REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8412040001 DOC.DATE: 84/11/29 NOTARIZED: YES DOCKET #
FACIL:50-410 Nine Mile Point Nuclear Station, Unit 2, Niagara Moha 05000410
AUTH.NAME AUTHOR AFFILIATION
MANAGAN,C.V. Niagara Mohawk Power Corp.
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards info requested by J Lazevnick re adequacy of station distribution sys voltages.Info will be included in Amend 16 to FSAR.

DISTRIBUTION CODE: B001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES:PNL 1cy FSAR'S & AMDTS ONLY. 05000410

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	NRR/DL/ADL	1	0	NRR LB2 BC	1	0
	NRR LB2 LA	1	0	HAUGHEY,M 01	1	1
INTERNAL:	ACRS 41	6	6	ADM/LFMB	1	0
	ELD/HDS3	1	0	IE FILE	1	1
	IE/DEPER/EPB 36	1	1	IE/DEPER/IRB 35	1	1
	IE/DQASIP/QAB21	1	1	NRR ROE,M.L	1	1
	NRR/DE/AEAB	1	0	NRR/DE/CEB 11	1	1
	NRR/DE/EHEB	1	1	NRR/DE/EQB 13	2	2
	NRR/DE/GB 28	2	2	NRR/DE/MEB 18	1	1
	NRR/DE/MTEB 17	1	1	NRR/DE/SAB 24	1	1
	NRR/DE/SGEB 25	1	1	NRR/DHFS/HFEB40	1	1
	NRR/DHFS/LQB 32	1	1	NRR/DHFS/PSRB	1	1
	NRR/DL/SSPB	1	0	NRR/DSI/AEB 26	1	1
	NRR/DSI/ASB	1	1	NRR/DSI/CPB 10	1	1
	NRR/DSI/CSB 09	1	1	NRR/DSI/ICSB 16	1	1
	NRR/DSI/METB 12	1	1	NRR/DSI/PSB 19	1	1
	NRR/DSI/RAB 22	1	1	NRR/DSI/RSB 23	1	1
	REG FILE 04	1	1	RGN1	3	3
	RM/DDAMI/MIB	1	0			
EXTERNAL:	BNL(AMDTS ONLY)	1	1	DMB/DSS (AMDTS)	1	1
	FEMA-REP DIV 39	1	1	LPDR 03	1	1
	NRC PDR 02	1	1	NSIC 05	1	1
	NTIS	1	1	PNL GRUEL,R	1	1
NOTES:		1	1			

TOTAL NUMBER OF COPIES REQUIRED: LTTR 55 ENCL 47

[illegible]

[illegible] stated description, [illegible] voltage. Tests will be [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

NIAGARA MOHAWK

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

November 29, 1984
(NMP2L 0260)

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 16.

Very truly yours,

C. V. Mangan
C. V. Mangan
Vice President
Nuclear Engineering & Licensing

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

B001
1/1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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

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.

CV Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 29th day of November, 1984.

Janis M Mauro
Notary Public in and for
Onondaga County, New York

My Commission expires:

JANIS M. MAURO
Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
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.

The degraded voltage relay is set at 3607.76V, which corresponds to 533.69V 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 521.69V at the 600V load terminals, which is 90.07 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

TABLE 8.2-1

MINIMUM VOLTAGES AT VARIOUS EMERGENCY BUSES AND THEIR CONNECTED LOADS UNDER DIFFERENT LOADING CONDITIONS

Item	Required Minimum Voltage (volts)		Actual Voltage Level: Reserve Transformer 106.07% (122.0 kV)→95% (109.25 kV)		Auxiliary Boiler Transformer 106.07% (122.0 kV) →95% (109.25 kV)		Diesel Generator 100% (4.16 kV)→ 94.26% (3.921 kV)		Remarks
	Steady-State	Transient	Steady-State	Transient	Steady-State	Transient	Steady-State	Transient	
1. 4.16 kV Bus									
SWG101, light load[5]	-	-	4112	-	4396	-	4160	-	
SWG101, max load[6]	-	-	4256	3628	3852	3664	3941	3328	
SWG101, partial load[7]	-	-	4012	-	3836	-	-	-	
SWG102, light load[5]			4112	-	Not Applicable		See FSAR Sec. 8.3.1.1.2		SWG102 can be energized only from reserve xfmr or HPCS diesel generator.
SWG102, max load[6]			4256	3628					
SWG102, partial load[7]			4012	-					
SWG103, light load[5]	-	-	4112	-	4396	-	4160	-	
SWG103, max load[6]	-	-	4256	3628	3780	3448	3941	3328	
SWG103, partial load[7]	-	-	4012	-	3852	3664	-	-	
2. 4.16 kV Load	3600	3200							
SWG101, light load[5]			4092	-	4376	-	4160	-	
SWG101, max. load[6]			4236	3568	3832	3604	3921	3268[1]	
SWG101, partial load[7]			3992	-	3816	-	-	>3268	
SWG102			Same as Above		Not Applicable		See FSAR Sec. 8.3.1.1.2		
SWG103			Same as Above		Same as Above		Same as Above		
3. 600-V Load Centers US1 and US3	-	-							
Light load[8]	-	-	638	-	559	-	615[2]	-	SWG102 does not have any load center.
Max load[9]			541.5	500	513	-	529.5	477	
Normal load[10]			-	511	525	485	>529.5	489	

TABLE 8.2-1 (Cont)

Item	Required Minimum Voltage (volts) Steady-State	Required Minimum Voltage (volts) Transient	Actual Voltage Level: Reserve Transformer 106.07% (122.0 kV)→95% (109.25 kV) Steady-State	Reserve Transformer Transient	Auxiliary Boiler Transformer 106.07% (122.0 kV)→95% (109.25 kV) Steady-State	Auxiliary Boiler Transformer Transient	Diesel Generator 100% (4.16 kV)→94.26% (3.921 kV) Steady-State	Diesel Generator Transient	Remarks
4. 600-V Load (motors connected directly to load centers)	517.5	460							
Light load[8]			626	-	547	-	603	-	
Max load[9]			529.5	482	501	-	517.5	461	
Normal load[10]			-	493	513	468	>517.5	472	
5. 600-V Motor Control Centers MCC101, 102, 103, 301, 302 and 303	-	-							
Light load[11]			534	-	555	-	611(3)	-	
Max load[11]			537.5	500(4)	509	-	525.5(3)		516
Normal load[11]			-	511(4)	521	485	>525.5(3)		527
MCC201					Not Applicable				SWS102 can be energized only from reserve xfmr or from HPCS diesel generator.
Light load[11]			638	-			614	-	
Max load[11]			576	560			577	558	
Normal load[11]			579	563			-	561	
6. 600-V Load (motors Connected to MCC)	517.5	460							
Light load[11]			626	-	547	-	603	-	
Max load[11]			529.5	482(4)	501	-	517.5	496	
Normal load[11]			-	493(4)	513	468(4)	>517.5	507	
MCC 201					Not Applicable				
Light load[11]			626	-			602	-	
Max load[11]			564	548			565	546	
Normal load[11]			567	551			-	549	

TABLE 8.2-1 (Cont)

Item	Required Minimum Voltage (volts) Steady-State	Required Minimum Voltage (volts) Transient	Reserve Transformer 106.07% (122.0 kV)→95% (109.25 kV) Steady-State	Reserve Transformer Transient	Auxiliary Boiler Transformer 106.07% (122.0 kV) →95% (109.25 kV) Steady-State	Auxiliary Boiler Transformer Transient	Diesel Generator 100% (4.16 kV)→ 94.26% (3.921 kV) Steady-State	Diesel Generator Transient	Remarks
			Actual Voltage Level						
7. 120-V AC loads									
Main plant computer	110		All 600-V cables feeding 600-120/208-V transformers and 120-V cables are sized to ensure the minimum voltages for each load terminal, assuming the minimum voltage (477 V; worst condition during motor starting condition, refer to Item 3) at the 600-V load center bus.						
Other computers	105								
Isolator	100								
MOV and SOV	96								
Starter	77								
Heater	-								
Light	-								
Motors (90% of motor nameplate voltage)	106								
8. 125-V DC Loads									
MOV and SOV	101		All 125-V dc cables are sized to maintain at least the minimum voltages at the 125-V load terminals, assuming the battery terminal voltage is 105-V for Divisions I and II and 12.5-V for Division III.						

NOTES:

1 The computer program assumes a 20-V drop from the 13.8-kV and/or 4.16-kV switchgear to the connected load during the steady-state condition and a 60-V drop during the motor starting condition (transient).

2 $V_2 = 4.16\ kV\ (\frac{600 V}{4.056 kV}) = 615V$; 4.056 kV is the tap voltage.

3 The computer program assumes a 12-V drop from 600-V load centers to connected loads during the steady-state condition. For motor control center loads, it is assumed that this voltage drop (12-V) is divided as follows: 4-V drop from the load center to the MCC, and 8-V drop from the MCC to connected loads. However, for MCC feeders with longer cable lengths, the voltage drops from 600-V load centers to the MCC and from the MCC to the motors are redistributed within the framework of the total voltage drop limitation of 12-V.

4 The starting voltage drop at motor terminal, MCC, and load center is dependent upon the cable size and length (cable impedance) and motor hp. Since the load center feeds motor loads from >50 to 200 hp and the MCC feeds motor loads from 1/2 to 50 hp, it is assumed that the transient volt drop at the MCC or motor terminals is equal to the worst case when starting the largest motor on the load center (180 hp).

5. Light load indicates very lightly loaded 4.16-kV bus (2.6 MVA or less) and very lightly loaded 13.8kV bus (1 MVA). The load tap changer for the reserve station service transformer adjusts according to the load on the 13.8-kV bus. For the auxiliary boiler transformer, the tap changer is set at the center tap (115kV).

6. Maximum load indicates maximum load on the 4.16-kV as well as 13.8-kV buses (for reserve station service transformer, 57.8 MVA on 13.8-kV bus and 8.7 MVA on 4.16-kV bus; for auxiliary boiler transformer, 12 MVA on 13.8-kV bus and 5.5 MVA on 4.16-kV bus).

7. Partial load indicates very heavily loaded 4.16-kV bus and very lightly loaded 13.8-kV bus (for reserve station service transformer, 8.7 MVA on 4.16-kV bus and 1 MVA on 13.8-kV bus; for auxiliary boiler transformer 5.5 MVA on 4.16-kV and 1 MVA on 13.8-kV). Since the load tap changer on the reserve station service transformer adjusts according to the load on the 13.8-kV bus, the 4.16-kV buses experience worst voltage under this condition.

8. Light load for the 600V load centers indicates lightly loaded load center bus (100 KVA running load); the voltage on the 4.16-kV bus is assumed to be the lowest (3832V at load center transformer primary side).

9. Maximum load for the 600V load center indicates maximum load on the load center bus (2025 KVA running load); the voltage on the 4.16 KV bus is assumed to be the lowest (3832V at load center transformer primary side).

10. Normal load for the 600V load centers indicates that only the loads which are energized during normal plant operation are on the 600V load center bus (estimated 1600 KVA; the load center transformer is rated for 1500/2025 KVA and the actual load is about 1200 KVA); the voltage on the 4.16-kV bus is assumed to be the lowest.

11. Light load, maximum load and normal load on the MCC's indicate light loading, maximum loading and normal loading conditions, respectively of the MCC bus; all these conditions assume the lowest voltage on the 600V load center it is fed from.