

ENGINEERING OFFICE

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June 30, 1980

B.3.2.1 WMY 80-100

United States Nuclear Regulatory Commission Washington, D.C. 20555

Attention: Robert A. Clark, Chief Operating Reactors Branch #3 Division of Licensing

Reference: (1) License No. DPR-36 (Docket No. 50-309)

- (2) USNRC Letter to MYAPC, dated May 6, 1980
- (3) MYAPC Letter to USNRC dated February 29, 1980
- (4) YAEC #1204 "Auxiliary Power System Voltage Study for
- Maine Yankee Atomic Power Station" dated February 28, 1980
- (5) USNRC Letter to All Power Reactors, dated August 8, 1979
- (6) MYAPC Letter to USNRC dated September 16, 1876

Subject: Request for Additional Information on Adequacy of Station Electric Distribution System Voltages

Dear Sir:

As required in reference (2) we are providing additional information regarding the adequacy of the station electrical distribution system voltages at Maine Yankee. The seven items below correspond to the seven questions of reference (2).

#### 1. Question

Reference (3) states that the computer program analysis was compared to the model of the station auxiliary power system. Comparing a computer analysis to a system model does not verify that the analysis correctly indicates the actual plant bus and load voltages. MYAPC should submit test procedures and verify the accuracy of the analyses per the NRC requirements.

#### Response

8007030225

Our statements in references (3) and (4) apparently require clarification. Reference (3) should not be interpreted to imply that the computer program analysis was compared to the model of the station auxiliary power system. It was our intent that Reference (3) state that the analysis was verified by "using our computer program and our model of the station auxiliary power system to predict bus voltages for actual plant conditions."

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We have not compared the computer program analysis to a system model. We have taken readings of voltages and loads at Maine Yankee and inputted the load readings to the computer model. The resulting calculated voltages were compared in Table 5.1 of reference (4) to voltages reading from Maine Yankee. We trust this clarification satisfies your concern.

### 2. Question

Supply the calculated voltages for all low voltage ac (less than 480 V) Class IE buses (including alternate sources) for each analyzed case. Do these systems supply any instruments or control circuits as required by GDC 13? If so, is all the equipment capable of sustaining the analyzed voltages without blowing of fuses, overheating, etc., and without affecting the equipment's ability to perform the required function?

### Response

The four Class lE 120 volt vital instrument buses are shown in the attached Figure 1. Each bus is fed directly from a 120 volt inverter. The inverter voltage is regulated to 120 V ac  $\pm 2\%$ .

Each inverter is normally powered by the station battery - battery charger. The battery charger requires 460 volts ±10% to operate successfully. Reference (4) demonstrates that adequate voltage is supplied by the station auxiliary power system to operate the battery chargers. If the battery chargers are not operable the inverters are supplied by the station batteries. There are no other ties from the station auxiliary power system to the Class 1E 120 volt buses. There are no other buses that supply 120 volt ac safety related instrument and control loads.

### 3. Question

The assumption that the reactor coolant pumps can be manually tripped is not permitted per the NRC guidelines. Therefore, MYAPC should provide a new analysis.

### Response

We have repeated Case 3 of report YAEC #1204 and submit revised tables 3.3 and 4.3 as attachment 2. Note that tables 3.1, 3.2, 4.1, and 4.2 of YAEC #1204 are not affected because the auxiliary power system study did <u>not</u> assume that the reactor coolant pumps are tripped while the safeguards motors are starting.

### 4. Question

Assumptions that the maximum and minimum grid voltages [sections 3.3.3.b and 3.3.2.g of reference (4)] are both 120 kV is not consistent with reference (6). This letter states that 117 kV has been the minimum voltage on the grid and that 124 kV has been the maximum. Per guideline of 6 reference (5), the reference (6) grid voltage values should be used in the MYAPC analysis.

### Response

The reference (6) grid voltage values are based on actual readings of

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voltmeters at the Maine Yankee 115 kV switchyard. The voltages used in reference (4) are based on the latest system load flow studies of the grid and therefore reflect a more realistic and accurate model of the power system than available using the values of reference (6). Furthermore, it was not our intent that reference (4) assume that the maximum and minimum voltages both equal 120 kV as stated in your question 4. We believe that reference (4), section 3.3.3.b and 3.3.2.g stated that voltage at Mason and Surowic station is controlled at 120 kV. Examination of tables 4.1 through 4.4 of reference (4) shows that node #1 voltage (115 kV switchyard at Maine Yankee) is 117 kV, 115.8 kV, 117.7 kV and 120 kV respectively. We, therefore, feel that the values in tables 4.1, 4.2 and 4.3 are consistent with the statements in reference (6). Even if the 120 kV voltage in table 4.4 is increased to 124 kV the voltages at all loads are well within the allowable voltages. We trust this clarification satisfies your concern.

### 5. Question

NRC guideline requires a separate analysis for each source of off-site power, including unit auxiliary transformer, to the Class IE buses. The analysis should include the following sources of power:

- (a) 22 kV source through transformer X24;
- (b) 115 kV source through tertiary winding of transformer X16 unless there is an LCO for this source in the technical specifications.

#### Response

- (a) An analysis for the 22 kV source through transformer X24 is provided in Attachment 3.
- (b) An analysis for the 115 kV source through the tertiary winding of transformer X16 is not being provided. Transformer X16 is a wye-wye transformer and requires a tertiary for circulating zero sequence current. A tertiary of 4.16 kV was selected and the tertiary was connected to one safety bus only as a further precaution in the event of loss of X14 and one diesel generator. No credit is taken for this connection in order to meet the requirements of GDC 17 as it is both above and beyond the requirements of GDC 17.

#### 6. Question

Per the NRC guideline, reference (3), the study should include starting of a large non-safety load when all Class IE loads are operating.

#### Response

The required analysis is included in Attachment 3.

### 7. Question

What are the 480 volt and lower equipment terminal voltages when starting the largest 480 V class LE load while all other Class LE equipment is operating?

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### Response

The required analysis is included in Attachment 3.

We trust this information is satisfactory; however, should you desire additional information, please contact us.

Very truly yours,

MAINE YANKEE ATOMIC POWER COMPANY

R. H. Groce Senior Engineer - Licensing

PRJ/kaf

Attachments

Attachment 1

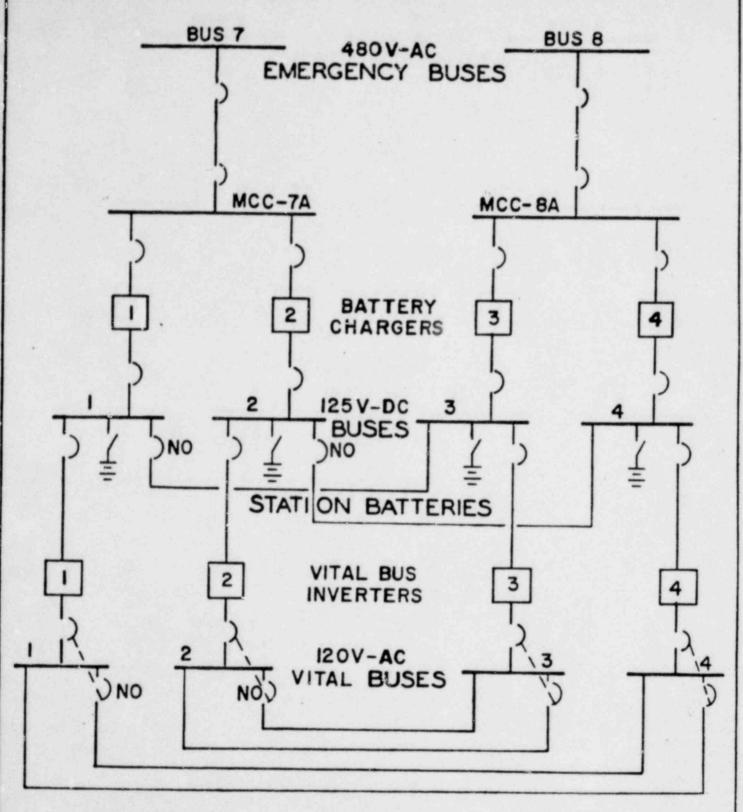


FIG. 1 ONE LINE DIAGRAM-125-DC BUSES AND 120V-AC VITAL BUSES MAINE YANKEE ATOMIC POWER COMPANY

REVISED DECEMBER 1970

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### Table 3.3

## Loading Assumptions - Case 3

Conditions: Maximum Load Reserve Station Service Transformer Carrying Auxiliary Loads Node Steady-State

Node No.*	Description	Steady	
	Description	Load	ing
1	115 kV Switchyard		
61	6.9 kV Buses 1 and 2	39,600	kVA
31	4.16 kV Bus 3	5,500	kVA
3	4.16 kV Bus 5		
41	4.16 kV Bus 4	4,200	kVA
4	4.16 kV Bus 6		
5	Charging Pump P-14A	800	hp
6	Primary Component Cooling Water Pump P-9A	350	
7	Containment Spray Pump P-61A	350	hp
9	Low Pressure Safety Injection Pump P-12A	400	hp
10	Low Pressure Safety Injection Pump P-12B	400	
11	Secondary Comp. Cooling Wtr. Pump P-10B	350	hp
12	Containment Spray Pump P-61B	350	hp
14	Charging Pump P-14B	800	hp
15	480 Volt Bus 7	250	hp
16	480 Volt Bus 8	375	hp
17	Service Water Pump P-29A	250	hp
18	Service Water Pump P-29B	250	hp
19	480 Volt MCC 7A	340	kVA
20	480 Volt MCC 7B	13	kVA
21	480 Volt MCC 8B	13	kVA
22	480 Volt MCC 8A	213	kVA
24	480 Volt MCC 7B1	25	kVA
25	HCV-271		
26	480 Volt MCC 8B1	50	kVA
27	Containment Air Compressor C-5B	7.5	hp
28	Control Air Compressor C-1A	75	hp
29	Spray Pump Room Exhaust Fan FN-44A	25	hp
30	Spray Pump Room Exhaust Fan FN-44B	25	hp

\* See Figure 3.1

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### Table 4.3

## Bus and Equipment Terminal Voltages - Case 3

Conditions: Maximum Load

Reserve Station Service Transformer Carrying Auxiliary Loads

			Allowable Voltage Range
Node		Volt age	(volts)
No.*	Description	(volts)	(Table 2.1)
		(10200)	VIII III IIII
1	115 kV Switchyard	116,500	
61	6.9 kV Buses 1 and 2		
31	4.16 kV Bus 3	3839	
3	4.16 kV Bus 5	3839	
41	4.16 kV Bus 4	3839	
4	4.16 kV Bus 6	3839	
5	Charging Pump P-14A	3833	4400-3600
6	Primary Comp. Cooling Wtr. Pump P-9A	3836	4400-3600
7	Containment Spray Pump P-61A	3831	4400-3600
9	Low Pressure Safety Injection Pump P-12A	3831	4400-3600
10	Low Pressure Safety Injection Pump P-12B	3830	4400-3600
11	Secondary Comp. Cooling Wtr. Pump P-10B	3835	4400-3600
12	Containment Spray Pump P-61B	3832	4400-3600
14	Charging Pump P-14B	3834	4400-3600
15	480 Volt Bus 7	432	
16	480 Volt Bus 8	430	
17	Service Water Pump P-29A	421	506-414
18	Service Water Pump P-29B	420	506-414
19	480 Volt MCC 7A	430	506-414
20	480 Volt MCC 7B	430	506-414
21	480 Volt MCC 8B	427	506-414
22	480 Vol: MCC 8A	428	506-414
24	480 Volt MCC 7B1	428	506-414
25	HCV-271		
26	480 Volt MCC 8B1	425	506-414
27	Containment Air Compressor C-5B	425	506-414
28	Control Air Compressor C-1A	416	506-414
29	Spray Pump Room Exhaust Fan FN-44A	425	506-414
30	Spray Pump Room Exhaust Fan FN-44B	422	506-414

\* See Figure 3.1

### ADDITIONAL ANALYSIS FOR MAINE YANKEE ATOMIC POWER COMPANY

# 1. Analysis for 22 kV Source Through the Unit Station Service Transformer

The source through the unit station service transformer is a delayed access source which is available through removal of the generator links. Because this source is delayed access and is available only when the generator is off-line, we assume that the following loads are shed prior to connection:

- a) condensate pumps
- b) heater drain pumps
- c) circulating water pumps

The analysis is based on the 345 kV system maximum and minimum voltage limits of 362 kV and 345 kV respectively.

Four studies were performed for the analysis of the 22 kV source. The first two studies present the voltages for the maximum load and minimum load studies. The loading and voltages for the maximum load study are shown in Table 3-1-A. The loading and voltages for the minimum load study are shown in Table 3-1-B.

The maximum load study demonstrates the capability to operate all safeguard loads through the unit station service transformer without exceeding the minimum allowable voltage. The minimum load study demonstrates that with light load the maximum allowable voltage is not exceeded at any bus.

Two additional studies were performed - the start of a large non-safety 4 kV load and the start of the largest 480 volt class lE load. These studies are discussed below.

## 2. Analysis for Start of Large Non-Safety Load

As required, we have performed studies of the start of a large non-safety load from both the reserve station service transformer and the unit station service transformer. We have studied the start of a 2500 hp, 4000 volt condensate pump. The 8000 hp, 6600 volt reactor coolant pump is the largest load at Maine Yankee but the start of the 4000 volt condensate pump would have a more direct effect on the 4160 volt safety buses.

The analysis assumes that the following loads have been shed prior to the start of the condensate pump.

- a. condensate pumps
- b. heater drains pump
- c. circulating water pump

The loading assumptions are provided in Table 3-2-A.

The analysis results are provided in Table 3-2-B for the start of the condensate pump through both the reserve station service transformer and

the unit station service transformer. The results indicate that during the start of the condensate pump no undervoltage relays will operate and no 480 volt contactors will drop out; furthermore, the voltage at the 4 kV buses and 480 volt buses may drop to slightly lower than the voltage required for continuous operation. This voltage dip is transitory (lasting only during the start of the condensate pump) and it will not affect the successful operation of the safety-related loads. The voltage at the condensate pump terminals may drop to approximately 3585 volts or 89.6% of reled. It can be shown that the condensate pump will accelerate under thes conditions.

## 3. Analysis for Start of Largest 480 V Class 1E Load

As required, we have performed studies of the start of the largest 480 volt Class 1E load, the 250 hp station service water pump. The loading assumptions for this analyses are provided in Table 3-3-A.

The analysis results are provided in Table 3-3-B for the start of the station service water pump through both the reserve station service transformer and the unit station service transformer. The results indicate that the terminal voltage at the station service water pump could drop to 379 volts, 82.5% of rated voltage. It can be shown that the service water pump motor will accelerate its load at this voltage. The results indicate that no 480 volt contactors drop out during this starting transient and no undervoltage relays are actuated.

The voltages for equipment on the Class 1E 120 volt buses are not affected by the start of the service water pump. Please refer to our response to Question 2.

### Table 3-1-A

### Maximum Load Study

Conditions: Unit Station Service Transformer Carrying Auxiliary Load Maximum Load

Steady-State Voltage Node (volts) Loading Description No. 345 kV 2 345 kV Switchyard 39,600 kVA ---6.9 kV Buses 1 and 2 61 4039 1,475 kVA 4.16 kV Bus 3 31 4039 4.16 kV Bus 5 1,200 kVA 3 4.16 kV Bus 4 4039 41 4039 4 4.16 kV Bus 6 4033 5 Charging Pump P-14A 800 hp 4036 6 Primary Component Cooling Water Pump P-9A 350 hp 7 350 4030 Containment Spray Pump P-61A hp 9 4031 400 Low Pressure Safety Injection Pump P-12A hp 4030 10 Low Pressure Safety Injection Pump P-12B 400 hp Secondary Comp. Cooling Wtr. Pump P-10B 4035 11 350 hp 4031 350 hp 12 Containment Spray Pump P-61B 4034 14 Charging Pump P-14B 800 hp 15 480 Volt Bus 7 250 455 hp 454 480 Volt Bus 8 16 375 hp 17 Service Water Pump P-29A 250 445 hp 250 hp 18 Service Water Pump P-29B 445 19 480 Volt MCC 7A 454 340 kVA 20 480 Volt MCC 7B 13 kVA 453 13 kVA 451 21 480 Volt MCC 8B 452 213 kVA 22 480 Volt MCC 8A 452 24 480 Volt MCC 7B1 25 kVA 453 25 HCV-271 449 50 kVA 26 480 Volt MCC 8B1 447 7.5 hp 27 Containment Air Compressor C-5B 441 28 Control Air Compressor C-1A 75 hp 29 449 Spray Pump Room Exhaust Fan FN-44A 25 hp 25 hp 446 Spray Pump Room Exhaust Fan FN-44B 30

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## Table 3-1-B

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## Minimum Load Study

Conditions: Unit Station Service Transformer Carrying Auxiliary Load Minimum Load

No.         Description         Loading         (voltg)           1         345 kV Switchyard         362 kV           61         6.9 kV Buses 1 and 2         362 kV           31         4.16 kV Bus 3         335 kVA         4329           3         4.16 kV Bus 4         335 kVA         4329           4         4.16 kV Bus 5         335 kVA         4329           4         4.16 kV Bus 6         335 kVA         4329           5         Charging Pump P-14A         6         4329           6         Primary Component Cooling Water Pump P-9A         350 hp         4329           7         Containment Spray Pump P-61A         350 hp         4329           9         Low Pressure Safety Injection Pump P-12A         10 kVA         498           10         Low Pressure Safety Injection Pump P-10B         350 hp         4329           11         Secondary Comp. Cooling Wtr. Pump P-10B         350 hp         4329           12         Containment Spray Pump P-61B         10 kVA         498           14         Charging Pump P-14B         10 kVA         498           15         480 Volt MCC 7A         10 kVA         498           16         480 Volt MCC 7B         110 k	Node		Steady-State	Volt age
61       6.9 kV Buses 1 and 2       11         31       4.16 kV Bus 3       235 kVA       4329         3       4.16 kV Bus 5       335 kVA       4329         4       4.16 kV Bus 4       329       4329         4       4.16 kV Bus 6       4329         5       Charging Pump P-14A       4329         6       Primary Component Cooling Water Pump P-9A       350 hp       4329         7       Containment Spray Pump P-61A       350 hp       4329         9       Low Pressure Safety Injection Pump P-12A       10       400 Pressure Safety Injection Pump P-10B       350 hp       4329         12       Containment Spray Pump P-61B       100 kVA       498       498         14       Charging Pump P-14B       110 kVA       498         15       480 Volt Bus 8       110 kVA       498         16       480 Volt MCC 7A       480 Volt MCC 7B       480 Volt MCC 7B         21       480 Volt MCC 7B       480 Volt MCC 7B       480 Volt MCC 7B         22       480 Volt MCC 7B       480 Volt MCC 7B       480 Volt MCC 7B         23       480 Volt MCC 8B       22       480 Volt MCC 8B       23         23       480 Volt MCC 8B1       27       26 </td <td>No.</td> <td>Description</td> <td></td> <td></td>	No.	Description		
61       6.9 kV Buses 1 and 2       11         31       4.16 kV Bus 3       235 kVA       4329         3       4.16 kV Bus 5       335 kVA       4329         4       4.16 kV Bus 4       329       4329         4       4.16 kV Bus 6       4329         5       Charging Pump P-14A       4329         6       Primary Component Cooling Water Pump P-9A       350 hp       4329         7       Containment Spray Pump P-61A       350 hp       4329         9       Low Pressure Safety Injection Pump P-12A       10       400 Pressure Safety Injection Pump P-10B       350 hp       4329         12       Containment Spray Pump P-61B       100 kVA       498       498         14       Charging Pump P-14B       110 kVA       498         15       480 Volt Bus 8       110 kVA       498         16       480 Volt MCC 7A       480 Volt MCC 7B       480 Volt MCC 7B         21       480 Volt MCC 7B       480 Volt MCC 7B       480 Volt MCC 7B         22       480 Volt MCC 7B       480 Volt MCC 7B       480 Volt MCC 7B         23       480 Volt MCC 8B       22       480 Volt MCC 8B       23         23       480 Volt MCC 8B1       27       26 </td <td>1</td> <td>345 kV Switchvard</td> <td></td> <td>362 14</td>	1	345 kV Switchvard		362 14
31       4.16 kV Bus 3       335 kVA       4329         3       4.16 kV Bus 5       335 kVA       4329         4       4.16 kV Bus 4       4329         4       4.16 kV Bus 6       335 kVA       4329         5       Charging Pump P-14A       4329       4329         6       Primary Component Cooling Water Pump P-9A       350 hp       4329         7       Containment Spray Pump P-61A       350 hp       4329         9       Low Pressure Safety Injection Pump P-12A       10       4329         10       Low Pressure Safety Injection Pump P-12B       350 hp       4329         11       Secondary Comp. Cooling Wtr. Pump P-10B       350 hp       4329         12       Containment Spray Pump P-61B       100 kVA       498         14       Charging Pump P-14B       100 kVA       498         15       480 Volt Bus 7       110 kVA       498         16       480 Volt Bus 8       110 kVA       498         17       Service Water Pump P-29A       100 kVA       498         18       Service Water Pump P-29B       480 Volt MCC 7A       480 Volt MCC 7B         21       480 Volt MCC 7B       480 Volt MCC 7B1       480 Volt MCC 7B1       480 Volt MCC	61			
414.16 kV Bus 4432944.16 kV Bus 643295Charging Pump P-14A43296Primary Component Cooling Water Pump P-9A350 hp43297Containment Spray Pump P-61A43299Low Pressure Safety Injection Pump P-12A432910Low Pressure Safety Injection Pump P-12B350 hp432911Secondary Comp. Cooling Wtr. Pump P-10B350 hp432912Containment Spray Pump P-61B480 Volt Bus 7110 kVA49816480 Volt Bus 8110 kVA49816480 Volt Bus 8110 kVA49817Service Water Pump P-29A10 kVA49819480 Volt MCC 7A480 Volt MCC 7B480 Volt MCC 7B21480 Volt MCC 7A480 Volt MCC 7B480 Volt MCC 7B22480 Volt MCC 8A480 Volt MCC 7B1480 Volt MCC 8B23480 Volt MCC 8B480 Volt MCC 7B1480 Volt MCC 8B124480 Volt MCC 8B17725480 Volt MCC 8B17726480 Volt MCC 8B17480 Volt MCC 8B127Containment Air Compressor C-5B5	31		335 kVA	
414.16 kV Bus 4432944.16 kV Bus 643295Charging Pump P-14A43296Primary Component Cooling Water Pump P-9A350 hp7Containment Spray Pump P-61A43299Low Pressure Safety Injection Pump P-12A400 Volte Safety Injection Pump P-12B10Low Pressure Safety Injection Pump P-10B350 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B110 kVA14Charging Pump P-14B110 kVA15480 Volt Bus 7110 kVA16480 Volt Bus 8110 kVA17Service Water Pump P-29A18Service Water Pump P-29B19480 Volt MCC 7A20480 Volt MCC 7B21480 Volt MCC 7B22480 Volt MCC 8A23480 Volt MCC 7B124480 Volt MCC 8B25HCV-27126480 Volt MCC 8B127Containment Air Compressor C-5B	3	4.16 kV Bus 5	335 kVA	4329
44.16 kV Bus 643295Charging Pump P-14A43296Primary Component Cooling Water Pump P-9A350 hp43297Containment Spray Pump P-61A350 hp43299Low Pressure Safety Injection Pump P-12A10Low Pressure Safety Injection Pump P-12B10Low Pressure Safety Injection Pump P-10B350 hp432912Containment Spray Pump P-61B350 hp432914Charging Pump P-14B110 kVA49815480 Volt Bus 8110 kVA49816480 Volt Bus 8110 kVA49817Service Water Pump P-29A100 kVA49818Service Water Pump P-29B110 kVA49822480 Volt MCC 7A480 Volt MCC 7B110 kVC23480 Volt MCC 7B1480 Volt MCC 7B1150 kVC24480 Volt MCC 8B1100 kVC110 kVC25HCV-271110 kVC811	41	4.16 kV Bus 4	JJJJ KIM	
6Primary Component Cooling Water Pump P-9A350 hp43297Containment Spray Pump P-61A350 hp43299Low Pressure Safety Injection Pump P-12A10Low Pressure Safety Injection Pump P-12B11Secondary Comp. Cooling Wtr. Pump P-10B350 hp432912Containment Spray Pump P-61B350 hp432914Charging Pump P-14B10 kVA49815480 Volt Bus 7110 kVA49816480 Volt Bus 8110 kVA49817Service Water Pump P-29A100 kVA49818Service Water Pump P-29B110 kVA49819480 Volt MCC 7A480 Volt MCC 7B110 kVC21480 Volt MCC 7B110 kVC8822480 Volt MCC 8A480 Volt MCC 8B23480 Volt MCC 8A480 Volt MCC 8B24480 Volt MCC 8B1110 kVC25HCV-271110 kVC26480 Volt MCC 8B1110 kVC27Containment Air Compressor C-5B110 kVC	4	4.16 kV Bus 6		
7Containment Spray Pump P-61ASof Mp43299Low Pressure Safety Injection Pump P-12A10Low Pressure Safety Injection Pump P-12B11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B14Charging Pump P-14B15480 Volt Bus 7110 kVA16480 Volt Bus 8110 kVA17Service Water Pump P-29A18Service Water Pump P-29B19480 Volt MCC 7A20480 Volt MCC 7B21480 Volt MCC 7B22480 Volt MCC 7B125HCV-27126480 Volt MCC 8B127Containment Air Compressor C-5B		Charging Pump P-14A		
<ul> <li>Containment Spray Pump P-61A</li> <li>Low Pressure Safety Injection Pump P-12A</li> <li>Low Pressure Safety Injection Pump P-12B</li> <li>Secondary Comp. Cooling Wtr. Pump P-10B</li> <li>Secondary Comp. Cooling Wtr. Pump P-10B</li> <li>Containment Spray Pump P-61B</li> <li>Charging Pump P-14B</li> <li>Charging Pump P-14B</li> <li>480 Volt Bus 7</li> <li>110 kVA</li> <li>498</li> <li>480 Volt Bus 8</li> <li>Service Water Pump P-29A</li> <li>Service Water Pump P-29B</li> <li>480 Volt MCC 7A</li> <li>480 Volt MCC 7B</li> <li>480 Volt MCC 7B</li> <li>480 Volt MCC 7B1</li> <li>HCV-271</li> <li>480 Volt MCC 8B1</li> <li>Containment Air Compressor C-5B</li> </ul>		Primary Component Cooling Water Pump P-9A	350 hp	4329
10Low Pressure Safety Injection Pump P-12B11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B14Charging Pump P-14B15480 Volt Bus 7110 kVA16480 Volt Bus 8110 kVA17Service Water Pump P-29A18Service Water Pump P-29B19480 Volt MCC 7A20480 Volt MCC 7B21480 Volt MCC 7B22480 Volt MCC 8B22480 Volt MCC 7B125HCV-27126480 Volt MCC 8B127Containment Air Compressor C-5B	7	Containment Spray Pump P-61A		
10Low Pressure Safety Injection Pump P-12B11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B14Charging Pump P-14B15480 Volt Bus 7110 kVA16480 Volt Bus 8110 kVA17Service Water Pump P-29A18Service Water Pump P-29B19480 Volt MCC 7A20480 Volt MCC 7B21480 Volt MCC 8B22480 Volt MCC 7B123HCV-27126480 Volt MCC 8B127Containment Air Compressor C-5B		Low Pressure Safety Injection Pump P-12A		
11       Secondary Comp. Cooling Wtr. Pump P-10B       350 hp       4329         12       Containment Spray Pump P-61B       12       12       12         14       Charging Pump P-14B       110 kVA       498         15       480 Volt Bus 7       110 kVA       498         16       480 Volt Bus 8       110 kVA       498         17       Service Water Pump P-29A       110 kVA       498         18       Service Water Pump P-29B       110 kVA       498         19       480 Volt MCC 7A       480 Volt MCC 7B       110 kVA       498         22       480 Volt MCC 7B       110 kVA       498         23       480 Volt MCC 8B       12       480 Volt MCC 8B       110 kVA         24       480 Volt MCC 8B       110 kVA       498       110 kVA         25       HCV-271       110 kVA       110 kVA       110 kVA         26       480 Volt MCC 8B1       110 kVA       110 kVA       110 kVA         26       480 Volt MCC 8B1       110 kVA       110 kVA       110 kVA         27       Containment Air Compressor C-5B       110 kVA       110 kVA       110 kVA		Low Pressure Safety Injection Pump P-12B		
14       Charging Pump P-14B         15       480 Volt Bus 7         16       480 Volt Bus 8         17       Service Water Pump P-29A         18       Service Water Pump P-29B         19       480 Volt MCC 7A         20       480 Volt MCC 7B         21       480 Volt MCC 8B         22       480 Volt MCC 8B         23       480 Volt MCC 7B         24       480 Volt MCC 7B         25       HCV-271         26       480 Volt MCC 8B1         27       Containment Air Compressor C-5B	11	Secondary Comp. Cooling Wtr. Pump P-10B	350 hp	4329
14       Charging Pump P-14B         15       480 Volt Bus 7         16       480 Volt Bus 8         17       Service Water Pump P-29A         18       Service Water Pump P-29B         19       480 Volt MCC 7A         20       480 Volt MCC 7B         21       480 Volt MCC 8B         22       480 Volt MCC 8B         23       480 Volt MCC 8B         24       480 Volt MCC 7B1         25       HCV-271         26       480 Volt MCC 8B1         27       Containment Air Compressor C-5B	12	Containment Spray Pump P-61B		
16       480 Volt Bus 8       110 KVA       498         17       Service Water Pump P-29A       110 kVA       498         18       Service Water Pump P-29B       110 kVA       498         19       480 Volt MCC 7A       480 Volt MCC 7B       480 Volt MCC 8B         21       480 Volt MCC 8B       110 kVA       498         22       480 Volt MCC 8B       110 kVA       498         23       480 Volt MCC 8B       110 kVA       498         24       480 Volt MCC 8A       480 Volt MCC 7B1       110 kVA       498         25       HCV-271       10 kVA       498       110 kVA       498         26       480 Volt MCC 8B1       110 kVA       498       110 kVA       498         26       480 Volt MCC 8B1       110 kVA       498       110 kVA       498         27       Containment Air Compressor C-58       110 kVA       498       110 kVA       498		Charging Pump P-14B		
17       Service Water Pump P-29A         18       Service Water Pump P-29B         19       480 Volt MCC 7A         20       480 Volt MCC 7B         21       480 Volt MCC 8B         22       480 Volt MCC 8A         24       480 Volt MCC 7B1         25       HCV-271         26       480 Volt MCC 8B1         27       Containment Air Compressor C-5B	15	480 Volt Bus 7	110 kVA	498
<ul> <li>17 Service Water Pump P-29A</li> <li>18 Service Water Pump P-29B</li> <li>19 480 Volt MCC 7A</li> <li>20 480 Volt MCC 7B</li> <li>21 480 Volt MCC 8B</li> <li>22 480 Volt MCC 8A</li> <li>24 480 Volt MCC 7B1</li> <li>25 HCV-271</li> <li>26 480 Volt MCC 8B1</li> <li>27 Containment Air Compressor C-5B</li> </ul>		480 Volt Bus 8	110 kVA	498
19       480 Volt MCC 7A         20       480 Volt MCC 7B         21       480 Volt MCC 8B         22       480 Volt MCC 8A         24       480 Volt MCC 7B1         25       HCV-271         26       480 Volt MCC 8B1         27       Containment Air Compressor C-5B				170
20       480 Volt MCC 7B         21       480 Volt MCC 8B         22       480 Volt MCC 8A         24       480 Volt MCC 7B1         25       HCV-271         26       480 Volt MCC 8B1         27       Containment Air Compressor C-5B	18	Service Water Pump P-29B		
21 480 Volt MCC 8B 22 480 Volt MCC 8A 24 480 Volt MCC 7B1 25 HCV-271 26 480 Volt MCC 8B1 27 Containment Air Compressor C-5B	the set of			
22 480 Volt MCC 8A 24 480 Volt MCC 7B1 25 HCV-271 26 480 Volt MCC 8B1 27 Containment Air Compressor C-5B				
<pre>24 480 Volt MCC 7B1 25 HCV-271 26 480 Volt MCC 8B1 27 Containment Air Compressor C-5B</pre>	21	480 Volt MCC 8B		
25 HCV-271 26 480 Volt MCC 8B1 27 Containment Air Compressor C-5B	22	480 Volt MCC 8A		
26 480 Volt MCC 8B1 27 Containment Air Compressor C-5B	24	480 Volt MCC 7B1		
27 Containment Air Compressor C-5B	25	HCV-271		
27 Containment Air Compressor C-5B		480 Volt MCC 8B1		
		Containment Air Compressor C-5B		
	28			
29 Spray Pump Room Exhaust Fan FN-44A	and the second se			
30 Spray Pump Room Exhaust Fan FN-44B	30	Spray Pump Room Exhaust Fan FN-44B		

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## Table 3-2-A

## Loading Assumptions

Conditions: Start Condensate Pump

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Node No.	Description	Steady-State Loading		Starting Load	
2	345 kV Switchyard				
1	115 kV Switchyard				
61	6.9 kV Buses 1 and 2	39,600	kVA		
31	4.16 kV Bus 3	1,475		2500	hp
3	4.16 kV Bus 5				
41	4.16 kV Bus 4	1200	kVA		
4	4.16 kV Bus 6				
5	Charging Pump P-14A	800	hp		
6	Primary Component Cooling Water Pump P-9A	350	hp		
7	Containment Spray Pump P-61A	350	hp		
9	Low Pressure Safety Injection Pump P-12A	400	hp		
1	Low Pressure Safety Injection Pump P-12B	400			
11	Secondary Comp. Cooling Wtr. Pump P-10B	350	hp		
12	Containment Spray Pump P-61B	350	hp		
14	Charging Pump P-14B	800	hp		
15	480 Volt Bus 7	250	hp		
16	480 Volt Bus 8	375	hp		
17	Service Water Pump P-29A	250	hp		
18	Service Water Pump P-29B	250	hp		
19	480 Volt MCC 7A	340	kVA		
20	480 Volt MCC 7B		kVA		
21	480 Volt MCC 8B	13	kVA		
22	480 Volt MCC 8A				
24	480 Volt MCC 7B1		kVA		
25	HCV-271	25	kVA		
26	480 Volt MCC 8B1		kVA		
27	Containment Air Compressor C-5B	7.5	hp		
28	Control Air Compressor C-1A	75	hp		
29	Spray Pump Room Exhaust Fan FN-44A	25	hp		
30	Spray Pump Room Exhaus: Fan FN-44B	25	hp		

## Table 3-2-B

# Bus and Equipment Terminal Voltages

Conditions: Start Condensate Pump

		Voltage		
		Reserve Station		
Node		Service XFMR	Service XFMR	
No.	Description	Source	Source	
2	345 kV Switchyard		345 kV	
1	115 kV Switchyard	115.9 kV		
61	6.9 kV Buses 1 and 2			
31	4.16 kV Bus 3	3598	3690	
3	4.16 kV Bus 5	3598	3690	
41	4.16 kV Bus 4	3598	3692	
4	4.16 kV BUs 6	3598	3692	
5	Charging Pump P-14A	3593	3685	
6	Primary Comp. Cooling Wtr Pump P-9A	3595	3687	
7	Containment Spray Pump P-61A	3500	36 82	
9	Low Pressure Safety Injection Pump P-12A	3590	36 82	
10	Low Pressure Safety Injection Pump P-12B	3590	3683	
11	Secondary Comp. Cooling Wtr. Pump P-10B	3595	3688	
12	Containment Spray Pump P-61B	3592	3685	
14	Charging Pump P-14B	3594	3687	
15	480 Volt Bus 7	405	416	
16	480 Volt Bus δ	404	415	
17	Service Water Pump P-29A	394	405	
18	Service Water Pump P-29B	394	406	
19	480 Volt MCC 7A	403	414	
20	480 Volt MCC 7B	403	414	
21	480 Volt MCC 8B	401	412	
22	480 Volt MCC 8A	402	413	
24	480 Volt MCC 7B1	402	413	
25	HCV-271	400	414	
26	480 Volt MCC 8B1	399	410	
27	Containment Air Compressor C-5B	397	408	
28	Control Air Compressors C-1A	390	402	
29	Spray Pump Room Exhaust Fan FN-44A	399	410	
30	Spray Pump Room Exhaust Fan FN-44B	396	407	

## Table 3-3-A

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## Loading Assumptions

NodeSteady-StateStartingNo.DescriptionLoadingLoad2345 kV Switchyard1115 kV Switchyard1115 kV Switchyard39,600 kVA314.16 kV Buss 1 and 239,600 kVA314.16 kV Bus 51,475 kVA34.16 kV Bus 51,200 kVA44.16 kV Bus 615Charging Pump P-14A800 hp6Primary Comp. Cooling Wtr. Pump P-9A350 hp7Containment Spray Pump P-61A350 hp10Low Pressure Safety Injection Pump P-12B400 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B350 hp14Charging Pump P-14B800 hp15480 Volt Bus 7250 hp16480 Volt Bus 8375 hp17Service Water Pump P-29A250 hp18Service Water Pump P-29B250 hp19480 Volt MCC 7A340 kVA21480 Volt MCC 7B13 kVA22480 Volt MCC 7B25 kVA23HCV-27125 kVA24480 Volt MCC 88150 kVA25HCV-27175 hp26480 Volt MCC 88150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp30Spray Pump Room Exhaust Fan FN-44B25 hp		Conditions: Start Service Water Pump			
2         345 kV Switchyard         10300           1         115 kV Switchyard         1         115 kV Switchyard           61         6.9 kV Buses 1 and 2         39,600 kVA           31         4.16 kV Bus 3         1,475 kVA           3         4.16 kV Bus 5         1,475 kVA           3         4.16 kV Bus 4         1,200 kVA           4         4.16 kV Bus 5         1,200 kVA           4         4.16 kV Bus 6         800 hp           5         Charging Pump P-14A         800 hp           6         Primary Comp. Cooling Wtr. Pump P-9A         350 hp           7         Containment Spray Pump P-61A         350 hp           9         Low Pressure Safety Injection Pump P-12A         400 hp           11         Secondary Comp. Cooling Wtr. Pump P-12B         350 hp           12         Containment Spray Pump P-61B         350 hp           14         Charging Pump P-14B         800 hp           15         480 Volt Bus 8         375 hp           16         480 Volt Bus 8         375 hp           17         Service Water Pump P-29A         250 hp           18         Service Water Pump P-29A         250 hp           18         Service Water Safett		Departation			
1       115 kV Switchyard         61       6.9 kV Buses 1 and 2       39,600 kVA         31       4.16 kV Bus 3       1,475 kVA         3       4.16 kV Bus 5       1,475 kVA         3       4.16 kV Bus 5       1,200 kVA         4       4.16 kV Bus 6       1,200 kVA         5       Charging Pump P-14A       800 hp         6       Primary Comp. Cooling Wtr. Pump P-9A       350 hp         7       Containment Spray Pump P-61A       350 hp         9       Low Pressure Safety Injection Pump P-12A       400 hp         10       Low Pressure Safety Injection Pump P-10B       350 hp         11       Secondary Comp. Cooling Wtr. Pump P-10B       350 hp         12       Containment Spray Pump P-61B       350 hp         14       Charging Pump P-14B       800 hp         15       480 Volt Bus 8       375 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29A       250 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         21       480 Volt MCC 7B       13 kVA         22       480 Volt MCC 7B1       25 kVA		Description	<u>L</u>	oading	Load
1       115 kV Switchyard         61       6.9 kV Buses 1 and 2       39,600 kVA         31       4.16 kV Bus 3       1,475 kVA         3       4.16 kV Bus 4       1,200 kVA         4       4.16 kV Bus 4       1,200 kVA         4       4.16 kV Bus 6       1,200 kVA         5       Charging Pump P-14A       800 hp         6       Primary Comp. Cooling Wtr. Pump P-9A       350 hp         7       Containment Spray Pump P-61A       350 hp         9       Low Pressure Safety Injection Pump P-12B       400 hp         10       Low Pressure Safety Injection Pump P-10B       350 hp         11       Secondary Comp. Cooling Wtr. Pump P-10B       350 hp         12       Containment Spray Pump P-61B       350 hp         14       Charging Pump P-14B       800 hp         15       480 Volt Bus 7       250 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29A       250 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         21       480 Volt MCC 7B       13 kVA         22       480 Volt MCC 7B1       25 kVA	2	345 kV Switchyard			
61       6.9 kV Buses 1 and 2       39,600 kVA         31       4.16 kV Bus 3       1,475 kVA         3       4.16 kV Bus 5       1,200 kVA         4       4.16 kV Bus 4       1,200 kVA         4       4.16 kV Bus 5       1,200 kVA         4       4.16 kV Bus 6       1,200 kVA         5       Charging Pump P-14A       800 hp         6       Primary Comp. Cooling Wtr. Pump P-9A       350 hp         7       Containment Spray Pump P-61A       350 hp         10       Low Pressure Safety Injection Pump P-12B       400 hp         11       Secondary Comp. Cooling Wtr. Pump P-10B       350 hp         12       Containment Spray Pump P-61B       350 hp         14       Charging Pump P-14B       800 hp         15       480 Volt Bus 7       250 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29B       250 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 7B1       25 kVA         22       480 Volt MCC 881       50 kVA	1				
31       4.16 kV Bus 3       1,475 kVA         3       4.16 kV Bus 5       1,200 kVA         4       4.16 kV Bus 4       1,200 kVA         4       4.16 kV Bus 6       1,200 kVA         5       Charging Pump P-14A       800 hp         6       Primary Comp. Cooling Wtr. Pump P-9A       350 hp         7       Containment Spray Pump P-61A       350 hp         9       Low Pressure Safety Injection Pump P-12B       400 hp         10       Low Pressure Safety Injection Pump P-12B       400 hp         11       Secondary Comp. Cooling Wtr. Pump P-10B       350 hp         12       Containment Spray Pump P-61B       350 hp         14       Charging Pump P-14B       800 hp         15       480 Volt Bus 7       250 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29B       250 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         21       480 Volt MCC 7B       13 kVA         22       480 Volt MCC 88       213 kVA         23       HCV-271       25 kVA         24       480 Volt MCC 881       50 kVA <tr< td=""><td></td><td></td><td>39,600</td><td>kVA</td><td></td></tr<>			39,600	kVA	
414.16 kV Bus 41,200 kVA44.16 kV Bus 61,200 kVA5Charging Pump P-14A800 hp6Primary Comp. Cooling Wtr. Pump P-9A350 hp7Containment Spray Pump P-61A350 hp9Low Pressure Safety Injection Pump P-12B400 hp10Low Pressure Safety Injection Pump P-10B350 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B350 hp14Charging Pump P-14B800 hp15480 Volt Bus 7250 hp16480 Volt Bus 8375 hp17Service Water Pump P-29B250 hp18Service Water Pump P-29B250 hp19480 Volt MCC 7A340 kVA21480 Volt MCC 7B13 kVA22480 Volt MCC 7B125 kVA23HCV-27125 kVA26480 Volt MCC 88150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	31	4.16 kV Bus 3			
44.16 kV Bus 65Charging Pump P-14A800 hp6Primary Comp. Cooling Wtr. Pump P-9A350 hp7Containment Spray Pump P-61A350 hp9Low Pressure Safety Injection Pump P-12A400 hp10Low Pressure Safety Injection Pump P-12B400 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B350 hp14Charging Pump P-14B800 hp15480 Volt Bus 7250 hp16480 Volt Bus 8375 hp17Service Water Pump P-29A250 hp18Service Water Pump P-29B250 hp19480 Volt MCC 7A340 kVA21480 Volt MCC 7B13 kVA22480 Volt MCC 7B125 kVA24480 Volt MCC 7B125 kVA25HCV-2712626480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp					
44.16 kV Bus 65Charging Pump P-14A Primary Comp. Cooling Wtr. Pump P-9A Containment Spray Pump P-61A800 hp 350 hp9Low Pressure Safety Injection Pump P-12A Low Pressure Safety Injection Pump P-12B Secondary Comp. Cooling Wtr. Pump P-10B Secondary Comp. Cooling Wtr. Pump P-10B Boo hp350 hp12Containment Spray Pump P-61B Charging Pump P-14B 480 Volt Bus 7350 hp14Charging Pump P-14B 800 hp350 hp15480 Volt Bus 8 Service Water Pump P-29A 8 Service Water Pump P-29B375 hp19480 Volt MCC 7A 480 Volt MCC 7B 1480 Volt MCC 7B 1480 Volt MCC 7B 15480 Volt MCC 7B 16480 Volt MCC 7B 175 hp250 hp22480 Volt MCC 7B 480 Volt MCC 7B 15480 Volt MCC 8A 16480 Volt MCC 7B 175 hp250 kVA23480 Volt MCC 8A 13 kVA213 kVA 25 kVA24480 Volt MCC 8B1 15 kVO 2550 kVA 75 hp25Spray Pump Room Exhaust Fan FN-44A25 hp			1,200	kVA	
6Primary Comp. Cooling Wtr. Pump P-9A350 hp7Containment Spray Pump P-61A350 hp9Low Pressure Safety Injection Pump P-12B400 hp10Low Pressure Safety Injection Pump P-12B400 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B350 hp14Charging Pump P-14B800 hp15480 Volt Bus 8375 hp16480 Volt Bus 8375 hp17Service Water Pump P-29B250 hp18Service Water Pump P-29B13 kVA20480 Volt MCC 7A340 kVA21480 Volt MCC 7B13 kVA22480 Volt MCC 8A213 kVA24480 Volt MCC 7B125 kVA25HCV-2712526480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	4	4.16 kV Bus 6			
6Primary Comp. Cooling Wtr. Pump P-9A Containment Spray Pump P-61A350 hp7Containment Spray Pump P-61A350 hp9Low Pressure Safety Injection Pump P-12B Low Pressure Safety Injection Pump P-12B Secondary Comp. Cooling Wtr. Pump P-10B400 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B Charging Pump P-14B 480 Volt Bus 7350 hp15480 Volt Bus 8 Service Water Pump P-29A Service Water Pump P-29B375 hp16480 Volt MCC 7A 480 Volt MCC 7B 21 480 Volt MCC 7B 21 480 Volt MCC 8B340 kVA 13 kVA22480 Volt MCC 8A 480 Volt MCC 7B1 HCV-271213 kVA 25 kVA26480 Volt MCC 8B1 Containment Air Compressor C-5B 850 kVA 7.5 hp29Spray Pump Room Exhaust Fan FN-44A25 hp			800	hp	
9Low Pressure Safety Injection Pump P-12A Low Pressure Safety Injection Pump P-12B Secondary Comp. Cooling Wtr. Pump P-10B400 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B Charging Pump P-14B350 hp14Charging Pump P-14B Charging Pump P-14B800 hp15480 Volt Bus 7250 hp16480 Volt Bus 8 Service Water Pump P-29A Service Water Pump P-29B375 hp19480 Volt MCC 7A 480 Volt MCC 7B 13 kVA340 kVA 13 kVA21480 Volt MCC 8B 13 kVA13 kVA22480 Volt MCC 7B1 480 Volt MCC 7B1 5 HCV-271250 kVA26480 Volt MCC 8B1 Containment Air Compressor C-5B Control Air Compressor C-1A50 kVA 75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp		Primary Comp. Cooling Wtr. Pump P-9A	350		
10Low Pressure Safety Injection Pump F-12B400 hp11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B350 hp14Charging Pump P-14B800 hp15480 Volt Bus 7250 hp16480 Volt Bus 8375 hp17Service Water Pump P-29A250 hp18Service Water Pump P-29B250 hp19480 Volt MCC 7A340 kVA20480 Volt MCC 7B13 kVA21480 Volt MCC 8B13 kVA22480 Volt MCC 7B125 kVA23HCV-27125 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	7	Containment Spray Pump P-61A	350	hp	
11Secondary Comp. Cooling Wtr. Pump P-10B350 hp12Containment Spray Pump P-61B350 hp14Charging Pump P-14B800 hp15480 Volt Bus 7250 hp16480 Volt Bus 8375 hp17Service Water Pump P-29A250 hp18Service Water Pump P-29B250 hp19480 Volt MCC 7A340 kVA20480 Volt MCC 7B13 kVA21480 Volt MCC 8B13 kVA22480 Volt MCC 7B125 kVA24480 Volt MCC 7B125 kVA25HCV-27126 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp		Low Pressure Safety Injection Pump P-12A	400	hp	
12       Containment Spray Pump P-61B       350 hp         14       Charging Pump P-14B       800 hp         15       480 Volt Bus 7       250 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29A       250 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 7B1       25 kVA         23       HCV-271       25 kVA         26       480 Volt MCC 8B1       50 kVA         27       Containment Air Compressor C-5B       7.5 hp         28       Control Air Compressor C-1A       75 hp		Low Pressure Safety Injection Pump P-12B	400	hp	
14       Charging Pump P-14B       300 hp         15       480 Volt Bus 7       250 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29A       375 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 8A       213 kVA         24       480 Volt MCC 7B1       25 kVA         25       HCV-271       50 kVA         26       480 Volt MCC 8B1       50 kVA         27       Containment Air Compressor C-5B       7.5 hp         28       Control Air Compressor C-1A       75 hp         29       Spray Pump Room Exhaust Fan FN-44A       25 hp	11	Secondary Comp. Cooling Wtr. Pump P-10B	350	hp	
15       480 Volt Bus 7       250 hp         16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29A       375 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 8A       213 kVA         24       480 Volt MCC 7B1       25 kVA         25       HCV-271       25 kVA         26       480 Volt MCC 8B1       50 kVA         27       Containment Air Compressor C-5B       7.5 hp         28       Control Air Compressor C-1A       75 hp         29       Spray Pump Room Exhaust Fan FN-44A       25 hp		Containment Spray Pump P-61B	350	hp	
16       480 Volt Bus 8       375 hp         17       Service Water Pump P-29A       375 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 8B       13 kVA         24       480 Volt MCC 7B1       25 kVA         25       HCV-271       25 kVA         26       480 Volt MCC 8B1       50 kVA         27       Containment Air Compressor C-5B       7.5 hp         28       Control Air Compressor C-1A       75 hp         29       Spray Pump Room Exhaust Fan FN-44A       25 hp			800	hp	
17Service Water Pump P-29A250 hp18Service Water Pump P-29B250 hp19480 Volt MCC 7A340 kVA20480 Volt MCC 7B13 kVA21480 Volt MCC 8B13 kVA22480 Volt MCC 8A213 kVA24480 Volt MCC 7B125 kVA25HCV-27125 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	15	480 Volt Bus 7	250	hp	
17       Service Water Pump P-29A       250 hp         18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 7B1       25 kVA         24       480 Volt MCC 7B1       25 kVA         25       HCV-271       25 kVA         26       480 Volt MCC 8B1       50 kVA         27       Containment Air Compressor C-5B       7.5 hp         28       Control Air Compressor C-1A       75 hp         29       Spray Pump Room Exhaust Fan FN-44A       25 hp		480 Volt Bus 8	375	hp	
18       Service Water Pump P-29B       250 hp         19       480 Volt MCC 7A       340 kVA         20       480 Volt MCC 7B       13 kVA         21       480 Volt MCC 8B       13 kVA         22       480 Volt MCC 8A       213 kVA         24       480 Volt MCC 7B1       25 kVA         25       HCV-271       25 kVA         26       480 Volt MCC 8B1       50 kVA         27       Containment Air Compressor C-5B       7.5 hp         28       Control Air Compressor C-1A       75 hp         29       Spray Pump Room Exhaust Fan FN-44A       25 hp		Service Water Pump P-29A			250 hp
20480 Volt MCC 7B13 kVA21480 Volt MCC 8B13 kVA22480 Volt MCC 8A213 kVA24480 Volt MCC 7B125 kVA25HCV-27125 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	18	Service Water Pump P-29B	250	hp	
21480 Volt MCC 8B13 kVA22480 Volt MCC 8A213 kVA24480 Volt MCC 7B125 kVA25HCV-27125 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp			340	kVA	
22480 Volt MCC 8A213 kVA24480 Volt MCC 7B125 kVA25HCV-27125 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp			13	kVA	
24480 Volt MCC 7B1215 kVA25HCV-27125 kVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	21	480 Volt MCC 8B	13	kVA	
25HCV-27125KVA26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp		480 Volt MCC 8A	213	kVA	
26480 Volt MCC 8B150 kVA27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp			25	kVA	
27Containment Air Compressor C-5B7.5 hp28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp	25	HCV-271			
27Containment Air Compressor C-5B7.5hp28Control Air Compressor C-1A75hp29Spray Pump Room Exhaust Fan FN-44A25hp			50	kVA	
28Control Air Compressor C-1A75 hp29Spray Pump Room Exhaust Fan FN-44A25 hp		Containment Air Compressor C-5B	7.5	np	
and the second s	28				
3.0		Spray Pump Room Exhaust Fan FN-44A	25	hp	
	30	Spray Pump Room Exhaust Fan FN-44B			

### Table 3-3-B

## Bus and Equipment Terminal Voltages

## Conditions: Start Service Water Pump

		Voltage	
		Reserve Station	Unit Station
Node		Service XFMR	Service XFMR
No.	Description	Source	Source
2	345 kV Switchyard		345 kV
1	115 kV Switchyard	116.9 kV	
61	6.9 kV Buses 1 and 2		
31	4.16 kV Bus 3	3910	3989
3	4.16 kV Bus 5	3910	3989
41	4.16 kV Bus 4	3910	3989
4	4.16 kV Bus 6	3910	3989
5	Charging Pump P-14A	3904	39 84
6	Primary Comp. Cooling Wtr. Pump P-9A	3907	3986
7	Containment Spray Pump P-61A	3902	39 81
9	Low Pressure Safety Injection Pump P-12A	3901	39 81
10	Low Pressure Safety Injection Pump P-128		3981
11	Secondary Comp. Cooling Wtr. Pump P-10B	3906	3986
12	Containment Spray Pump P-61B	3902	39 82
14	Charging Pump P-14B	3905	39 84
15	480 Volt Bus 7	408	417
16	480 Volt Bus 8	439	449
17	Service Water Pump P-29A	379	387
18	Service Water Pump P-29B	429	4 39
19	480 Volt MCC 7A	407	415
20	480 Volt MCC 7B	406	415
21	480 Volt MCC 8B	435	445
22	480 Volt MCC 8A	437	447
24	480 Volt MCC 7B1	405	413
25	HCV-271	403	415
26	480 Volt MCC 8B1	433	443
27	Containment Air Compressor C-5B	432	442
28	Control Air Compressor C-1A	425	435
29	Spray Pump Room Exhaust Fan FN-44A	402	411
30	Spray Pump Room Exhaust Fan FN-44B	431	440