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SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards info requested by J Lozevnick re adequacy of station electrical distribution sys voltages.Info will be included in FSAR Amend 17.

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

December 13, 1984
(NMP2L 0295)

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Schwencer:

Re: Nine Mile Point Unit 2
Docket No: 50-410

Attached is the information requested by Mr. J. Lazevnick on the adequacy of Station Electrical Distribution System Voltages.

This information will be included in Final Safety Analysis Report Amendment 17.

Very truly yours,

CVMangan

C. V. Mangan
Vice President
Nuclear Engineering & Licensing

DS:ja
Enclosure
xc: R. A. Gramm, NRC Resident Manager
Project File (2)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Niagara Mohawk Power Corporation	)	Docket No. 50-410
	)	
(Nine Mile Point Unit 2)	)	

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C. V. Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 13th day of December, 1984.

Christine Austin
Notary Public in and for
Onondaga County, New York

My Commission expires:

CHRISTINE AUSTIN
Notary Public in the State of New York
Qualified in Onondaga Co. No. 4787697
My Commission Expires March 30, 1985

Under the opposite conditions, i.e., when the 13.8-kV buses are heavily loaded and the 4.16-kV buses are lightly loaded with the 115-kV system operating at the minimum (109.25 kV), voltage at the 4.16-kV load terminal will be 4.328 kV (108.2 percent of the motor nameplate voltage of 4 kV). This is within 10 percent of the motor nameplate voltage.

With the grid voltage at the minimum level, the voltages at the 4.16 kV and 600V buses under various bus loading conditions are above 80 percent of the nominal bus voltage of 4.16 kV and 600V during worst case starting condition and above 90 percent of the nominal bus voltage of 4.16 kV and 600V during steady state condition. The voltages at the 4.16 kV and 600V load terminals are above 80 percent of the rated load voltages of 4 kV and 575V during starting and 90 percent of the rated load voltages of 4 kV and 575V during normal running. The actual voltages are shown in Table 8.2-1.

From the voltage profile study for the auxiliary boiler transformer, it is observed that when the auxiliary boiler is feeding any 4.16-kV bus, the minimum 115-kV system voltage that will ensure at least 80 percent of the motor nameplate voltage at the motor terminals during starting condition and 90 percent of the motor nameplate voltage at the motor terminals during normal running condition for 4.16-kV as well as 600V levels is 109.25 kV (95 percent of 115kV), which is within the operating limits of the 115 kV system. With the grid voltage at the minumum level, the voltages at the connected 4.16 kV and 600V buses under various bus loading conditions are above 80percent of the nominal bus voltage of 4.16 kV and 600V during worst case starting condition, and above 90 percent of the nominal bus voltages of 4.16 kV and 600V during steady state condition. The voltages at 4.16 kV and 600V load terminals are above 80 percent of the rated load voltages of 4 kV and 575V during starting and above 90 percent of the rated load voltages of 4 kV and 575V during normal running. The actual voltages are shown in Table 8.2-1.

It may be noted that the auxiliary boiler transformer serves only as a backup for either Division I or Division II emergency bus and supply the auxiliary boiler loads. The auxiliary boiler loads are present during plant shutdown and startup conditions. However, for the purposes of observing the worst case, the voltage profile study on the auxiliary boiler transformer assumes that one auxiliary boiler load as well as one of the emergency bus (Division I or Division II) loads occur simultaneously. It may also be noted that transfer of one 4.16 kV emergency bus from the reserve station service transformer to the auxiliary boiler transformer can occur only by manual transfer initiated by the operator in absence of any DBA condition.

When the 4.16-kV emergency buses (Divisions I and II) are fed from the emergency diesel generators, the minimum voltages at the 4.16-kV loads under the most severe starting condition and the normal running condition will be 3,268V (81.7 percent of the nominal load terminal voltage of 4000V) and 3921V (98 percent of 4000V), respectively; the minimum voltages at the 600V loads under the most severe starting condition and the normal running condition will be 461V (80.2 percent of the nominal load terminal voltage of 575V) and 517.5V (90 percent of 575V), respectively.

The minimum voltage that will ensure proper operation of all Class 1E control and other loads at 120V ac level is as follows:

a. The minimum pickup voltage for all starters is 77V ac (70 percent of the rated coil voltage of 110V ac).

b. The minimum voltage for all other control devices, including MOVs and SOVs, is 96V (80 percent of 120V).

All 600V cables feeding 600V-120/208V transformers and 120V cables are sized to ensure the minimum voltages shown above for 120V loads at the 120V load terminals assuming the minimum voltage (477V, the worst voltage condition during motor starting) at the 600V load centers.

The minimum 125V dc voltage that will ensure proper operation of all Class 1E dc loads are as follows:

a. The minimum operating voltage for all Division I and II dc loads is 101V (SOVs, MOVs, etc.)

b. The minimum operating voltage for all Division III dc loads is 110V (SOVs and MOVs).

All 125V dc cables are sized to maintain these minimum voltages at the 125V load terminals, assuming the battery terminal voltage at the minimum of 105V for Divisions I and II and 112.5V for Division III, except in cases where the device (relay trip coils and closing coils) is capable of operating at levels below 101 or 110V, when the cables are sized to maintain these minimum voltages.

The minimum voltages at the various buses and their connected loads under different loading conditions are summarized in Table 8.2-1.

Two levels of undervoltage protection are provided at the 4.16-kV emergency buses: one to detect loss of offsite power and one to detect degraded voltage conditions. The loss of offsite power relay is set to trip the offsite power supply breaker, alarm the control room and initiate emergency diesel generator starting when the 4.16-kV bus voltage drops to 3212.86V which corresponds to 475.5V at the 600V buses. The time setting is 3.0 sec.

In order to maintain 90% voltage at the 600V motor terminals, it is calculated that the degraded voltage relay would have to be set at 3847 volts. This assumes that all of the 600V connectable load is being supplied simultaneously from the load center. Niagara Mohawk Power Corporation is concerned that setting this relay too high could result in unnecessary transfer of power supply during motor starting conditions. Additional field test and analysis will be performed to determine the lowest level this relay can be set and still ensure minimum voltage at the 600V motor terminals. The NRC will be consulted prior to lowering this relay setpoint below 3847V. Setting the degraded voltage relay at 3847V corresponds to 529.5V at the 600V buses. With the maximum of 12V permissible drop between the 600V load center bus and any 600V load during normal running, this corresponds to 517.5V at the 600V load terminals, which is 90 percent of the rated load voltage of 575 volts.

The degraded voltage relay is provided with two time delays. The first time delay is at 8 sec. Following this time delay, the degraded voltage condition is alarmed in the control room uner normal plant operating conditions. Under accident conditions, the offsite power supply breaker will trip, and the emergency diesel generator will start following this time delay. The second time delay is set at 30 sec. Following this time delay, the degraded voltage condition will be alarmed in the control room, the offsite power supply breaker will trip, and the emergency diesel generator will start under normal plant operating conditions.

When the emergency buses are energized from the diesel generators, the undervoltage protection scheme prevents any load shedding during sequencing of emergency loads on the bus under an accident condition. When the emergency buses are energized from the offsite source (preferred source), the undervoltage protection scheme is functionally operational.

The undervoltage protection scheme uses coincident logic (two out of three phases) to preclude spurious trips of the offsite power sources. The relays and other devices associated with the undervoltage protection scheme are Class 1E and are located on the respective Class 1E switchgear.

The voltages at different buses under various loading conditions obtained from the voltage profile study will be verified by actual measurement (Table 14.2-90) prior to initial full-power reactor operation.

Stability Considerations

The designs and operation of the interconnected power system must be such that system and generator unit stability will

[illegible]