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December 10, 1979
GQL 1470

Director of Nuclear Reactor Regulation
Attn: R. W. Reid, Chief
Operating Reactors Branch No. 4
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

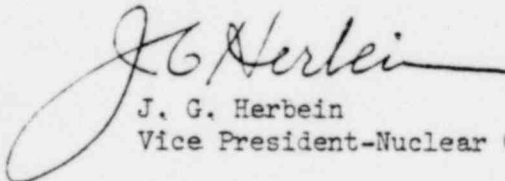
Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Docket No. 50-289
License No. DPR-50
Degraded Grid Voltage

With regard to your letter of August 14, 1979, concerning a request for additional information on degraded grid voltage, enclosed please find the responses to Items 1 and 2.

The response to Item 3 is presently undergoing review and, therefore has not been included. It is anticipated that the response will be completed by December 21, 1979.

Additionally, your letter of August 14, 1979, referred to our letter of August 19, 1977. The August 19, 1977 letter has been supplemented by an October 16, 1979 letter (GQL 1292) and should be considered an addendum to the August 19, 1977 letter. Both of these letters have been referenced in the attached responses.

Sincerely,



J. G. Herbein
Vice President-Nuclear Operations

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ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION -
DEGRADED GRID VOLTAGE

ITEM 1

Your chosen nominal set point of 3534V and minimum acceptable setpoint of 3423V correlates to 88% and 85.6% of motor rated voltage, respectively. As both of the voltages are below those recommended by ANSI C84.1-1973 and most manufacturers, show by analysis that a postulated voltage of 89% of 4000V for an indefinite time will not cause thermal damage to the ESF motors.

RESPONSE

The undervoltage relays are set to provide the necessary protection for the following reasons:

1. To prevent the control transformer fuses within the motor control centers from burning due to a low voltage condition.
2. To prevent spurious trips during the starting of large motors.

In the submittals dated August 19, 1977, and October 16, 1979, both of the above requirements have been satisfied under the worst conditions in which one (1) Aux. transformer is in operation, the grid is at 223KV, the plant operating at 100% power and one full ES train running. Under the above stated conditions, it has also been shown in the submittal of October 16, 1979 - Exhibit 12, that the 4000 volt bus will be at 3625 volts under running conditions. This is 90.6% of the motor rated voltage. This rating is within the limits as recommended by ANSI C84.1-1973.

ITEM 2

Provide the time delay of the undervoltage protection at your chosen setpoint. Provide analysis showing that the time delay for undervoltage protection will preclude any spurious trips from starting large motors and also prevent any thermal damage to the safety related equipment. Also provide sufficient information (voltage drop analyses) to allow our independent verification that the undervoltage set point and time delay selected will not cause spurious separation of safety buses from offsite power during all modes of plant operation (start-up, shutdown, power operation and accident condition) due to automatic or manual starting of large motors, bulk or sequential loading or automatic transfer of electrical loads. The analyses should include conditions when the safety buses are supplied from the Unit Auxiliary Transformer, the Start-Up/Reserve Transformer or other available offsite connections and assuming the need for electrical power is initiated by an anticipated transient (e.g., unit trip) or an accident, whichever presents the largest load demand.

Request for Additional Information -
Degraded Grid Voltage

Response:

The undervoltage relays applied on TMI Unit No. 1 class IE Equipment are LAV51K inverse time-voltage characteristic relays. These relays presently have the following documented setting:

Pickup = 3534 volts

Tested set point = 6.5 seconds at 2994.7 volts

Due to the inverse time characteristic of these relays the time to trip varies with the magnitude of the voltage applied. Therefore, the defined range of operation for these relays as presently set is:

16 seconds to trip at 3423 volts

2.1 seconds to trip at 0 volts

The NRC's concerns about spurious trips during the starting of large motors and the possibility of voltages below motor ratings under worst case conditions were answered by the voltage study data supplied to you for the October 16, 1979 reply to the NRC's inquiry on the adequacy of station distribution voltages.

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