequacy of the voltage applied to ESF equipment during the starting of large non-Class IE motors, such as reactor coolant pump motors. This is a major concern. Your analysis indicates that the lowest acceptable voltage is 92% for an eight-second duration. During the starting of large motors, you have stated that the voltage falls below 92% and stays for longer than eight seconds. Provide the values of these lower voltages and duration for the starting of each large non-IE motor (under appropriate plant and grid conditions). Explain why voltage levels below your minimum voltage acceptance criterion should be considered acceptable. Please note that the voltages when starting large motors must be determined to be acceptable (on an appropriate basis) before one considers the acceptability of a design feature that would bypass the degraded voltage protection during such startings.

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ITEM 5

Submittal V-2A and V-3A shows motor base voltage on 4160V bus higher than designed maximum 110% and that on 480V bus as marginal. Further, if transformer secondary voltage gain (due to higher applied voltage (22 kv) on lower rated (21.5kv) primary windings) is added to the bus voltages, the result will be unacceptably higher voltages on both 4160 and 480V equipment. The submittal further indicates that your assumed no load condition includes 25% of the transformer capacity as running load on 480V bus and 1.885 MVA on 4160V bus. You are requested to justify 1.0 PU tap under the above mentioned concerns. Also provide the analysis that gives acceptable voltages on Class IE equipment for maximum grid voltage and a realistic no load condition (such as 5% or less of the transformer capacity as 480V running load).

ITEM 6

Our review of the bypass circuit for the starting of large motors has determined that this single bypass is a single failure point for operation of ESF equipment. This is a major concern. Each large motor has a single time delay device. (This timer does have two output contacts which operate in separate schemes to bypass the degraded voltage protection in both divisions of electric power). However, the postulated failure of the timer mechanism itself for any such motor can result in the loss of voltage protection in both electrical divisions. This single failure potential must be eliminated, possibly by using two timer mechanisms per motor.

See also our comment earlier regarding Item 4c.

ITEM 8

Your response dated July 12, 1979, indicated that load shedding of essential loads was proposed only when the station auxiliaries are supplied power from start up transformer No. 2 (ST 2). No load shedding would be applied to start up transformer No. 1 (ST 1) under the same conditions. Your August 23, 1978 analysis and all our subsequent communications have indicated that when operating on ST-1 during "abnormal" conditions, shedding of non-essential loads was essential to maintain acceptable voltage. Explain this change. Show why load shedding is not needed for ST-1.

ITEM 9

As you have indicated, your response is not complete. You have committed to providing information on the set points of the undervoltage relays. Provide the information or a schedule for providing the information.

Our concern here is a proper stack up of the tolerances in the system including the inaccuracies of instrumentation in adjusting the set points to assure that the voltage applied to ESF equipment is not unacceptable. In your discussion display such tolerances and error bands and their stack up to assure that the voltage applied to the ESF equipment is not unacceptable.

Another concern is that, after considering the build-up of inaccuracies, etc., the nominal setpoint should not be so high as to cause the safety buses to be spuriously disconnected from the preferred power source.