CAROLINA POWER & LIGHT COMPANY

Brunswick Steam Electric Plant

Units 1 & 2

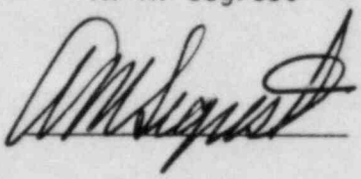
Low Voltage (208/120 Volt)
Electrical Distribution System Study

Safety Classification: Nuclear Safety Related (Q List)

Seismic Classification: N/A

Project Manager

A. M. Segrest



Revision 1

July, 1984

DUKE POWER | MATS

01077 (R11-82)

Form 101.1 Rev. 7

CERTIFICATION OF ENGINEERING CALCULATION

Station and Unit Number: Brunswick Steam Electric Plant, Units 1 & 2

Title of Calculation: Low Voltage (208/120 Volt) Electrical Distribution System Study

Calculation Number: MTS-2076-1808.04-00-0001 (Nuclear Safety Related (Q List))

Originally consisting of Pages: 1A through 14; A1 through A113; B1 through B24; 1.1 through 1.106.

These Engineering Calculations cover QA CONDITION 1 items. In accordance with established procedures, the quality has been assured and I certify that the above calculation has been performed, checked or approved as noted below: Seismic Classification - Not Applicable

Performed by: Craig R Cuevas — Date: June 7, 1984

Checked by: S. Chhak — Date: June 7, 1984

Approved by: D M Clark — Date: June 7, 1984

Issued to General Services Division: _____ — Date: _____

Received by General Services Division: _____ — Date: _____

Revision/Addenda Log:

No.	Pages Revised	Pages Deleted	Pages Added	Performed By / Date	Checked By / Date	Approved By / Date	Issue Date / Rec'd Date
1	See Page 1b	---	1b & 1c of 14	CRCuevas 7-27-84	S.Chhak 7-27-84	DM Clark 7-27-84	

Form 101.2 Revision 0
26164 (12-82)

Performed by: CRC 7-27-8
Checked by: SC 7-27-81

Calculation No. MTS-2076-
1808.04-00-0001

REVISION DOCUMENTATION SHEET

REVISION NUMBER	REVISION DESCRIPTION
1	U.E. & C. revised the 1X-LOCA load data for Panel 31A (Circuit 8) and Panel 32B (Circuit 14) from 1621 VA to 353 VA. Minor changes are noted on the following pages: Page 4 of 14 Page 9 of 14 Page 12 of 14 Page 13 of 14 Page A40 of 113 Page A99 of 113 Page B10 of 24 Page B18 of 24 Page 1.3 of 106 Page 1.49 of 106 Page 1.98 of 106

Performed by: CRC 7-27-84
Checked by: SC 7-27-84

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 & 2

LOW VOLTAGE (208/120 VOLT) ELECTRICAL DISTRIBUTION SYSTEM

DESIGN ENGINEERING CALCULATION NO. MTS-2076-1808.04-00-001

This is to certify that I, Aldean Benge, have reviewed the above calculation, which was developed under my direction, and find it to be complete and in conformance with generally accepted engineering practice.

Signature: Aldean Benge

Name: Aldean Benge
Registered Professional Engineer

PE No. NC 6509

Date: 7/26/84

Performed By: CRC 6-7-84
Checked By: SC 6-7-84

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Performed By: CRC 6-7-84
Checked By: SC 6-7-84

1.0 PURPOSE

The purpose of this study was to perform the electrical distribution system analyses for Carolina Power & Light (CP&L) Company's Brunswick Steam Electric Plant (BSEP), Units 1 and 2, as required to demonstrate the adequacy of the 208/120 VAC system to supply safety system loads. The objectives of this study were achieved by:

- Identifying voltage requirements (limits) at the load terminals.
- Defining modes of plant operation requiring analysis in order to demonstrate electrical distribution system adequacy.
- Modeling and analyzing the distribution system in order to determine distribution panel bus and load terminal voltages for each mode of operation.
- Comparing computed voltage values with the load requirements.

The above scope of work was performed by Duke Power Company as part of Request for Services Number 12 to the North Carolina Technical Services Agreement with CP&L.

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2.0 SUMMARY

In its present configuration, the BSEP 208/120 VAC Distribution System provides acceptable voltage levels to all but three 120 VAC single phase circuits for both LOCA Run and Shutdown modes of operation. These three loads have terminal voltages which, under LOCA Run conditions, fall outside the range specified by study criteria. Cable additions and resizing recommendations are provided in Section 8.0 which will solve these problems . More detailed analyses of the actual load may show these terminal voltages to be within acceptance criteria. If so, no cable modifications would be necessary.

In addition, a slight overvoltage condition exists on certain panels during light load (Shutdown) periods. A tap change of the transformers feeding these panels is recommended, even though this overvoltage condition does not jeopardize the ability of this system to meet its design function.

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3.0 METHOD OF ANALYSIS

3.1 MODES OF OPERATION ANALYZED

The 208/120 VAC system was analyzed for LOCA Run and Shutdown modes of operation. The LOCA Run mode represented the steady state condition after a LOCA with the safety loads running. The LOCA Run mode was selected in order to demonstrate the capability of the 208/120 VAC loads to operate with the minimum expected source voltage. The Shutdown mode represented the unit with minimum expected auxiliary load. This case was developed in order to demonstrate that the 208/120 VAC system voltage would be within equipment ratings with the source voltage at the maximum expected value.

3.2 COMPUTER PROGRAMS

The Auxiliary System Design Optimization Program (ASDOP) was used to compute voltages at the 208/120 VAC distribution panel buses. The distribution system was modeled considering the 480 VAC bus supplying the 208/120 VAC system as the source. Impedances of the 480 VAC feeder cable, 480/208/120 VAC transformer and 208/120 VAC feeder cable from the transformer were included in the model. The 208/120 VAC loads were modeled as lumped static (constant impedance) loads at each distribution panel.

3.3 HAND CALCULATIONS

The voltage at the terminals of selected loads was determined by hand calculations. The hand calculations were performed as follows:

- Load impedance was computed using the load KVA and load voltage rating.
- The load terminal voltage was computed by voltage division using the distribution panel voltage, feeder cable impedance and the load impedance.

For the LOCA Run condition, relay or solenoid circuits on each panel were selected for analysis for each of the criteria below:

- Longest cable supplying a single phase load.
- Maximum load on a single phase circuit.
- Single phase loads with cable length more than 50% of the longest cable and load more than 50% of the largest load.

During the Light Load (Shutdown) condition, calculations to determine load terminal voltage were not necessary when the distribution panel bus voltage was less than the load maximum rated voltages. If the distribution bus voltage was more than the load maximum rated voltage, then the circuit with the minimum feeder circuit impedance was examined for compliance with the criteria.

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4.0 EQUIPMENT VOLTAGE CRITERIA

The voltage criteria used in this study are as follows:

- The voltage at the load terminal must be maintained at no less than 90% of the device's nominal voltage for the steady state condition after a LOCA on one unit with the other unit shutdown.

- The voltage at the load terminals must not exceed 110% of the device's nominal voltage during a Light Load (Shutdown) condition.

The source voltage was at the minimum expected value for the LOCA Run mode and at the maximum expected value for the Shutdown mode. The single phase loads are rated 115 volts. Thus, the acceptable terminal voltage criteria was 0.90 to 1.10 p.u. on a 115V base or 0.865 to 1.054 p.u. on a 120V base.

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5.0 ASSUMPTIONS

The following assumptions were used in this analysis:

- Load on the 208/120 VAC distribution panels was balanced between phases.
- Operating power factor of solenoid and relay devices was 0.5. This assumption was based on a review of power factors of auxiliary relays which typically have a power factor of 0.5 or greater.
- Power factor of loads other than solenoids and relays was 0.85. This should be conservative since it included resistive heaters and other non-inductive type loads.
- The distribution panel load during shutdown was conservatively assumed to be 0.5 times the normal power operation load.

6.0 SOURCES OF INFORMATION

6 1 LOAD DATA, CABLE IMPEDANCE, AND TRANSFORMER DATA

All load, cable, and transformer data required to perform the study was developed by United Engineers and Contractors (U.E. & C.) for CP&L. The data sheets are included in Attachment I and provide a tabulation of the load for Normal and LOCA Run conditions. The distribution panel load during Light Load (Shutdown) operation was obtained by multiplying the Normal Load value by 0.5.

The cable impedance given on the load tabulation sheets is the impedance of one conductor between the distribution panel and the load. The total impedance of the single phase circuit is two times this value.

All cable impedance calculations by Duke Power Company personnel were performed with the aid of Table 1.20 and adjusted to 90°C using the correction factor provided by U.E. & C. Both Table 1.20 and the temperature correction factor can be found on Sheet 53 of U.E. & C. Calculation #7453-127-3-ED00-01 included in Attachment 1. Calculations for cable impedances not provided by U.E. & C. are included in Appendix B.

Worst case transformer data was used in all cases modeled. For LOCA Run models, the transformer impedance was assumed to be nominal plus the allowable tolerance, thereby producing the maximum voltage drop across the transformer and minimum panel voltage. For Light Load (Shutdown) models, the transformer impedance was assumed to be nominal minus the allowable tolerance, thereby producing the minimum voltage drop across the transformer and maximum panel voltage.

6.2 EQUATIONS AND COMPUTER PROGRAMS

Calculations of voltage at the distribution panels utilized the ASDOP 1 computer program developed by Duke Power Company.

Hand calculations were performed using standard textbook equations which are demonstrated in Appendix B.

7.0 STUDY RESULTS

Calculations were performed for the Shutdown and LOCA Run conditions in order to determine the distribution panel and load terminal voltages. ASDOP one-line models and program inputs and outputs for each case are provided in Appendix A. Hand calculations of load terminal voltage are included in Appendix B.

Initial Shutdown studies indicated a potential overvoltage situation on Unit 2 distribution panels supplied by transformers GF4 and GF6. With these transformers tapped at -2.5% (present tap setting), the voltage at some panels exceeded the overvoltage criterion (105.4% on a 120 VAC base) by as much as 0.80%. This voltage is not great enough to be a major concern since there will be some voltage drop in the cables and the time that the voltage would be at the maximum should be limited. The overvoltage can be easily prevented by changing the transformer taps to nominal. In the calculations, taps on these transformers were changed from -2.5% to nominal in order to resolve the overvoltage situation. Taps on the other 208/120 VAC transformers were not changed. The Shutdown case results for before and after the tap change are included in the ASDOP outputs in Appendix A. For the LOCA Run condition, the ASDOP outputs are also included in Appendix A for the tap change cases.

In the LOCA Run cases, three single phase loads were found to have terminal voltages outside the range specified by study criteria. Voltages at all other loads analyzed met the study criteria. The undervoltage condition at the three loads was caused by a combination of heavy load and long cable runs. In the analysis, this problem was corrected either by paralleling the existing cable with another of the same size or by replacing the original cable with a larger one. Details of the individual circuit modification are included in Table 8-1.

With the tap change and the recommended cable modifications, voltage at the load terminals was above the minimum allowable value (0.90 pu on a 115V base) for the LOCA Run case and below the maximum value (1.10 pu on a 115V base) for the Light Load (Shutdown) case. The results of the modifications are demonstrated by the summary of LOCA Run and Light Load study results in Table 7-1 for Unit 1 and Table 7-2 for Unit 2.

TABLE 7-1
BSEP - Unit #1

208/120 VAC Distribution System Bus and Load Terminal Voltages
(After Implementation of Recommendations)

PANEL	LOCA RUN VOLTAGES[1] (p.u. on a 115V base)			Shutdown Voltages[2] (p.u. on a 115V base)
	Panel Bus	Terminals of Load with Longest Cable	Terminals of Largest Load	Panel Bus
1A-TB	0.9699	0.9690	0.9493	1.0928
31AB	0.9718	0.9641	0.9641	1.0938
1C	0.9718	0.9428	0.9428	1.0938
1A	0.9716	0.9658	0.9508	1.0938
1AB-RX	0.9706	0.9685	0.9696	1.0937
1AB	0.9716	0.9555	0.9634	1.0938
1A-RX	0.9700	0.9671	0.9693	1.0928
1AB-TB	0.9658	0.9619	0.9023	1.0922
1B-TB	0.9712	0.9703	N/A	1.0950
1B-RX	0.9707	0.9694	N/A	1.0948
1D	0.9718	0.9113	N/A	1.0953
1B	0.9715	0.9600	0.9581	1.0951
31A	0.9549	0.9539	0.9543	1.0802
1A-DG	0.9554	0.9547	0.9532	1.0793
31B	0.9548	0.9005	0.9431	1.0863
1B-DG	0.9472	0.9460	0.9444	1.0823

Notes:

1. Acceptance Voltage $\geq$ 0.90 p.u. on a 115V base

2. Acceptance Voltage $\leq$ 1.10 p.u. on a 115V base

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TABLE 7-2
BSEP - Unit #2

208/120 VAC Distribution System Bus and Load Terminal Voltages
(After Implementation of Recommendations)

PANEL	LOCA RUN VOLTAGES[1] (p.u. on a 115V base)			Shutdown Voltages[2] (p.u. on a 115V base)
	Panel Bus	Terminals of Load with Longest Cable	Terminals of Largest Load	Panel Bus
2A-TB	0.9607	0.9526	0.9499	1.0753
32AB	0.9639	0.9632	0.9552	1.0771
2C	0.9640	0.9489	0.9521	1.0771
2A	0.9639	0.9531	0.9431	1.0771
2AB-RX	0.9633	0.9622	N/A	1.0769
2AB	0.9637	0.9509	0.9510	1.0770
2A-RX	0.9632	0.9603	0.9617	1.0768
2AB-TB	0.9634	0.9183	0.9280	1.0783
2B-TB	0.9658	0.9649	N/A	1.0794
2B-RX	0.9654	0.9636	N/A	1.0792
2D	0.9676	0.9303	0.9589	1.0803
2B	0.9674	0.9560	0.9546	1.0802
32A	0.9789	0.9756	0.9785	1.0986
2A-DG	0.9711	0.9682	0.9682	1.0940
32B	0.9697	0.9551	0.9091	1.0971
2B-DG	0.9720	0.9666	0.9686	1.0964

Notes:

1. Acceptance Voltage $\geq$ 0.90 p.u. on a 115V base

2. Acceptance Voltage $\leq$ 1.10 p.u. on a 115V base

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Checked By: SC 7-27-8

8.0 CONCLUSIONS AND RECOMMENDATIONS

A potential for voltages slightly exceeding the voltage criteria exists on the Unit 2 Low Voltage (208/120 VAC) system when a unit is shutdown. Although the voltage is not great enough to present a significant concern, a tap change of transformers GF4 and GF6 from -2.5% to nominal is recommended to correct this situation. In addition, the cable changes shown in Table 8-1 are recommended to alleviate undervoltage conditions during LOCA Run operation unless detailed analysis based on the voltage drop of the individual circuit components show these modifications to be unnecessary. After implementation of these recommendations, adequate voltage should be maintained on the 208/120 VAC safety system during LOCA Run and Shutdown modes of operation.

TABLE 8-1
BSEP UNITS 1 & 2

Recommended Load Feeder Cable Modifications

Panel	Circuit #	Cable	Cable Length (Ft.)	Panel Voltage |Vp| @ 115 VAC (p.u.)	Load |S| (VA)	Load Terminal Voltage $\|V_L\|$ @ 115 VAC (p.u.)
1AB-TB	18	As-built with one #12 cable	908	0.9658	882	0.8398
		Replace with two #12 cables	908	0.9658	882	0.9023
2AB-TB	16	As-built with one #12 cable	648	0.9634	882	0.8732
		Replace with two #12 cables	648	0.9634	882	0.9183
2D	12	As-built with one #12 cable	1961	0.9676	240	0.8929
		Replace with two #12 cables	1961	0.9676	240	0.9303

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9.0 CALCULATION DOCUMENTATION

A. PROBLEM: See Section 1.0

B. RELATIONSHIP TO QA CONDITION: Nuclear Safety Related (QA Condition 1)

C. DESIGN METHODS: ASDOP computer program and standard engineering practices and techniques

D. APPLICABLE CODES AND STANDARDS (Name, Number, Date, Revision): N/A

E. OTHER DESIGN CRITERIA: None

F. RELATED SAR CRITERIA (PSAR or FSAR, Page, Amendment) Updated FSAR dated 7/19/82

G. CALCULATIONS ---------- Appendix B

H. ASSUMPTIONS ---------- Section 5.0

I. REFERENCES ---------- N/A

J. CONCLUSION ---------- Section 8.0

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APPENDIX A

Model One Lines

ASDOP Inputs and Outputs

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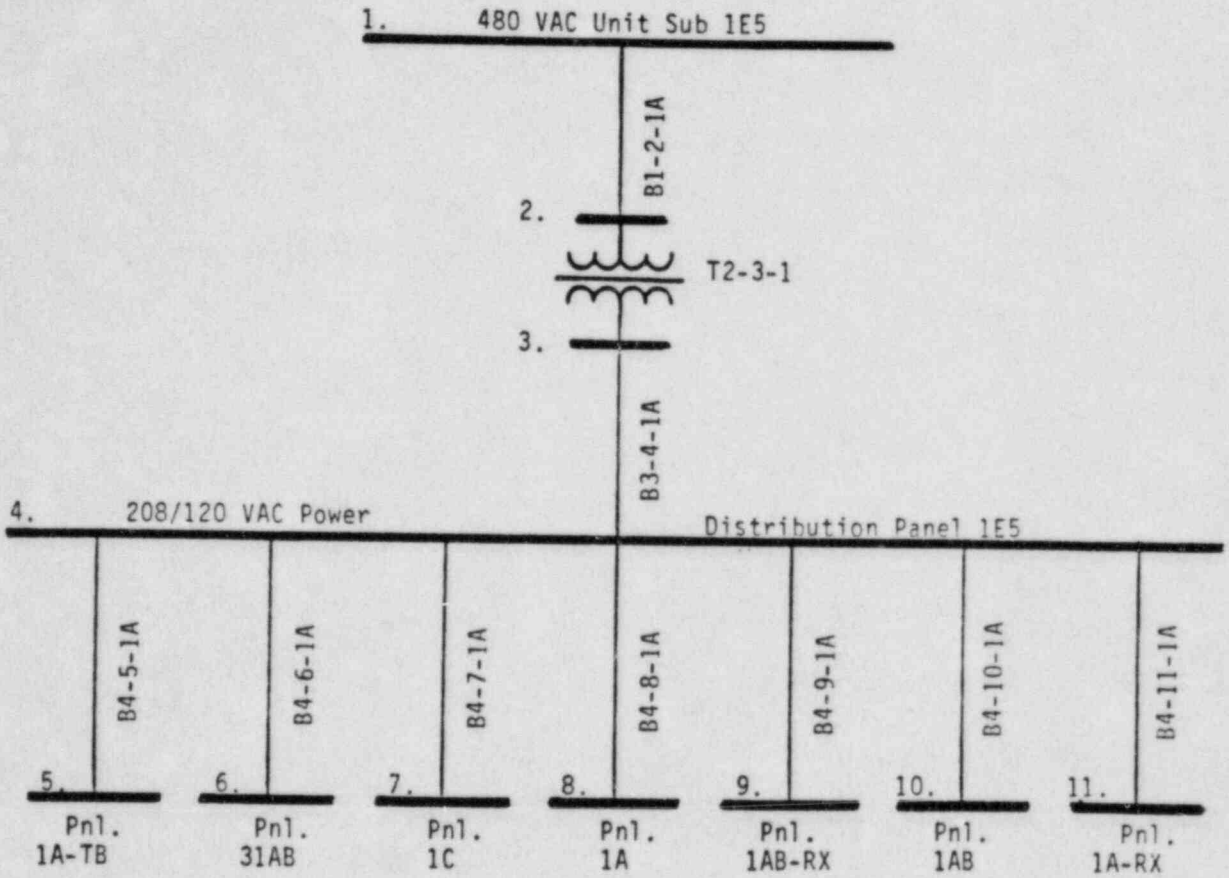
BSEP - Unit #1



ASDOP MODEL #1

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #1
Swgr. 1E5

STATIC LOADS

DATA

INPUT CODE	Rated Voltage	Rated KVA at Rated Voltage	Load Power Factor	Lead or Lag PF	Comments
	KV	KVA	PFL	LEAD/LAG	
L 5-1	.208	3.695	.85	LAG	LIGHTLY LOADED RUN
L-5-2	.208	0.566	.5	LAG	LIGHTLY LOADED RUN
L-6-1	.208	0.288	.85	LAG	LIGHTLY LOADED RUN
L-6-2	.208	0.250	.5	LAG	LIGHTLY LOADED RUN
L-7-1	.208	0.665	.85	LAG	LIGHTLY LOADED RUN
L-7-2	.208	0.090	.5	LAG	LIGHTLY LOADED RUN
L-8-1	.208	1.386	.85	LAG	LIGHTLY LOADED RUN
L-8-2	.208	1.219	.5	LAG	LIGHTLY LOADED RUN
L-9-1	.208	0.406	.85	LAG	LIGHTLY LOADED RUN
L-9-2	.208	0.040	.5	LAG	LIGHTLY LOADED RUN
L-10-1	.208	1.177	.85	LAG	LIGHTLY LOADED RUN
L-10-2	.208	0.780	.5	LAG	LIGHTLY LOADED RUN
L-11-1	.208	1.538	.85	LAG	LIGHTLY LOADED RUN
L-11-2	.208	0.078	.5	LAG	LIGHTLY LOADED RUN

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DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #1
Swgr. 1E5

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0238	0.0259
B3-4-1A	Cable	0.0010	0.0011
B4-5-1A	Cable	0.0051	0.0091
B4-6-1A	Cable	0.0040	0.0072
B4-7-1A	Cable	0.0026	0.0046
B4-8-1A	Cable	0.0021	0.0021
B4-9-1A	Cable	0.0130	0.0231
B4-10-1A	Cable	0.0018	0.0032
B4-11-1A	Cable	0.0130	0.0231

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ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84
CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #1(SWGR 1E5) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 11 NO. OF LINES= 10
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000009 0.000005

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	16.326	13.429	21.140	0.028
2	1	-16.266	-13.375	21.059	0.028
2	3	16.266	13.374	21.058	0.028
3	2	-16.226	-13.262	20.956	0.062
3	4	16.238	13.266	20.968	0.062
4	3	-16.225	-13.255	20.951	0.062
4	5	5.929	4.218	7.276	0.022
4	6	0.419	0.501	0.653	0.002
4	7	0.770	0.788	1.102	0.003
4	8	3.089	3.155	4.415	0.013
4	9	1.521	0.981	1.810	0.005

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Checked by: SC 6-6-84

4	10	2.148	2.084	2.992	0.009
4	11	2.339	1.524	2.792	0.008
5	4	-5.916	-4.211	7.262	0.022
6	4	-0.419	-0.501	0.653	0.002
7	4	-0.770	-0.788	1.102	0.003
8	4	-3.088	-3.154	4.414	0.013
9	4	-1.519	-0.980	1.807	0.005
10	4	-2.147	-2.083	2.992	0.009
11	4	-2.334	-1.521	2.786	0.008

-----BUS DATA-----

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR1E5	0.9168	-10.92	0.480	16.33	13.43	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9133	-10.93	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0004	-0.0004
3	XFMRS	0.9322	-11.10	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0117	0.0043
4	PNL1E5	0.9314	-11.10	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0104	-0.0042
5	PNL1ATB	0.9295	-11.09	0.208	0.00	0.00	0.00	0.00	5.92	4.21	-0.0000	0.0000
6	PNL31AB	0.9313	-11.10	0.208	0.00	0.00	0.00	0.00	0.42	0.50	-0.0000	-0.0001
7	PNL1C	0.9313	-11.10	0.208	0.00	0.00	0.00	0.00	0.77	0.79	-0.0001	0.0003
8	PNL1A	0.9311	-11.10	0.208	0.00	0.00	0.00	0.00	3.09	3.15	-0.0002	0.0004
9	PNL1ABRX	0.9302	-11.10	0.208	0.00	0.00	0.00	0.00	1.52	0.98	-0.0000	0.0000
10	PNL1AB	0.9311	-11.10	0.208	0.00	0.00	0.00	0.00	2.15	2.08	0.0000	-0.0002
11	PNL1ARX	0.9296	-11.09	0.208	0.00	0.00	0.00	0.00	2.33	1.52	0.0000	0.0000

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS		CABLE		BUS			REACTOR OR CAPACITOR		
		--X--	--R--	NO.-SIZE	--FT--	--X/FT--	--R/FT--	--FT--	--X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	2.38E-02	2.59E-02								
B 3- 4- 1A	CAB	1.00E-03	1.10E-03								
B 4- 5- 1A	CAB	5.10E-03	9.10E-03								

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AS-BUILT WITH XFMR TAPPED AT -2.5%

B	4- 6- 1A	CAB	4.00E-03	7.20E-03		
B	4- 7- 1A	CAB	2.60E-03	4.60E-03		
B	4- 8- 1A	CAB	2.10E-03	2.10E-03		
B	4- 9- 1A	CAB	1.30E-02	2.31E-02		
B	4- 10- 1A	CAB	1.80E-03	3.20E-03		
B	4- 11- 1A	CAB	1.30E-02	2.31E-02		

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0333	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	7.39	0.85	LAG
L 0- 5- 2	0.21	1.13	0.50	LAG
L 0- 6- 1	0.21	0.27	0.85	LAG
L 0- 6- 2	0.21	0.50	0.50	LAG
L 0- 7- 1	0.21	0.66	0.85	LAG
L 0- 7- 2	0.21	0.65	0.50	LAG
L 0- 8- 1	0.21	2.68	0.85	LAG
L 0- 8- 2	0.21	2.57	0.50	LAG
L 0- 9- 1	0.21	2.02	0.85	LAG
L 0- 9- 2	0.21	0.08	0.50	LAG
L 0- 10- 1	0.21	2.00	0.85	LAG
L 0- 10- 2	0.21	1.56	0.50	LAG
L 0- 11- 1	0.21	3.09	0.85	LAG
L 0- 11- 2	0.21	0.15	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84
CRC 5-10-84
[illegible]

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #1(SWGR 1E5) LIGHTLY LOADED CASE WITH SWYD VO=1.017

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 11 NO. OF LINES= 10
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000001 0.000007

SUMMARY OF TAPS

FROM-BUS	TO-BUS	ZTAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	10.242	8.225	13.136	0.015
2	1	-10.224	-8.208	13.111	0.015
2	3	10.219	8.203	13.104	0.015
3	2	-10.209	-8.174	13.078	0.035
3	4	10.233	8.181	13.102	0.035
4	3	-10.229	-8.178	13.096	0.035
4	5	3.759	2.675	4.614	0.012
4	6	0.406	0.404	0.573	0.002
4	7	0.668	0.469	0.816	0.002
4	8	1.965	1.962	2.777	0.007
4	9	0.401	0.273	0.485	0.001

4	10	1.527	1.423	2.087	0.006
4	11	1.478	0.964	1.764	0.005
5	4	-3.755	-2.672	4.609	0.012
6	4	-0.406	-0.404	0.573	0.002
7	4	-0.667	-0.469	0.816	0.002
8	4	-1.965	-1.962	2.777	0.007
9	4	-0.401	-0.273	0.485	0.001
10	4	-1.527	-1.423	2.087	0.006
11	4	-1.477	-0.963	1.763	0.005

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR1E5	1.0266	-4.81	0.480	10.24	8.22	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0246	-4.82	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0042	-0.0046
3	XFMRS	1.0488	-4.89	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0246	0.0078
4	PNL1E5	1.0483	-4.89	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0258	-0.0076
5	PNL1ATB	1.0473	-4.88	0.208	0.00	0.00	0.00	0.00	3.76	2.67	0.0002	0.0001
6	PNL31AB	1.0482	-4.89	0.208	0.00	0.00	0.00	0.00	0.41	0.40	0.0007	0.0003
7	PNL1C	1.0482	-4.89	0.208	0.00	0.00	0.00	0.00	0.67	0.47	0.0021	0.0009
8	PNL1A	1.0482	-4.89	0.208	0.00	0.00	0.00	0.00	1.96	1.96	-0.0009	-0.0001
9	PNL1ABRX	1.0481	-4.89	0.208	0.00	0.00	0.00	0.00	0.40	0.27	0.0001	0.0000
10	PNL1AB	1.0482	-4.89	0.208	0.00	0.00	0.00	0.00	1.53	1.42	0.0009	0.0006
11	PNL1ARX	1.0473	-4.89	0.208	0.00	0.00	0.00	0.00	1.48	0.96	0.0002	0.0001

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	2.38E-02	2.59E-02								
B 3- 4- 1A	CAB	1.00E-03	1.10E-03								
B 4- 5- 1A	CAB	5.10E-03	9.10E-03								

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT XFMR TAPPED AT -2.5%

B	4- 6- 1A	CAB	4.00E-03	7.20E-03		
B	4- 7- 1A	CAB	2.60E-03	4.60E-03		
B	4- 8- 1A	CAB	2.10E-03	2.10E-03		
B	4- 9- 1A	CAB	1.30E-02	2.31E-02		
B	4- 10- 1A	CAB	1.80E-03	3.20E-03		
B	4- 11- 1A	CAB	1.30E-02	2.31E-02		

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAR-	-X/R-
T 2- 3- 1	0.0287	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	3.69	0.85	LAG
L 0- 5- 2	0.21	0.57	0.50	LAG
L 0- 6- 1	0.21	0.29	0.85	LAG
L 0- 6- 2	0.21	0.25	0.50	LAG
L 0- 7- 1	0.21	0.66	0.85	LAG
L 0- 7- 2	0.21	0.09	0.50	LAG
L 0- 8- 1	0.21	1.39	0.85	LAG
L 0- 8- 2	0.21	1.22	0.50	LAG
L 0- 9- 1	0.21	0.41	0.85	LAG
L 0- 9- 2	0.21	0.04	0.50	LAG
L 0- 10- 1	0.21	1.18	0.85	LAG
L 0- 10- 2	0.21	0.78	0.50	LAG
L 0- 11- 1	0.21	1.54	0.85	LAG
L 0- 11- 2	0.21	0.08	0.50	LAG

SYSTEM EQUIVALENT

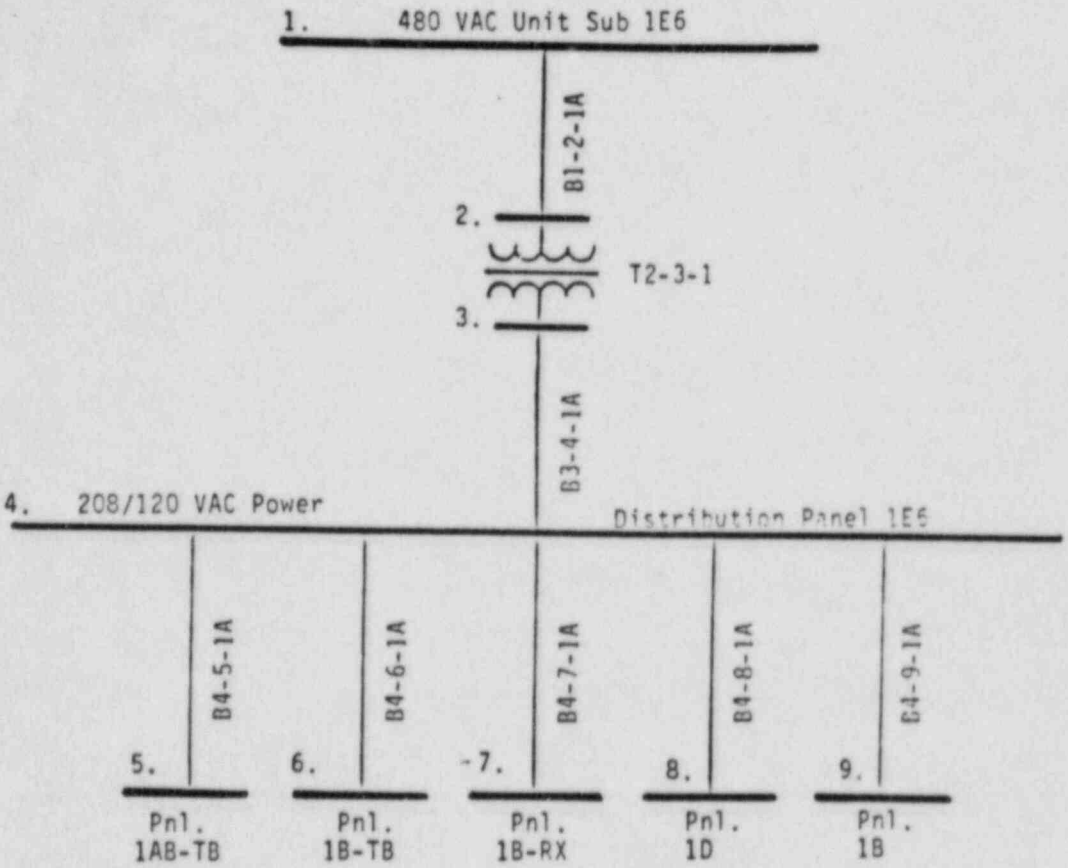
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #1



DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #2
Swgr. 1E6

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-5-1	0.208	11.388	.85	LAG	LOCA RUN
L-5-2	0.208	1.625	.5	LAG	LOCA RUN
L-6-1	0.208	2.455	.85	LAG	LOCA RUN
L-6-2	0.208	0.021	.5	LAG	LOCA RUN
L-7-1	0.208	4.896	.85	LAG	LOCA RUN
L-7-2	0.208	0.047	.5	LAG	LOCA RUN
L-8-1	0.208	0.776	.85	LAG	LOCA RUN
L-8-2	0.208	0.657	.5	LAG	LOCA RUN
L-9-1	0.208	5.274	.85	LAG	LOCA RUN
L-9-2	0.208	0.975	.5	LAG	LOCA RUN
L-5-1	0.208	5.214	.85	LAG	LIGHTLY LOADED RUN
L-5-2	0.208	0.867	.5	LAG	LIGHTLY LOADED RUN
L-6-1	0.208	1.228	.85	LAG	LIGHTLY LOADED RUN
L-6-2	0.208	0.011	.5	LAG	LIGHTLY LOADED RUN
L-7-1	0.208	2.395	.85	LAG	LIGHTLY LOADED RUN
L-7-2	0.208	0.024	.5	LAG	LIGHTLY LOADED RUN
L-8-1	0.208	0.657	.85	LAG	LIGHTLY LOADED RUN
L-8-2	0.208	0.056	.5	LAG	LIGHTLY LOADED RUN
L-9-1	0.208	2.790	.85	LAG	LIGHTLY LOADED RUN
L-9-2	0.208	0.488	.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-
Checked by: SC 6-8-

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #2
Swgr. 1E6

2 - WINDING TRANSFORMERS

DATA

INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0333	0.480	0.208	150	150	2.82	LOCA RUN
T2-3-1	0.0287	0.480	0.208	150	150	2.82	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #2
Swgr. 1E6

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0159	0.0177
B3-4-1A	Cable	0.0007	0.0007
B4-5-1A	Cable	0.0103	0.0183
B4-6-1A	Cable	0.0059	0.0105
B4-7-1A	Cable	0.0050	0.0089
B4-8-1A	Cable	0.0018	0.0032
B4-9-1A	Cable	0.0019	0.0020

Performed by: CRC 6-6-94
Checked by: SC 6-6-94

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY

DATE = 05/10/84

CRC 5-10-84

SC 5/10/84 #1

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #2(SWGR 1E6) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000

NO. OF BUSES= 9 NO. OF LINES= 8

SWING BUS NO.= 1

NO. OF ITERATIONS= 4

ABS VOLTAGE ERROR= 0.000006 0.000004

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	19.779	13.983	24.222	0.032
2	1	-19.725	-13.935	24.151	0.032
2	3	19.725	13.934	24.150	0.032
3	2	-19.672	-13.787	24.023	0.072
3	4	19.682	13.787	24.031	0.072
4	3	-19.671	-13.776	24.016	0.072
4	5	9.051	6.380	11.074	0.033
4	6	1.818	1.137	2.144	0.006
4	7	3.626	2.270	4.278	0.013
4	8	0.857	0.848	1.206	0.004
4	9	4.310	5.142	5.333	0.016

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

5	4	-8.991	-6.347	11.006	0.033
6	4	-1.817	-1.136	2.143	0.006
7	4	-3.622	-2.267	4.273	0.013
8	4	-0.857	-0.848	1.206	0.004
9	4	-4.309	-3.140	5.331	0.016

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR1E6	0.9162	-11.07	0.480	19.78	13.98	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9135	-11.09	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0002	-0.0002
3	XFMRS	0.9320	-11.30	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0096	0.0001
4	PNL1E6	0.9314	-11.31	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0080	0.0005
5	PNL1ABTB	0.9256	-11.27	0.208	0.00	0.00	0.00	0.00	8.99	6.35	-0.0001	-0.0000
6	PNL1BTB	0.9307	-11.31	0.208	0.00	0.00	0.00	0.00	1.82	1.14	-0.0001	-0.0000
7	PNL1BRX	0.9303	-11.31	0.208	0.00	0.00	0.00	0.00	3.62	2.27	-0.0002	-0.0001
8	PNL1D	0.9313	-11.31	0.208	0.00	0.00	0.00	0.00	0.86	0.85	-0.0003	-0.0003
9	PNL1B	0.9310	-11.31	0.208	0.00	0.00	0.00	0.00	4.31	3.14	-0.0003	-0.0000

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT	CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS X/FT--	BUS R/FT--	BUS --FT--	REACTOR OR CAPACITOR X(PU)--	REACTOR OR CAPACITOR --IR--	REACTOR OR CAPACITOR --KV--
B 1-	2- 1A	CAB	1.59E-02	1.77E-02								
B 3-	4- 1A	CAB	7.00E-04	7.00E-04								
B 4-	5- 1A	CAB	1.03E-02	1.83E-02								
B 4-	6- 1A	CAB	5.90E-03	1.05E-02								
B 4-	7- 1A	CAB	5.00E-03	8.90E-03								
B 4-	8- 1A	CAB	1.80E-03	3.20E-03								
B 4-	9- 1A	CAB	1.90E-03	2.00E-03								

Performed by: CRC 6-6-
Checked by: SC 6-6-

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 3 05/10/84

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0333	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	11.39	0.85	LAG
L 0- 5- 2	0.21	1.63	0.50	LAG
L 0- 6- 1	0.21	2.45	0.85	LAG
L 0- 6- 2	0.21	0.02	0.50	LAG
L 0- 7- 1	0.21	4.90	0.85	LAG
L 0- 7- 2	0.21	0.05	0.50	LAG
L 0- 8- 1	0.21	0.78	0.85	LAG
L 0- 8- 2	0.21	0.66	0.50	LAG
L 0- 9- 1	0.21	5.27	0.85	LAG
L 0- 9- 2	0.21	0.97	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84
CRC 5-10-84
SC 5/11/84 #2

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #2(SWGR 1E6) LIGHTLY LOADED RUN WITH SWYD V0=1.017

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 9 NO. OF LINES= 8
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000000 0.000000

SUMMARY OF TAPS

FROM-BUS	TO-BUS	ΣTAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	12.319	8.554	14.998	0.018
2	1	-12.303	-8.539	14.976	0.018
2	3	12.304	8.541	14.978	0.018
3	2	-12.290	-8.503	14.945	0.040
3	4	12.298	8.499	14.949	0.040
4	3	-12.295	-8.495	14.945	0.040
4	5	5.346	3.841	6.583	0.017
4	6	1.156	0.723	1.364	0.004
4	7	2.253	1.411	2.658	0.007

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

5	4	-5.329	-3.831	6.564	0.017
6	4	-1.156	-0.723	1.363	0.004
7	4	-2.251	-1.410	2.657	0.007
8	4	-0.645	-0.434	0.777	0.002
9	4	-2.878	-2.081	3.552	0.009

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SUGR1E6	1.0276	-4.75	0.480	12.32	8.55	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0261	-4.76	0.480	0.00	0.00	0.00	0.00	0.00	0.00	0.0007	0.0025
3	XFMRS	1.0501	-4.85	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0082	-0.0039
4	FNL1E6	1.0497	-4.85	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0163	-0.0045
5	FNL1ABTB	1.0467	-4.84	0.208	0.00	0.00	0.00	0.00	5.33	3.83	0.0013	0.0006
6	FNL1BTB	1.0494	-4.85	0.208	0.00	0.00	0.00	0.00	1.16	0.72	-0.0005	-0.0002
7	FNL1BRX	1.0492	-4.85	0.208	0.00	0.00	0.00	0.00	2.25	1.41	0.0027	0.0013
8	FNL1D	1.0497	-4.85	0.208	0.00	0.00	0.00	0.00	0.65	0.43	0.0014	0.0007
9	FNL1B	1.0495	-4.86	0.208	0.00	0.00	0.00	0.00	2.88	2.08	0.0029	0.0031

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT	CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS X/FT--	BUS R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IK--	--KV--
B 1-	2- 1A	CAB	1.59E-02	1.77E-02								
B 3-	4- 1A	CAB	7.00E-04	7.00E-04								
B 4-	5- 1A	CAB	1.03E-02	1.83E-02								
B 4-	6- 1A	CAB	5.90E-03	1.05E-02								
B 4-	7- 1A	CAB	5.00E-03	8.90E-03								
B 4-	8- 1A	CAB	1.80E-03	3.20E-03								
B 4-	9- 1A	CAB	1.90E-03	2.00E-03								

2-WINDING TRANSFORMERS

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 3 05/10/84

-INPUT CODE-	--XI--	--KV1-	--KV2-	--KVAI-	--KVAB-	-X/R-
T 2- 3- 1	0.0287	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	5.21	0.85	LAG
L 0- 5- 2	0.21	0.87	0.50	LAG
L 0- 6- 1	0.21	1.23	0.85	LAG
L 0- 6- 2	0.21	0.01	0.50	LAG
L 0- 7- 1	0.21	2.39	0.85	LAG
L 0- 7- 2	0.21	0.02	0.50	LAG
L 0- 8- 1	0.21	0.66	0.85	LAG
L 0- 8- 2	0.21	0.06	0.50	LAG
L 0- 9- 1	0.21	2.79	0.85	LAG
L 0- 9- 2	0.21	0.49	0.50	LAG

SYSTEM EQUIVALENT

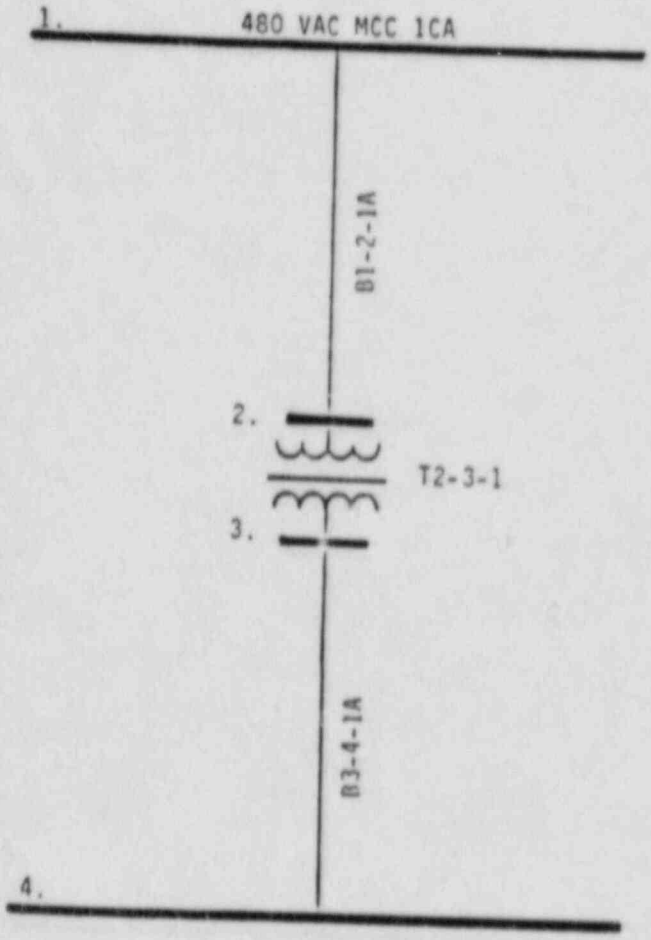
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #1



Pnl. 31A

ASDOP MODEL #3

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #3
Pnl. 31A

STATIC LOADS

INPUT CODE	DATA Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	1.129	0.85	LAG	LOCA RUN
L-4-2	0.208	0.143	0.5	LAG	LOCA RUN
L-4-1	0.208	0.565	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.074	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-8
Checked by: SC 6.6.8

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #3
Pnl. 31A

2 - WINDING TRANSFORMERS

DATA

INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0273	0.480	0.208	30	30	0.63	LOCA RUN
T2-3-1	0.0257	0.480	0.208	30	30	0.63	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #3
Pnl. 31A

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0029	0.0387
B3-4-1A	Cable	0.0010	0.0031

Performed by: CRC 6-6-89
Checked by: JC 6-6-89

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84
CRC 5-10-84
SC 5/10/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #3(PUL 31A) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000002 0.000003

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	LINE POWER FLOW KVAR	LINE POWER FLOW KVA	LINE CURRENT MAG(KA)
1	2	0.866	0.603	1.055	0.001
2	1	-0.866	-0.603	1.055	0.001
2	3	0.865	0.603	1.055	0.001
3	2	-0.864	-0.602	1.053	0.003
3	4	0.864	0.601	1.053	0.003
4	3	-0.864	-0.601	1.053	0.003

BUS DATA

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 03/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC1CA	0.8944	-11.25	0.480	0.87	0.60	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.8942	-11.24	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0003	0.0000
3	XFMRS	0.9152	-11.24	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0009	-0.0008
4	PNL31A	0.9151	-11.23	0.208	0.00	0.00	0.00	0.00	0.86	0.60	-0.0008	0.0007

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	++++CABLE OR BUS++++ X	++++CABLE OR BUS++++ R	+++++CABLE++++++ NO.-SIZE	+++++CABLE++++++ --FT--	++++++++++++BUS++++++++++++ ---X/FT--	++++++++++++BUS++++++++++++ ---R/FT--	++++++++++++BUS++++++++++++ --FT--	++REACTOR OR CAPACITOR+++ --X(PU)--	++REACTOR OR CAPACITOR+++ --IR--	++REACTOR OR CAPACITOR+++ --KV--
B 1- 2- 1A	CAB	2.90E-03	3.87E-02								
B 3- 4- 1A	CAB	1.00E-03	3.10E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0273	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	1.13	0.85	LAG
L 0- 4- 2	0.21	0.14	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6
Checked by: SC 6-7-

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                              DATE = 05/10/84
```

CRC 5-10-84
SC 5/10/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #3(PNL 31A) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

```
CASE TITLE:LOAD FLOW AND LIST ALL                               00000
NO. OF BUSES=   4     NO. OF LINES=   3
SWING BUS NO.=   1
NO. OF ITERATIONS=   4
ABS VOLTAGE ERROR=  0.000001  0.000002
```

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	0.560	0.388	0.681	0.001
2	1	-0.560	-0.388	0.681	0.001
2	3	0.555	0.388	0.677	0.001
3	2	-0.554	-0.389	0.676	0.002
3	4	0.544	0.384	0.666	0.002
4	3	-0.544	-0.384	0.666	0.002

BUS DATA

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC1CA	1.0105	-5.00	0.480	0.56	0.39	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0104	-5.00	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0049	-0.0001
3	XFMRS	1.0353	-4.99	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0100	-0.0033
4	PNL31A	1.0352	-4.99	0.208	0.00	0.00	0.00	0.00	0.55	0.39	0.0100	0.0033

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS R	CABLE NO.-SIZE	CABLE FT	BUS X/FT	BUS R/FT	BUS FT	REACTOR OR CAPACITOR X(PU)	IR	KV
B 1- 2- 1A	CAB	2.90E-03	3.87E-02							
B 3- 4- 1A	CAB	1.00E-03	3.10E-03							

2-WINDING TRANSFORMERS

-INPUT CODE-	XT	KV1	KV2	KVAT	KVAB	X/R
T 2- 3- 1	0.0257	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	KV	KVA	PFL	LEAD/LAG
L 0- 4- 1	0.21	0.56	0.85	LAG
L 0- 4- 2	0.21	0.07	0.50	LAG

SYSTEM EQUIVALENT

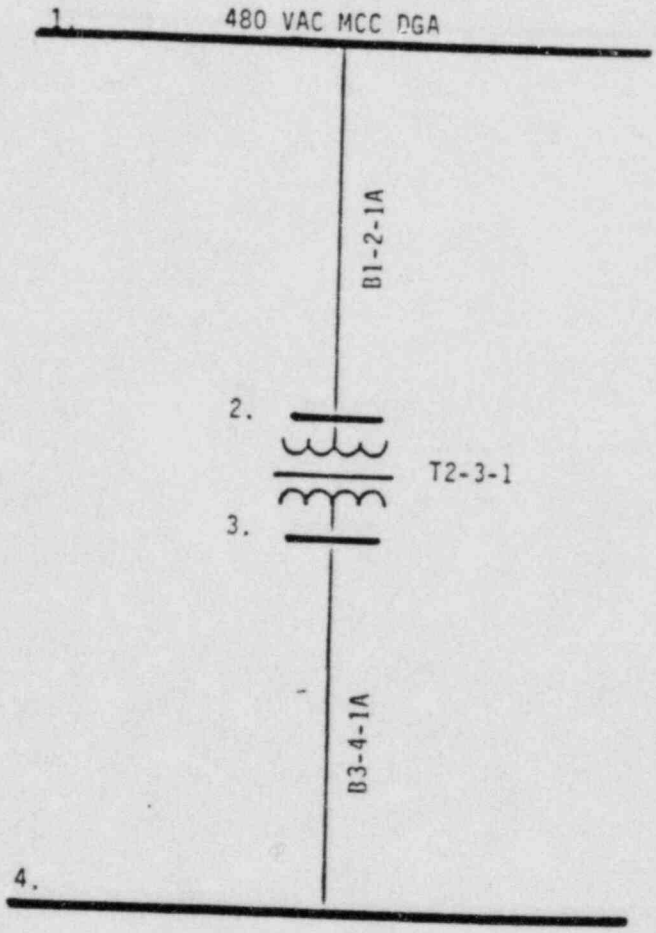
-INPUT CODE-	FMVA	KV	X/R
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #1



DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #4
Pnl. 1A-DG

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	12.363	0.85	LAG	LOCA RUN
L-4-2	0.208	0.209	0.5	LAG	LOCA RUN
L-4-1	0.208	8.429	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.018	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #4
Pnl. 1A-DG

2 - WINDING TRANSFORMERS

DATA INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0273	0.480	0.208	30	30	0.63	LOCA RUN
T2-3-1	0.0257	0.480	0.208	30	30	0.63	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                              DATE = 05/10/84
```

CRC 5-10-84

SC 5/10/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #4(PNL 1A-DG) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

```
CASE TITLE:LOAD FLOW AND LIST ALL                               00000
NO. OF BUSES=   4     NO. OF LINES=   3
SWING BUS NO.=   1
NO. OF ITERATIONS=   4
ABS VOLTAGE ERROR=  0.000003  0.000002
```

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	LINE POWER FLOW KVAR	LINE POWER FLOW KVA	LINE CURRENT MAG(KA)
1	2	9.143	5.737	10.794	0.014
2	1	-9.106	-5.734	10.761	0.014
2	3	9.106	5.734	10.760	0.014
3	2	-8.915	-5.614	10.535	0.032
3	4	8.915	5.614	10.535	0.032
4	3	-8.895	-5.610	10.517	0.032

BUS DATA

Page A35 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY

DATE = 05/10/84

CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #4(PNL 1A-DG) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000003 0.000002

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	9.143	5.737	10.794	0.014
2	1	-9.106	-5.734	10.761	0.014
2	3	9.106	5.734	10.760	0.014
3	2	-8.915	-5.614	10.535	0.032
3	4	8.915	5.614	10.535	0.032
4	3	-8.895	-5.610	10.517	0.032

BUS DATA

LOAD

Page A35 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCDGA	0.9162	-10.94	0.480	9.14	5.74	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9134	-10.85	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0002	-0.0001
3	XFMRS	0.9172	-10.85	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0001	0.0001
4	PNL1ADG	0.9156	-10.80	0.208	0.00	0.00	0.00	0.00	8.89	5.61	-0.0001	-0.0001

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-			TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	REACTOR OR CAPACITOR --IR--	REACTOR OR CAPACITOR --KV--
B	1-	2- 1A	CAB	4.70E-03	6.15E-02								
B	3-	4- 1A	CAB	1.10E-03	6.60E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-			--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T	2-	3- 1	0.0273	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-			--KV--	---KVA--	-PFL-	LEAD/LAG
L	0-	4- 1	0.21	12.36	0.85	LAG
L	0-	4- 2	0.21	0.21	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-			--FMVA--	--KV--	-X/R--
S	0-	1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CKC 6-6-84
Checked by: SC 6.6.84

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 1 05/10/84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE 80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY DATE = 05/10/84

CRC 5-10-84
SC 5/10/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #4(PNL 1A-DG) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000000 0.000001

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	7.813	4.836	9.188	0.011
2	1	-7.791	-4.834	9.169	0.011
2	3	7.790	4.834	9.168	0.011
3	2	-7.686	-4.769	9.045	0.024
3	4	7.685	4.769	9.044	0.024
4	3	-7.673	-4.767	9.033	0.024

BUS DATA

!!!!!!!!!!!!!!!!!!!!LOAD!!!!!!!!!!!!!!!!!!!!

Page A37 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCPGA	1.0255	-4.87	0.480	7.81	4.84	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0234	-4.81	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0015	-0.0000
3	XFMRS	1.0356	-4.81	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0014	-0.0003
4	PNL1ADG	1.0343	-4.78	0.208	0.00	0.00	0.00	0.00	7.67	4.77	0.0014	0.0002

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-			TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE FT	BUS X/FT	BUS R/FT	BUS FT	REACTOR OR CAPACITOR X(PU)	REACTOR OR CAPACITOR IR	REACTOR OR CAPACITOR KV
P	1-	2- 1A	CAB	4.70E-03	6.15E-02								
B	3-	4- 1A	CAB	1.10E-03	6.60E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-			XT	KV1	KV2	KVAT	KVAB	X/R
T	2-	3- 1	0.0257	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-			KV	KVA	PFL	LEAD/LAG
L	0-	4- 1	0.21	8.43	0.85	LAG
L	0-	4- 2	0.21	0.02	0.50	LAG

SYSTEM EQUIVALENT

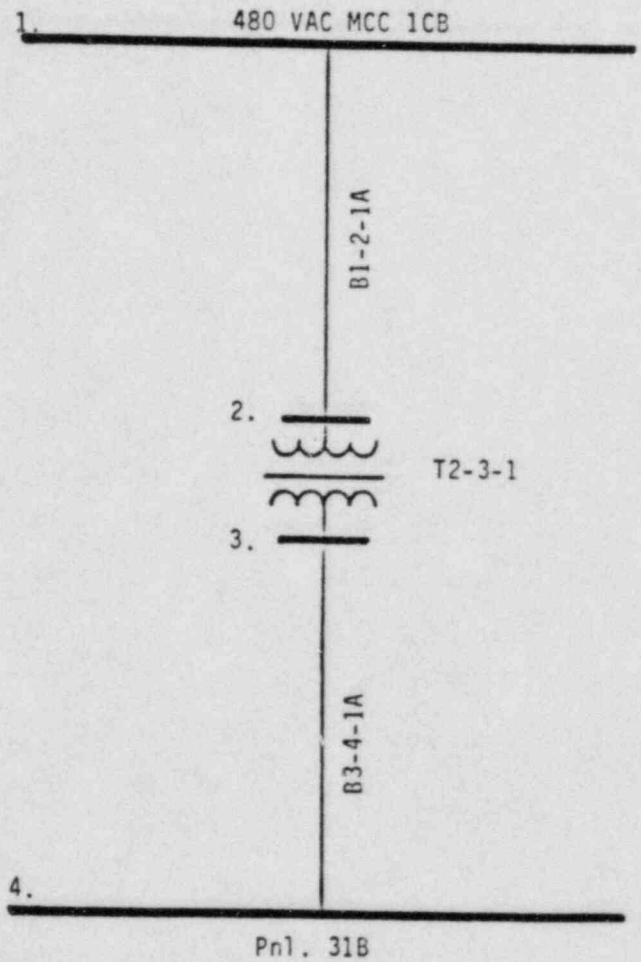
-INPUT CODE-			FMVA	KV	X/R
S	0-	1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: JC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #1



ASDOP MODEL #5

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #5
Pnl. 31B

STATIC LOADS

INPUT CODE	DATA Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	0.785	0.85	LAG	LOCA RUN
L-4-2	0.208	3.358	0.5	LAG	LOCA RUN
L-4-1	0.208	0.888	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.140	0.5	LAG	LIGHTLY LOADED RUN

Note: Revision 1 of this calculation reduced the LOCA run load value (L-4-2) given above. With this reduced load value, the actual panel voltage would be slightly greater than the value derived in this calculation. Since this was a more conservative treatment of the model, new ASDOP runs were not performed. | 1

Performed by: CRC 7-27-
Checked by: SC 7-27-

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #5
Pnl. 31B

2 - WINDING TRANSFORMERS

DATA INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0273	0.480	0.208	30	30	0.63	LOCA RUN
T2-3-1	0.0257	0.480	0.208	30	30	0.63	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #5
Pnl. 31B

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0063	0.0827
B3-4-1A	Cable	0.0009	0.0051

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84

CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #5(PWL 31B) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000003 0.000003

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	1.991	2.794	3.431	0.005
2	1	-1.986	-2.794	3.428	0.005
2	3	1.986	2.794	3.427	0.005
3	2	-1.966	-2.781	3.406	0.010
3	4	1.967	2.780	3.406	0.010
4	3	-1.965	-2.780	3.404	0.010

BUS DATA

Page A43 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC1CB	0.8990	-11.31	0.480	1.99	2.79	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.8981	-11.24	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0001	-0.0001
3	XFMRS	0.9153	-11.09	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0008	-0.0006
4	PNL31B	0.9150	-11.07	0.208	0.00	0.00	0.00	0.00	1.96	2.78	-0.0007	0.0006

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE FT	BUS X/FT	BUS R/FT	BUS FT	REACTOR OR CAPACITOR X(PU)	REACTOR OR CAPACITOR IR	REACTOR OR CAPACITOR KV
B 1- 2- 1A	CAB	6.30E-03	8.27E-02								
B 3- 4- 1A	CAB	9.00E-04	5.10E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	XT	KV1	KV2	KVAT	KVAB	X/R
T 2- 3- 1	0.0273	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	KV	KVA	PFL	LEAD/LAG
L 0- 4- 1	0.21	0.78	0.85	LAG
L 0- 4- 2	0.21	3.36	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	FMVA	KV	X/R
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84

CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #5(FHL 31B) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000001 0.000002

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	0.898	0.640	1.102	0.001
2	1	-0.897	-0.639	1.102	0.001
2	3	0.896	0.639	1.100	0.001
3	2	-0.894	-0.638	1.099	0.003
3	4	0.892	0.638	1.097	0.003
4	3	-0.892	-0.638	1.096	0.003

BUS DATA

LOAD

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC1CB	1.0171	-4.87	0.480	0.90	0.64	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0168	-4.86	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0017	-0.0001
3	XFMRS	1.0411	-4.85	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0022	-0.0004
4	PNL31B	1.0410	-4.85	0.208	0.00	0.00	0.00	0.00	0.89	0.64	0.0021	0.0004

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	6.30E-03	8.27E-02								
B 3- 4- 1A	CAB	9.00E-04	5.10E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0257	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	0.89	0.85	LAG
L 0- 4- 2	0.21	0.14	0.50	LAG

SYSTEM EQUIVALENT

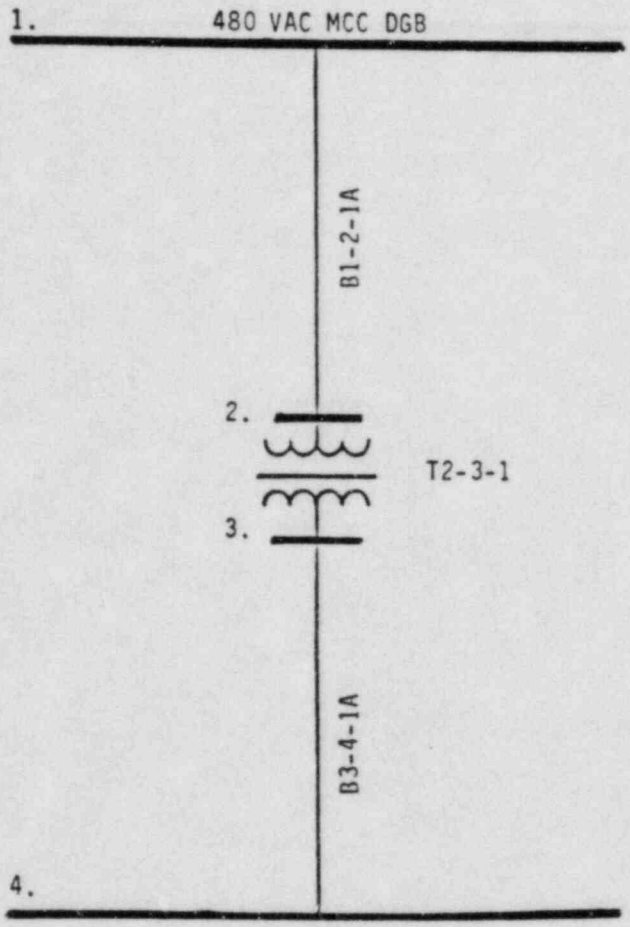
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Page A46 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #1



ASDOP MODEL #6

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #6
Pnl. 1B-DG

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	12.630	0.85	LAG	LOCA RUN
L-4-2	0.208	0.198	0.5	LAG	LOCA RUN
L-4-1	0.208	6.765	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.013	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-9
Checked by: SC 6-6-9

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #6
Pnl. 1B-DG

2 - WINDING TRANSFORMERS

DATA INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0273	0.480	0.208	30	30	0.63	LOCA RUN
T2-3-1	0.0257	0.480	0.208	30	30	0.63	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: JC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-1

CASE TITLE: Model #6
Pnl. 1B-DG

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0043	0.0573
B3-4-1A	Cable	0.0007	0.0043

Performed by: CRC 6-6-94
Checked by: SC 6-6-94

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE 80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY

DATE = 05/08/84
CRC 5-10-84
SC 5/11/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #6(FNL 1B-DG) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000003 0.000002

SUMMARY OF TAPS

FROM-BUS	TO-BUS	ΣTAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	9.170	5.751	10.824	0.014
2	1	-9.135	-5.748	10.793	0.014
2	3	9.135	5.748	10.792	0.014
3	2	-8.939	-5.625	10.562	0.03[illegible]
3	4	8.940	5.625	10.562	0.0[illegible]
4	3	-8.926	-5.623	10.549	0.032

BUS DATA

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/08/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCDGB	0.9080	-11.16	0.480	9.17	5.75	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9054	-11.07	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0002	-0.0001
3	XFMRS	0.9087	-11.07	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0001	0.0001
4	PNL1BDG	0.9077	-11.04	0.208	0.00	0.00	0.00	0.00	8.93	5.62	-0.0000	-0.0001

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	++++CABLE OR BUS++++ X	++++CABLE OR BUS++++ R	+++++CABLE++++++ NO.-SIZE	+++++CABLE++++++ FT	+++++++++++BUS+++++++++++ X/FT	+++++++++++BUS+++++++++++ R/FT	+++++++++++BUS+++++++++++ FT	++REACTOR OR CAPACITOR+++ X(PU)	++REACTOR OR CAPACITOR+++ IR	++REACTOR OR CAPACITOR+++ KV
B 1- 2- 1A	CAB	4.30E-03	5.73E-02								
B 3- 4- 1A	CAB	7.00E-04	4.30E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0273	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	12.63	0.85	LAG
L 0- 4- 2	0.21	0.20	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Page A52 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                    DATE = 05/08/84
```

CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #1 208/120 VOLT LOAD STUDY
MODEL #6(PNL 1B-DG) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

```
CASE TITLE:LOAD FLOW AND LIST ALL                               00000
NO. OF BUSES=   4     NO. OF LINES=   3
SWING BUS NO.=   1
NO. OF ITERATIONS=   4
ABS VOLTAGE ERROR=  0.000000  0.000001
```

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	LINE POWER FLOW KVAR	LINE POWER FLOW KVA	LINE CURRENT MAG(KA)
1	2	6.278	3.890	7.385	0.009
2	1	-6.265	-3.889	7.374	0.009
2	3	6.265	3.889	7.374	0.009
3	2	-6.198	-3.847	7.295	0.020
3	4	6.194	3.846	7.291	0.020
4	3	-6.189	-3.845	7.287	0.020

BUS DATA

Page A53 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #1 208/120 VOLT LOAD STUDY PAGE 2 05/08/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCDGB	1.0245	-4.78	0.480	6.28	3.89	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRS	1.0229	-4.73	0.480	0.00	0.00	0.00	0.00	0.00	0.00	0.0001	-0.0001
3	XFMRS	1.0378	-4.74	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0039	-0.0004
4	PNL1BDG	1.0372	-4.72	0.208	0.00	0.00	0.00	0.00	6.19	3.85	0.0037	0.0003

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	4.30E-03	5.73E-02								
B 3- 4- 1A	CAB	7.00E-04	4.30E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0257	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	6.76	0.85	LAG
L 0- 4- 2	0.21	0.01	0.50	LAG

SYSTEM EQUIVALENT

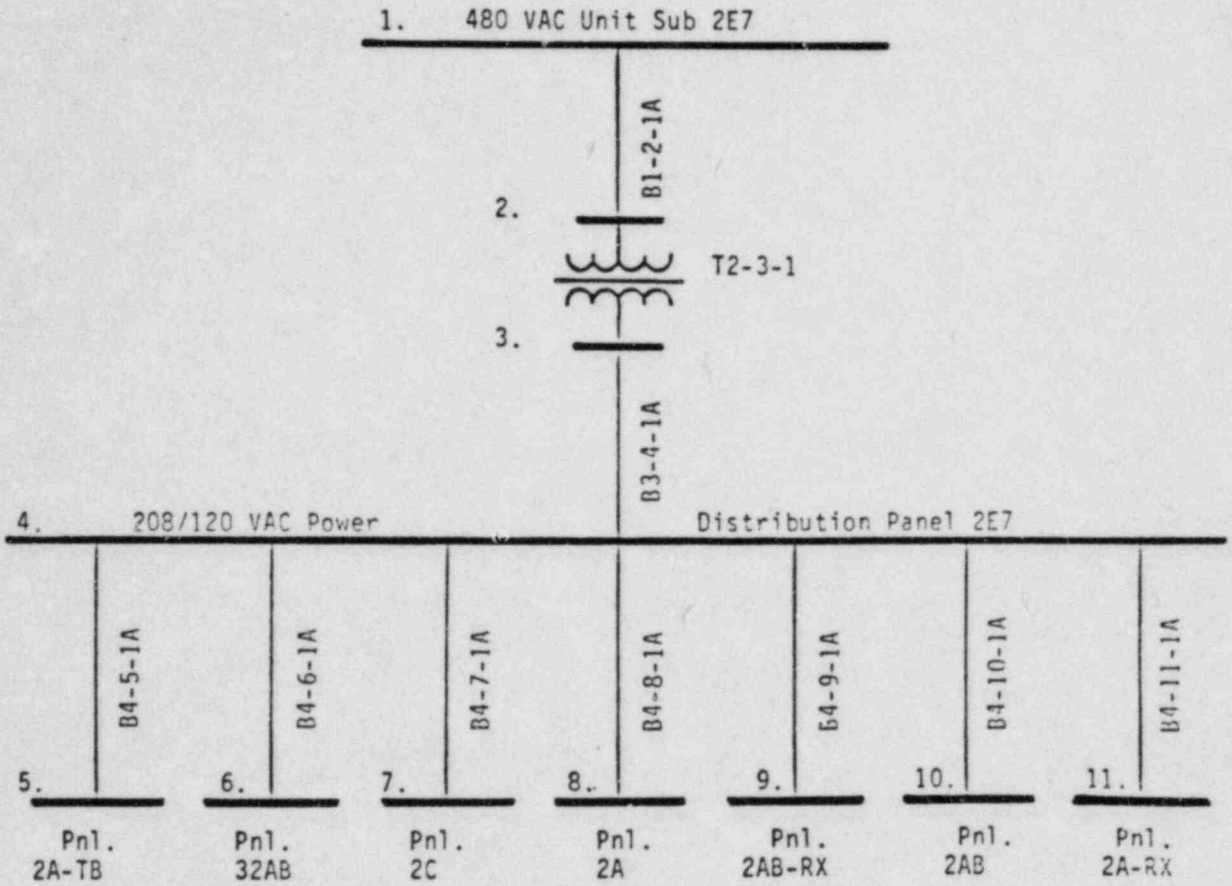
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Page A54 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #2



ASDOP MODEL #1

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #1
Swgr. 2E7

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-5-1	0.208	9.348	0.85	LAG	LOCA RUN
L-5-2	0.208	2.974	0.5	LAG	LOCA RUN
L-6-1	0.208	0.324	0.85	LAG	LOCA RUN
L-6-2	0.208	0.552	0.5	LAG	LOCA RUN
L-7-1	0.208	0.863	0.85	LAG	LOCA RUN
L-7-2	0.208	1.434	0.5	LAG	LOCA RUN
L-8-1	0.208	4.577	0.85	LAG	LOCA RUN
L-8-2	0.208	0.574	0.5	LAG	LOCA RUN
L-9-1	0.208	2.436	0.85	LAG	LOCA RUN
L-9-2	0.208	0.059	0.5	LAG	LOCA RUN
L-10-1	0.208	3.808	0.85	LAG	LOCA RUN
L-10-2	0.208	1.560	0.5	LAG	LOCA RUN
L-11-1	0.208	3.193	0.85	LAG	LOCA RUN
L-11-2	0.208	0.165	0.5	LAG	LOCA RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #1
Swgr. 2E7

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-5-1	0.208	4.674	0.85	LAG	LIGHTLY LOADED RUN
L-5-2	0.208	1.487	0.5	LAG	LIGHTLY LOADED RUN
L-6-1	0.208	0.314	0.85	LAG	LIGHTLY LOADED RUN
L-6-2	0.208	0.276	0.5	LAG	LIGHTLY LOADED RUN
L-7-1	0.208	0.811	0.85	LAG	LIGHTLY LOADED RUN
L-7-2	0.208	0.145	0.5	LAG	LIGHTLY LOADED RUN
L-8-1	0.208	2.321	0.85	LAG	LIGHTLY LOADED RUN
L-8-2	0.208	0.269	0.5	LAG	LIGHTLY LOADED RUN
L-9-1	0.208	0.738	0.85	LAG	LIGHTLY LOADED RUN
L-9-2	0.208	0.030	0.5	LAG	LIGHTLY LOADED RUN
L-10-1	0.208	2.055	0.85	LAG	LIGHTLY LOADED RUN
L-10-2	0.208	0.780	0.5	LAG	LIGHTLY LOADED RUN
L-11-1	0.208	1.588	0.85	LAG	LIGHTLY LOADED RUN
L-11-2	0.208	0.083	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #1
Swgr. 2E7

2 - WINDING TRANSFORMERS

INPUT CODE	DATA: Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0333	0.480	0.208	150	150	2.82	LOCA RUN
T2-3-1	0.0287	0.480	0.208	150	150	2.82	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-7-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP - Unit #2

CASE TITLE: Model #1
Swgr. 2E7

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.01822	0.01962
B3-4-1A	Cable	0.0010	0.0011
B4-5-1A	Cable	0.0060	0.0106
B4-6-1A	Cable	0.0040	0.0072
B4-7-1A	Cable	0.0007	0.0013
B4-8-1A	Cable	0.0009	0.0009
B4-9-1A	Cable	0.0058	0.0104
B4-10-1A	Cable	0.0014	0.0026
B4-11-1A	Cable	0.0049	0.0088

Performed By: CRC 6-7-84
Checked By: SC 6-7-84

```
ENTER COMMAND
EXECUTED NOTAP
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL----NO TAPS                                    00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                          DATE = 05/12/84
```

CRC 5-15-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #1(SWGR 2E7) LOCA RUN

MODIFIED WITH XFMR TAPS AT NOMINAL

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL----NO TAPS 00000
NO. OF BUSES= 11 NO. OF LINES= 10
SWING BUS NO.= 1
NO. OF ITERATIONS= 3
ABS VOLTAGE ERROR= 0.000001 0.000005

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	21.119	16.722	26.938	0.035
2	1	-21.048	-16.657	26.841	0.035
2	3	21.047	16.656	26.841	0.035
3	2	-20.982	-16.472	26.675	0.080
3	4	20.981	16.471	26.674	0.080
4	3	-20.961	-16.451	26.645	0.080
4	5	8.027	6.375	10.251	0.031
4	6	0.471	0.554	0.727	0.002
4	7	1.238	1.452	1.908	0.006
4	8	3.564	2.487	4.346	0.013

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

4	11	2.385	1.557	2.848	0.009
5	4	-7.997	-6.358	10.216	0.031
6	4	-0.470	-0.554	0.727	0.002
7	4	-1.238	-1.452	1.908	0.006
8	4	-3.564	-2.486	4.345	0.013
9	4	-1.790	-1.138	2.121	0.006
10	4	-3.484	-2.901	4.534	0.014
11	4	-2.383	-1.556	2.846	0.009

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR2E7	0.9339	-9.85	0.480	21.12	16.72	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9306	-9.86	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0004	-0.0004
3	XFMRS	0.9248	-10.09	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0008	-0.0008
4	PNL2E7	0.9236	-10.09	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0011	0.0110
5	PNL2ATB	0.9207	-10.06	0.208	0.00	0.00	0.00	0.00	8.00	6.36	-0.0002	0.0001
6	PNL32AB	0.9237	-10.09	0.208	0.00	0.00	0.00	0.00	0.47	0.55	-0.0000	-0.0005
7	PNL2C	0.9238	-10.09	0.208	0.00	0.00	0.00	0.00	1.24	1.45	-0.0001	-0.0040
8	PNL2A	0.9237	-10.10	0.208	0.00	0.00	0.00	0.00	3.56	2.48	0.0001	-0.0052
9	PNL2ABRX	0.9232	-10.09	0.208	0.00	0.00	0.00	0.00	1.79	1.14	-0.0001	-0.0005
10	PNL2AB	0.9235	-10.09	0.208	0.00	0.00	0.00	0.00	3.48	2.90	-0.0004	-0.0031
11	PNL2ARX	0.9231	-10.09	0.208	0.00	0.00	0.00	0.00	2.38	1.56	-0.0001	-0.0006

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	REACTOR OR CAPACITOR --IR--	REACTOR OR CAPACITOR --IX--
B 1- 2- 1A	CAB	1.82E-02	1.96E-02								
B 3- 4- 1A	CAB	1.03E-03	1.07E-03								
B 4- 5- 1A	CAB	6.00E-03	1.06E-02								
B 4- 6- 1A	CAB	4.00E-03	7.20E-03								

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

B	4- 7- 1A	CAB	7.00E-04	1.30E-03		
B	4- 8- 1A	CAB	9.00E-04	9.00E-04		
B	4- 9- 1A	CAB	5.80E-03	1.04E-02		
B	4- 10- 1A	CAB	1.40E-03	2.60E-03		
B	4- 11- 1A	CAB	4.90E-03	8.80E-03		

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAR-	-X/R-
T 2- 3- 1	0.0333	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	9.35	0.85	LAG
L 0- 5- 2	0.21	2.97	0.50	LAG
L 0- 6- 1	0.21	0.32	0.85	LAG
L 0- 6- 2	0.21	0.55	0.50	LAG
L 0- 7- 1	0.21	0.86	0.85	LAG
L 0- 7- 2	0.21	1.43	0.50	LAG
L 0- 8- 1	0.21	4.58	0.85	LAG
L 0- 8- 2	0.21	0.57	0.50	LAG
L 0- 9- 1	0.21	2.44	0.85	LAG
L 0- 9- 2	0.21	0.06	0.50	LAG
L 0- 10- 1	0.21	3.89	0.85	LAG
L 0- 10- 2	0.21	1.56	0.50	LAG
L 0- 11- 1	0.21	3.19	0.85	LAG
L 0- 11- 2	0.21	0.16	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND
EXECUTED NOTAP
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL----NO TAPS                                    , 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                                   DATE = 05/12/84

                              AUXILIARY SYSTEM DESIGN
                               OPTIMIZATION PROGRAM
                                    (ASDOP)
                          BSEP UNIT #2 208/120 VOLT LOAD STUDY
                  MODEL #1(SWGR 2E7) LIGHTLY LOADED      WITH SWYD VO=1.017
```

CRC 5-15-84

MODIFIED WITH XFMR TAPS AT NOMINAL

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

```
CASE TITLE:LOAD FLOW AND LIST ALL----NO TAPS                         00000
NO. OF BUSES=  11     NO. OF LINES=  10
SWING BUS NO.=   1
NO. OF ITERATIONS=   3
ABS VOLTAGE ERROR=  0.000002  0.000002
```

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	LINE POWER FLOW KVAR	LINE POWER FLOW KVA	LINE CURRENT MAG(KA)
1	2	12.998	9.918	16.350	0.019
2	1	-12.977	-9.899	16.321	0.019
2	3	12.972	9.893	16.314	0.019
3	2	-12.955	-9.846	16.272	0.044
3	4	12.964	9.854	16.284	0.044
4	3	-12.958	-9.848	16.276	0.044
4	5	5.018	3.988	6.410	0.017
4	6	0.428	0.429	0.606	0.002
4	7	0.811	0.588	1.002	0.003
4	8	2.245	1.549	2.727	0.007
4	9	0.682	0.441	0.812	0.002
4	10	2.274	1.821	2.944	0.008

4	11	1.481	0.967	1.768	0.005
5	4	-5.009	-3.982	6.399	0.017
6	4	-0.428	-0.429	0.606	0.002
7	4	-0.811	-0.588	1.002	0.003
8	4	-2.245	-1.548	2.727	0.007
9	4	-0.682	-0.441	0.812	0.002
10	4	-2.273	-1.871	2.944	0.008
11	4	-1.480	-0.966	1.768	0.005

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR2E7	1.0373	-3.95	0.480	13.00	9.92	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0355	-3.96	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0052	-0.0054
3	XFMRS	1.0328	-4.06	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0091	0.0082
4	PNL2E7	1.0323	-4.06	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0202	-0.0155
5	PNL2ATB	1.0305	-4.04	0.208	0.00	0.00	0.00	0.00	5.01	3.98	-0.0001	-0.0000
6	PNL32AB	1.0322	-4.06	0.208	0.00	0.00	0.00	0.00	0.43	0.43	0.0038	0.0019
7	PNL2C	1.0322	-4.06	0.208	0.00	0.00	0.00	0.00	0.81	0.59	0.0011	0.0006
8	PNL2A	1.0322	-4.06	0.208	0.00	0.00	0.00	0.00	2.25	1.55	0.0005	0.0024
9	PNL2ABRX	1.0320	-4.06	0.208	0.00	0.00	0.00	0.00	0.68	0.44	0.0021	0.0010
10	PNL2AB	1.0321	-4.06	0.208	0.00	0.00	0.00	0.00	2.28	1.87	0.0029	0.0019
11	PNL2ARX	1.0319	-4.06	0.208	0.00	0.00	0.00	0.00	1.48	0.97	0.0014	0.0008

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

	-INPUT CODE-		TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B	1-	2- 1A	CAB	1.82E-02	1.96E-02								
B	3-	4- 1A	CAB	1.03E-03	1.07E-03								

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

MODIFIED WITH XFMR TAPS AT NOMINAL

B	4-	7-	1A	CAB	7.00E-04	1.30E-03
B	4-	8-	1A	CAB	9.00E-04	9.00E-04
B	4-	9-	1A	CAB	5.80E-03	1.04E-02
B	4-	10-	1A	CAB	1.40E-03	2.60E-03
B	4-	11-	1A	CAB	4.90E-03	8.80E-03

2-WINDING TRANSFORMERS

-INPUT CODE-			--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T	2-	3- 1	0.0287	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-			--KV--	---KVA--	-PFL-	LEAD/LAG
L	0-	5- 1	0.21	4.67	0.85	LAG
L	0-	5- 2	0.21	1.49	0.50	LAG
L	0-	6- 1	0.21	0.31	0.85	LAG
L	0-	6- 2	0.21	0.28	0.50	LAG
L	0-	7- 1	0.21	0.81	0.85	LAG
L	0-	7- 2	0.21	0.14	0.50	LAG
L	0-	8- 1	0.21	2.32	0.85	LAG
L	0-	8- 2	0.21	0.27	0.50	LAG
L	0-	9- 1	0.21	0.74	0.85	LAG
L	0-	9- 2	0.21	0.03	0.50	LAG
L	0-	10- 1	0.21	2.05	0.85	LAG
L	0-	10- 2	0.21	0.78	0.50	LAG
L	0-	11- 1	0.21	1.59	0.85	LAG
L	0-	11- 2	0.21	0.08	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-			--FMVA--	--KV--	-X/R--
S	0-	1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY DATE = 05/12/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)

CRC 5-15-84

BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #1(SWGR 2E7) LIGHTLY LOADED RUN WITH SWYD VO=1.017

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 11 NO. OF LINES= 10
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000001 0.000000

SUMMARY OF TAPS

FROM-BUS	TO-BUS	ΣTAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	13.668	10.430	17.193	0.020
2	1	-13.645	-10.408	17.161	0.020
2	3	13.644	10.408	17.160	0.020
3	2	-13.626	-10.358	17.116	0.045
3	4	13.627	10.350	17.112	0.045
4	3	-13.621	-10.343	17.103	0.045
4	5	5.279	4.095	6.743	0.018
4	6	0.455	0.454	0.643	0.002
4	7	0.856	0.621	1.057	0.003
4	8	2.358	1.628	2.866	0.008

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

4	10	2.390	1.969	3.097	0.008
4	11	1.559	1.018	1.862	0.005
5	4	-5.269	-4.189	6.732	0.018
6	4	-0.455	-0.454	0.643	0.002
7	4	-0.856	-0.621	1.057	0.003
8	4	-2.358	-1.628	2.866	0.008
9	4	-0.718	-0.464	0.855	0.002
10	4	-2.390	-1.968	3.096	0.008
11	4	-1.558	-1.017	1.861	0.005

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SUGR2E7	1.0373	-3.95	0.480	13.67	10.43	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0354	-3.96	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0010	-0.0002
3	XFMRS	1.0592	-4.06	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0013	-0.0085
4	PNL2E7	1.0586	-4.06	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0045	0.0048
5	PNL2ATB	1.0569	-4.04	0.208	0.00	0.00	0.00	0.00	5.27	4.19	-0.0013	-0.0008
6	PNL32AB	1.0585	-4.06	0.208	0.00	0.00	0.00	0.00	0.45	0.45	-0.0016	-0.0008
7	PNL2C	1.0586	-4.06	0.208	0.00	0.00	0.00	0.00	0.85	0.62	-0.0023	-0.0012
8	PNL2A	1.0586	-4.06	0.208	0.00	0.00	0.00	0.00	2.36	1.63	0.0033	0.0030
9	PNL2ARRX	1.0584	-4.06	0.208	0.00	0.00	0.00	0.00	0.72	0.46	0.0014	0.0006
10	PNL2AR	1.0584	-4.06	0.208	0.00	0.00	0.00	0.00	2.39	1.97	0.0039	0.0012
11	PNL2ARX	1.0582	-4.06	0.208	0.00	0.00	0.00	0.00	1.56	1.02	-0.0001	-0.0002

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	1.82E-02	1.96E-02								
B 3- 4- 1A	CAB	1.03E-03	1.07E-03								
B 4- 5- 1A	CAB	6.00E-03	1.06E-02								

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 3 05/12/84

B	4- 6- 1A	CAB	4.00E-03	7.20E-03	
B	4- 7- 1A	CAB	7.00E-04	1.30E-03	
B	4- 8- 1A	CAB	9.00E-04	9.00E-04	
B	4- 9- 1A	CAB	5.80E-03	1.04E-02	
B	4- 10- 1A	CAB	1.40E-03	2.60E-03	
B	4- 11- 1A	CAB	4.90E-03	8.80E-03	

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0287	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	4.67	0.85	LAG
L 0- 5- 2	0.21	1.49	0.50	LAG
L 0- 6- 1	0.21	0.31	0.85	LAG
L 0- 6- 2	0.21	0.28	0.50	LAG
L 0- 7- 1	0.21	0.81	0.85	LAG
L 0- 7- 2	0.21	0.14	0.50	LAG
L 0- 8- 1	0.21	2.32	0.85	LAG
L 0- 8- 2	0.21	0.27	0.50	LAG
L 0- 9- 1	0.21	0.74	0.85	LAG
L 0- 9- 2	0.21	0.03	0.50	LAG
L 0- 10- 1	0.21	2.05	0.85	LAG
L 0- 10- 2	0.21	0.78	0.50	LAG
L 0- 11- 1	0.21	1.59	0.85	LAG
L 0- 11- 2	0.21	0.08	0.50	LAG

SYSTEM EQUIVALENT

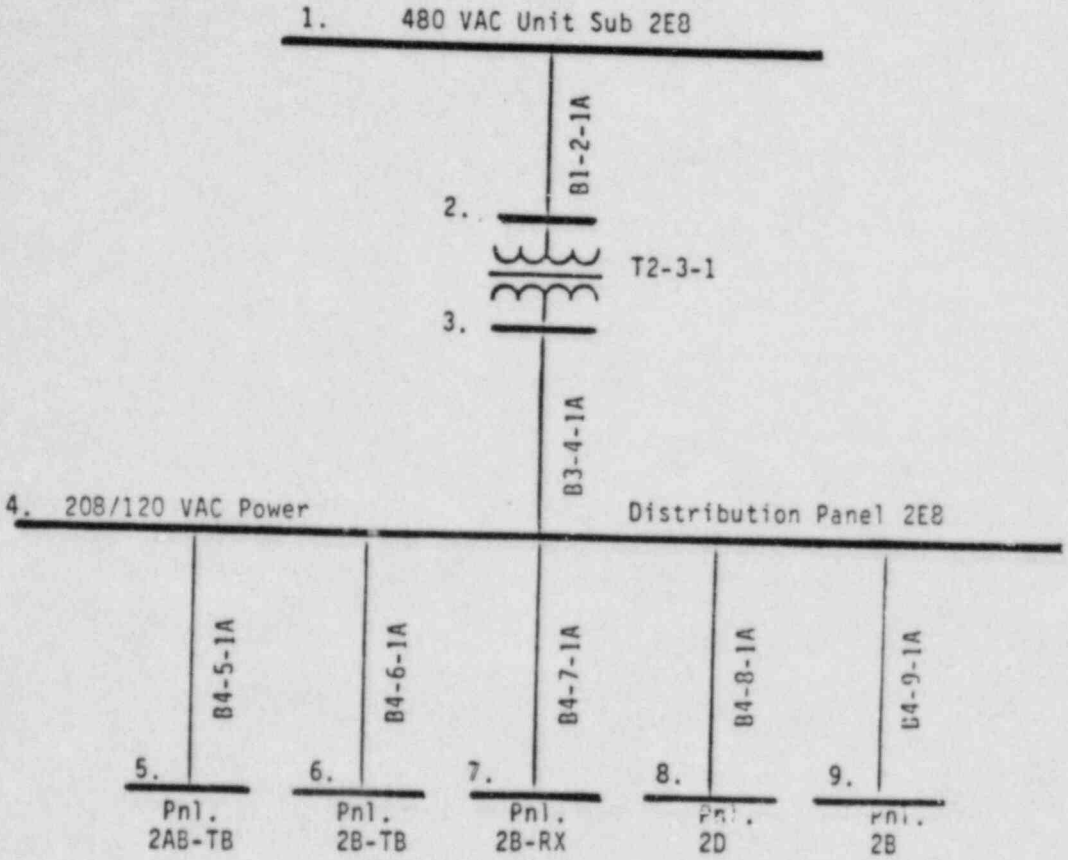
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #2



DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #2
Swgr. 2E8

STATIC LOADS

INPUT CODE	DATA Rated Voltage	Rated KVA at Rated Voltage	Load Power Factor	Lead or Lag PF	Comments
	KV	KVA	PFL	LEAD/LAG	
L-5-1	0.208	5.430	0.85	LAG	LOCA RUN
L-5-2	0.208	1.625	0.5	LAG	LOCA RUN
L-6-1	0.208	2.455	0.85	LAG	LOCA RUN
L-6-2	0.208	0.021	0.5	LAG	LOCA RUN
L-7-1	0.208	4.068	0.85	LAG	LOCA RUN
L-7-2	0.208	0.042	0.5	LAG	LOCA RUN
L-8-1	0.208	0.776	0.85	LAG	LOCA RUN
L-8-2	0.208	0.822	0.5	LAG	LOCA RUN
L-9-1	0.208	5.875	0.85	LAG	LOCA RUN
L-9-2	0.208	0.975	0.5	LAG	LOCA RUN
L-5-1	0.208	2.235	0.85	LAG	LIGHTLY LOADED RUN
L-5-2	0.208	0.867	0.5	LAG	LIGHTLY LOADED RUN
L-6-1	0.208	1.228	0.85	LAG	LIGHTLY LOADED RUN
L-6-2	0.208	0.011	0.5	LAG	LIGHTLY LOADED RUN
L-7-1	0.208	1.981	0.85	LAG	LIGHTLY LOADED RUN
L-7-2	0.208	0.021	0.5	LAG	LIGHTLY LOADED RUN
L-8-1	0.208	0.656	0.85	LAG	LIGHTLY LOADED RUN
L-8-2	0.208	0.138	0.5	LAG	LIGHTLY LOADED RUN
L-9-1	0.208	3.129	0.85	LAG	LIGHTLY LOADED RUN
L-9-2	0.208	0.487	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #2
Swgr. 2E8

2 - WINDING TRANSFORMERS

DATA

INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0333	0.480	0.208	150	150	2.82	LOCA RUN
T2-3-1	0.0287	0.480	0.208	150	150	2.82	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-7-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP - Unit #2

CASE TITLE: Model #2
Swgr. 2E8

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.02941	0.03235
B3-4-1A	Cable	0.0006785	0.0007038
B4-5-1A	Cable	0.0137	0.0244
B4-6-1A	Cable	0.0159	0.0284
B4-7-1A	Cable	0.0120	0.0213
B4-8-1A	Cable	0.0010	0.0017
B4-9-1A	Cable	0.0010	0.0011

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND
EXECUTED NOTAP
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL----NO TAPS                                  ' 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY

DATE = 05/12/84

CRC 5-14-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #2(SUGR 268) LOCA RUN

MODIFIED WITH XFMR TAPS AT NOMINAL

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL----NO TAPS 00000
NO. OF BUSES= 9 NO. OF LINES= 8
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000000 0.000000

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	LINE POWER FLOW KVAR	LINE POWER FLOW KVA	LINE CURRENT MAG(KA)
1	2	15.156	11.140	18.810	0.024
2	1	-15.099	-11.088	18.733	0.024
2	3	15.099	11.088	18.733	0.024
3	2	-15.067	-10.998	18.654	0.056
3	4	15.067	10.997	18.653	0.056
4	3	-15.060	-10.991	18.644	0.056
4	5	4.650	3.651	5.912	0.018
4	6	1.800	1.126	2.123	0.006
4	7	2.985	1.869	3.522	0.011
4	8	0.913	0.959	1.324	0.004
4	9	4.712	3.387	5.803	0.017

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

5	4	-4.627	-3.638	5.886	0.018
6	4	-1.797	-1.124	2.119	0.006
7	4	-2.978	-1.865	3.514	0.011
8	4	-0.913	-0.959	1.324	0.004
9	4	-4.711	-3.386	5.802	0.017

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR2E8	0.9355	-10.06	0.480	15.16	11.14	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9317	-10.08	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0002	-0.0003
3	XFMRS	0.9278	-10.25	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0008	-0.0009
4	PNL2E8	0.9273	-10.25	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0010
5	PNL2AITB	0.9233	-10.21	0.208	0.00	0.00	0.00	0.00	4.63	3.64	0.0000	-0.0000
6	PNL2BTB	0.9256	-10.25	0.208	0.00	0.00	0.00	0.00	1.80	1.12	-0.0000	-0.0000
7	PNL2BRX	0.9252	-10.24	0.208	0.00	0.00	0.00	0.00	2.98	1.87	0.0000	0.0000
8	PNL2B	0.9273	-10.25	0.208	0.00	0.00	0.00	0.00	0.91	0.96	0.0002	0.0001
9	PNL2B	0.9271	-10.25	0.208	0.00	0.00	0.00	0.00	4.71	3.39	0.0006	-0.0002

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS ---X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	2.94E-02	3.23E-02								
B 3- 4- 1A	CAB	6.78E-04	7.04E-04								
B 4- 5- 1A	CAB	1.37E-02	2.44E-02								
B 4- 6- 1A	CAB	1.59E-02	2.84E-02								
B 4- 7- 1A	CAB	1.20E-02	2.13E-02								
B 4- 8- 1A	CAB	1.00E-03	1.70E-03								
B 4- 9- 1A	CAB	1.00E-03	1.10E-03								

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

MODIFIED WITH XFMR TAPS AT NOMINAL

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 3 05/12/84

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0333	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	5.43	0.85	LAG
L 0- 5- 2	0.21	1.63	0.50	LAG
L 0- 6- 1	0.21	2.45	0.85	LAG
L 0- 6- 2	0.21	0.02	0.50	LAG
L 0- 7- 1	0.21	4.07	0.85	LAG
L 0- 7- 2	0.21	0.04	0.50	LAG
L 0- 8- 1	0.21	0.77	0.85	LAG
L 0- 8- 2	0.21	0.82	0.50	LAG
L 0- 9- 1	0.21	5.88	0.85	LAG
L 0- 9- 2	0.21	0.97	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Page A75 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-7-84

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 1 05/12/84

ENTER COMMAND
EXECUTED NOTAP
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL----NO TAPS 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY DATE = 05/12/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #2(SWGR 2E8) LIGHTLY LOADED RUN WITH SWYD V0=1.017

CRC 5-14-84

MODIFIED WITH XFMR TAPS AT NOMINAL

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL----NO TAPS 00000
NO. OF BUSES= 9 NO. OF LINES= 8
SWING BUS NO.= 1
NO. OF ITERATIONS= 3
ABS VOLTAGE ERROR= 0.000002 0.000002

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	9.249	6.662	11.399	0.013
2	1	-9.232	-6.647	11.376	0.013
2	3	9.229	6.644	11.372	0.013
3	2	-9.221	-6.621	11.352	0.030
3	4	9.218	6.620	11.349	0.030
4	3	-9.216	-6.618	11.346	0.030
4	5	2.497	2.062	3.238	0.009
4	6	1.123	0.703	1.325	0.004
4	7	1.814	1.136	2.140	0.006

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Performed by: CRC 6-6-84
Checked by: SC 6-6-84

5	4	-2.491	-2.059	3.232	0.009
6	4	-1.122	-0.702	1.324	0.004
7	4	-1.812	-1.135	2.138	0.006
8	4	-0.672	-0.499	0.837	0.002
9	4	-3.114	-2.221	3.825	0.010

BUS DATA

		VOLTAGE			GENERATION		LOAD: MOTOR		LOAD: STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SUGR2E8	1.0395	-4.14	0.480	9.25	6.66	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0374	-4.15	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0032	-0.0027
3	XFMRS	1.0356	-4.22	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0029	-0.0013
4	PNL2E8	1.0354	-4.22	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0045	0.0031
5	PNL2ABIB	1.0334	-4.20	0.208	0.00	0.00	0.00	0.00	2.49	2.06	0.0002	0.0001
6	PNL2B1B	1.0344	-4.22	0.208	0.00	0.00	0.00	0.00	1.12	0.70	0.0005	0.0002
7	PNL2BRX	1.0342	-4.22	0.208	0.00	0.00	0.00	0.00	1.81	1.14	0.0007	0.0003
8	PNL2B	1.0353	-4.22	0.208	0.00	0.00	0.00	0.00	0.67	0.50	-0.0001	-0.0002
9	PNL2B	1.0352	-4.23	0.208	0.00	0.00	0.00	0.00	3.11	2.22	-0.0031	-0.0024

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS: X	CABLE OR BUS: R	CABLE: NO.-SIZE	CABLE: FT	BUS: X/FT	BUS: R/FT	BUS: FT	REACTOR OR CAPACITOR: X(PU)	REACTOR OR CAPACITOR: IR	REACTOR OR CAPACITOR: KV
B 1- 2- 1A	CAB	2.94E-02	3.23E-02								
B 3- 4- 1A	CAB	6.78E-04	7.04E-04								
B 4- 5- 1A	CAB	1.37E-02	2.44E-02								
B 4- 6- 1A	CAB	1.59E-02	2.84E-02								
B 4- 7- 1A	CAB	1.20E-02	2.13E-02								
B 4- 8- 1A	CAB	1.00E-03	1.70E-03								
B 4- 9- 1A	CAB	1.00E-03	1.10E-03								

2-WINDING TRANSFORMERS

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

MODIFIED WITH XFMR TAPS AT NOMINAL

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 3 05/12/84

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0287	0.48	0.21	150.00	150.00	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	2.23	0.85	LAG
L 0- 5- 2	0.21	0.87	0.50	LAG
L 0- 6- 1	0.21	1.23	0.85	LAG
L 0- 6- 2	0.21	0.01	0.50	LAG
L 0- 7- 1	0.21	1.98	0.85	LAG
L 0- 7- 2	0.21	0.02	0.50	LAG
L 0- 8- 1	0.21	0.66	0.85	LAG
L 0- 8- 2	0.21	0.14	0.50	LAG
L 0- 9- 1	0.21	3.13	0.85	LAG
L 0- 9- 2	0.21	0.49	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/12/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #2(SWGR 2E8) LIGHTLY LOADED RUN WITH SWYD V0=1.017

CRC 5-14-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 9 NO. OF LINES= 8
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000001 0.000000

SUMMARY OF TAPS

FROM-BUS	TO-BUS	TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	9.728	7.008	11.989	0.014
2	1	-9.709	-6.991	11.964	0.014
2	3	9.704	6.987	11.957	0.014
3	2	-9.695	-6.962	11.936	0.031
3	4	9.721	6.957	11.954	0.031
4	3	-9.719	-6.955	11.952	0.031
4	5	2.625	2.168	3.405	0.009
4	6	1.182	0.739	1.394	0.004
4	7	1.907	1.195	2.251	0.006
4	8	0.707	0.525	0.881	0.002
4	9	3.266	2.329	4.012	0.010

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

5	4	-2.620	-2.165	3.399	0.009
6	4	-1.181	-0.739	1.392	0.004
7	4	-1.905	-1.194	2.248	0.006
8	4	-0.707	-0.525	0.881	0.002
9	4	-3.266	-2.329	4.011	0.010

BUS DATA

		VOLTAGE			GENERATION		LOAD MOTOR		LOAD STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	SWGR2EB	1.0395	-4.14	0.480	9.73	7.01	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0373	-4.15	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0054	-0.0048
3	XFMRS	1.0620	-4.22	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0264	-0.0052
4	PNL2EB	1.0618	-4.23	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0315	0.0023
5	PNL2ARTB	1.0598	-4.21	0.208	0.00	0.00	0.00	0.00	2.62	2.17	0.0009	0.0003
6	PNL2B1B	1.0608	-4.22	0.208	0.00	0.00	0.00	0.00	1.18	0.74	-0.0000	0.0000
7	PNL2BRX	1.0606	-4.22	0.208	0.00	0.00	0.00	0.00	1.91	1.17	0.0008	0.0004
8	PNL2B	1.0618	-4.22	0.208	0.00	0.00	0.00	0.00	0.71	0.52	-0.0006	-0.0007
9	PNL2B	1.0617	-4.23	0.208	0.00	0.00	0.00	0.00	3.27	2.33	0.0064	0.0041

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT	CODE-	TYPE	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS X/FT--	BUS R/FT--	BUS --FT--	REACTOR OR CAPACITOR X(PU)--	REACTOR OR CAPACITOR --IR--	REACTOR OR CAPACITOR --KV--
B 1-	2- 1A	CAB	3.23E-02								
B 3-	4- 1A	CAB	7.04E-04								
B 4-	5- 1A	CAB	2.44E-02								
B 4-	6- 1A	CAB	2.84E-02								
B 4-	7- 1A	CAB	2.13E-02								
B 4-	8- 1A	CAB	1.70E-03								
B 4-	9- 1A	CAB	1.10E-03								

Page A80 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 3 05/12/84

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0287	0.48	0.21	150.00	150.00*	2.82

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 5- 1	0.21	2.23	0.85	LAG
L 0- 5- 2	0.21	0.87	0.50	LAG
L 0- 6- 1	0.21	1.23	0.85	LAG
L 0- 6- 2	0.21	0.01	0.50	LAG
L 0- 7- 1	0.21	1.98	0.85	LAG
L 0- 7- 2	0.21	0.02	0.50	LAG
L 0- 8- 1	0.21	0.66	0.85	LAG
L 0- 8- 2	0.21	0.14	0.50	LAG
L 0- 9- 1	0.21	3.13	0.85	LAG
L 0- 9- 2	0.21	0.49	0.50	LAG

SYSTEM EQUIVALENT

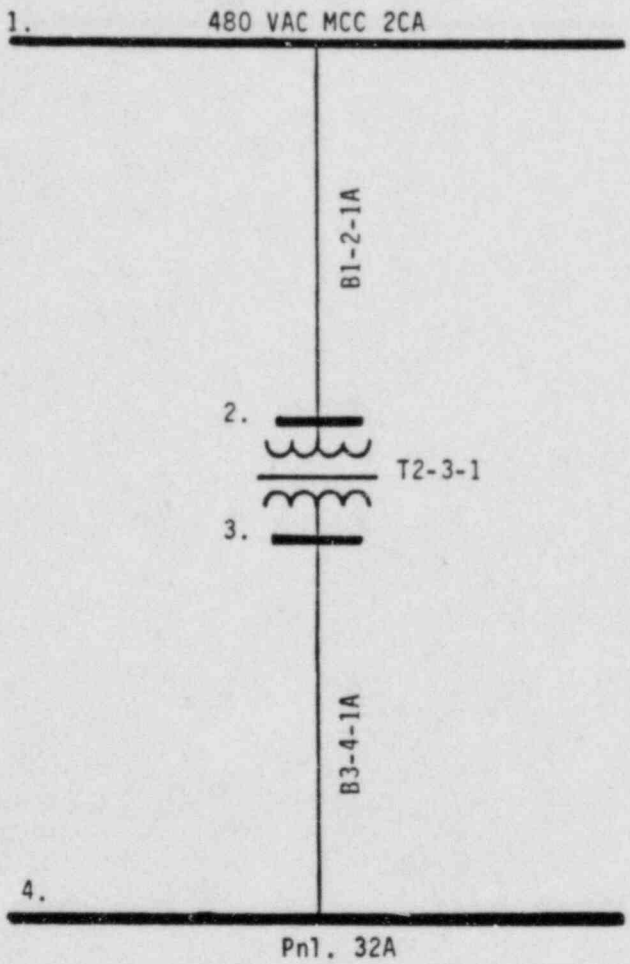
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #2



ASDOP MODEL #3

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #3
Pnl. 32A

STATIC LOADS

INPUT CODE	DATA Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	0.959	0.85	LAG	LOCA RUN
L-4-2	0.208	0.693	0.5	LAG	LOCA RUN
L-4-1	0.208	0.480	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.347	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #3
Pnl. 32A

2 - WINDING TRANSFORMERS

DATA INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.02043	0.480	0.208	30	30	0.95	LOCA RUN
T2-3-1	0.01758	0.480	0.208	30	30	0.95	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP - Unit #2

CASE TITLE: Model #3
Pnl. 32A

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0018	0.0232
B3-4-1A	Cable	0.0017	0.0052

Performed by: CRC 6-6-84
Checked By: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY DATE= 05/04/84
CRC 5-8-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #3(PNL 32A) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000002 0.000003

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	1.025	0.975	1.414	0.002
2	1	-1.024	-0.975	1.414	0.002
2	3	1.024	0.974	1.414	0.002
3	2	-1.023	-0.973	1.411	0.004
3	4	1.023	0.972	1.411	0.004
4	3	-1.022	-0.972	1.411	0.004

BUS DATA

**********LOAD**********

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2/5%

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 2 05/04/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC2CA	0.9164	-10.08	0.480	1.02	0.97	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9163	-10.07	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0003	-0.0003
3	XFMRS	0.9383	-10.07	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0002	-0.0005
4	PNL32A	0.9381	-10.07	0.208	0.00	0.00	0.00	0.00	1.02	0.97	-0.0001	0.0004

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-			TYPE	++++CABLE OR BUS++++ ----X----	----R----	+++++CABLE++++++ NO.-SIZE	--FT--	++++++++++++BUS++++++++++++ ---X/FT--	---R/FT--	--FT--	++REACTOR OR CAPACITOR+++ --X(PU)--	--IR--	--KV--
B	1-	2- 1A	CAB	1.80E-03	2.33E-02								
B	3-	4- 1A	CAB	1.70E-03	5.20E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-			--XT--	--KV1-	--KV2-	--KVAT-	--KVAR-	-X/R-
T	2-	3- 1	0.0204	0.48	0.21	30.00	30.00+	0.95

STATIC LOADS

-INPUT CODE-			--KV--	---KVA--	-PFL-	LEAD/LAG
L	0-	4- 1	0.21	0.96	0.85	LAG
L	0-	4- 2	0.21	0.69	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-			--FMVA--	--KV--	-X/R--
S	0-	1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                              DATE = 05/04/84
```

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #3(PNL 32A) LIGHTLY LOADED RUN

CRC 5-10-84

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

```
CASE TITLE:LOAD FLOW AND LIST ALL                                00000
NO. OF BUSES=   4     NO. OF LINES=   3
SWING BUS NO.=   1
NO. OF ITERATIONS=   4
ABS VOLTAGE ERROR=  0.000001  0.000002
```

---SUMMARY OF TAPS---

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

--- LINE FLOWS ---

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	0.646	0.614	0.891	0.001
2	1	-0.646	-0.614	0.891	0.001
2	3	0.646	0.614	0.891	0.001
3	2	-0.645	-0.614	0.891	0.002
3	4	0.641	0.612	0.886	0.002
4	3	-0.641	-0.612	0.886	0.002

---BUS DATA---

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 2 05/04/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC2CA	1.0273	-4.05	0.480	0.65	0.61	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0272	-4.05	0.480	0.00	0.00	0.00	0.00	0.00	0.00	0.0001	0.0002
3	XFMRS	1.0529	-4.05	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0045	-0.0023
4	PNL32A	1.0528	-4.04	0.208	0.00	0.00	0.00	0.00	0.64	0.61	0.0037	0.0016

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	CABLE OR BUS X	CABLE OR BUS R	CABLE NO.-SIZE	CABLE --FT--	BUS --X/FT--	BUS ---R/FT--	BUS --FT--	REACTOR OR CAPACITOR --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	1.80E-03	2.32E-02								
B 3- 4- 1A	CAB	1.70E-03	5.20E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0176	0.48	0.21	30.00	30.00*	0.95

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	0.48	0.85	LAG
L 0- 4- 2	0.21	0.35	0.50	LAG

SYSTEM EQUIVALENT

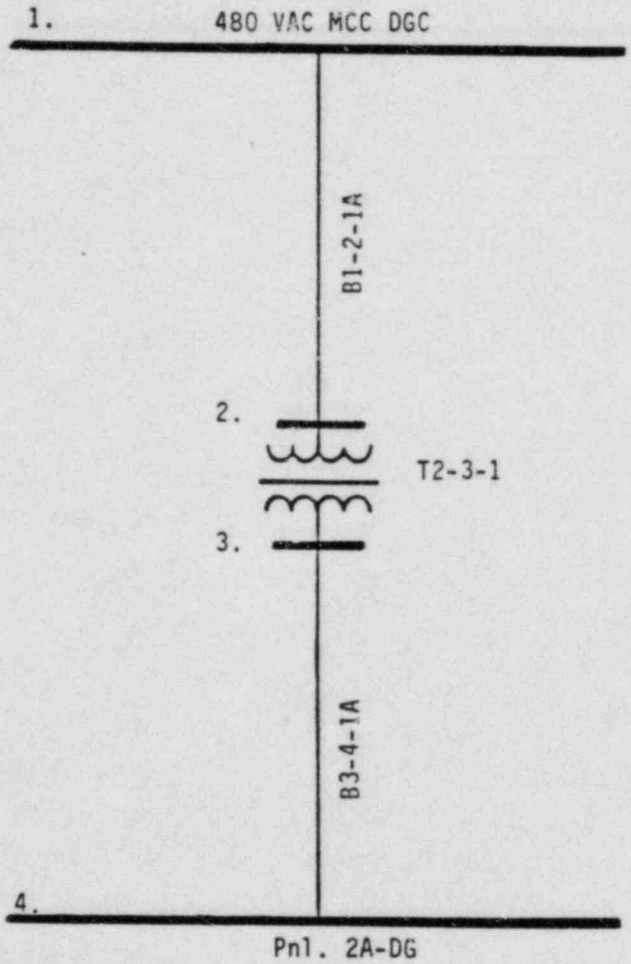
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #2



ASDOP MODEL #4

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #4
Pnl. 2A-DG

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	13.158	0.85	LAG	LOCA RUN
L-4-2	0.208	0.906	0.5	LAG	LOCA RUN
L-4-1	0.208	7.356	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.367	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #4
Pnl. 2A-DG

2 - WINDING TRANSFORMERS

DATA

INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0273	0.480	0.208	30	30	0.63	LOCA RUN
T2-3-1	0.0257	0.480	0.208	30	30	0.63	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP - Unit #2

CASE TITLE: Model #4
Pnl. 2A-DG

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0037	0.0225
B3-4-1A	Cable	0.0007	0.0043

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUT ? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                              DATE = 05/10/84
                                                                CRC 5-10-84
                                                                SC 5/14/84
                        AUXILIARY SYSTEM DESIGN
                        OPTIMIZATION PROGRAM
                             (ASDOP)
                  BSEP UNIT #2 208/120 VOLT LOAD STUDY
                     MODEL #4(PNL 2A-DG) LOCA RUN
-------------------------------------------------------------------------------------------------
                        AS-BUILT WITH XFMR TAPPED AT -2.5%
                        BUS VOLTAGES,CURRENTS,AND POWER FLOWS
CASE TITLE:LOAD FLOW AND LIST ALL                                       00000
NO. OF BUSES=   4     NO. OF LINES=   3
SWING BUS NO.=   1
NO. OF ITERATIONS=   4
ABS VOLTAGE ERROR=  0.000002  0.000002
-----------------------------------------SUMMARY OF TAPS-----------------------------------------

                                    FROM-BUS      TO-BUS      %TAPS
                                        2           3        -2.50
------------------------------------------------ LINE FLOWS ------------------------------------------------

                        -------LINE POWER FLOW-------    LINE CURRENT
FROM-BUS      TO-BUS        KW        KVAR       KVA        MAG(KA)
   1            2          10.357     6.842     12.414       0.016
-------------------------------------------------------------------------------
   2            1         -10.340    -6.840     12.397       0.016
   2            3          10.340     6.839     12.397       0.016
-------------------------------------------------------------------------------
   3            2         -10.096    -6.685     12.109       0.036
   3            4          10.095     6.685     12.108       0.036
-------------------------------------------------------------------------------
   4            3         -10.079    -6.683     12.093       0.036

-------------------------------------------------BUS DATA-------------------------------------------------
```


Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCDGC	0.9313	-9.84	0.480	10.36	6.84	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9301	-9.80	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0004	-0.0005
3	XFMRS	0.9318	-9.77	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0003	-0.0001
4	PNL2ADG	0.9306	-9.74	0.208	0.00	0.00	0.00	0.00	10.08	6.68	0.0003	0.0001

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-			TYPE	++++CABLE OR BUS++++ X	++++CABLE OR BUS++++ R	+++++CABLE++++++ NO.-SIZE	--FT--	+++++++++++BUS+++++++++++ ---X/FT--	---R/FT--	--FT--	++REACTOR OR CAPACITOR+++ --X(PU)--	--IR--	--KV--
B	1-	2- 1A	CAB	3.70E-03	2.25E-02								
B	3-	4- 1A	CAB	7.00E-04	4.30E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-			--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T	2-	3- 1	0.0273	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-			--KV--	---KVA--	-PFL-	LEAD/LAG
L	0-	4- 1	0.21	13.16	0.85	LAG
L	0-	4- 2	0.21	0.91	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-			--FMVA--	--KV--	-X/R--
S	0-	1- 1	18.00	0.48	5.0

ENTER COMMAND

Page A95 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY                                              DATE = 05/10/84
```

CRC 5-10-84
SC 5/14/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #4(PNL 2A-DG) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

```
CASE TITLE:LOAD FLOW AND LIST ALL                               00000
NO. OF BUSES=   4     NO. OF LINES=   3
SWING BUS NO.=   1
NO. OF ITERATIONS=   4
ABS VOLTAGE ERROR=  0.000001  0.000001
```

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	7.182	4.667	8.565	0.010
2	1	-7.175	-4.666	8.559	0.010
2	3	7.169	4.665	8.553	0.010
3	2	-7.081	-4.610	8.449	0.022
3	4	7.084	4.610	8.452	0.022
4	3	-7.078	-4.609	8.446	0.022

BUS DATA

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #2 203/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCDGC	1.0363	-3.94	0.480	7.18	4.67	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0355	-3.92	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0065	-0.0009
3	XFMRS	1.0492	-3.91	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0033	0.0000
4	PNL2ADG	1.0484	-3.89	0.208	0.00	0.00	0.00	0.00	7.07	4.61	-0.0031	0.0001

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	++++CABLE OR BUS++++ ----X----	----R----	+++++CABLE++++++ NO.-SIZE	--FT--	++++++++++++BUS++++++++++++ ---X/FT--	---R/FT--	--FT--	++REACTOR OR CAPACITOR+++ --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	3.70E-03	2.25E-02								
B 3- 4- 1A	CAB	7.00E-04	4.30E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0257	0.48	0.21	30.00	30.00	0.63

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	7.36	0.85	LAG
L 0- 4- 2	0.21	0.37	0.50	LAG

SYSTEM EQUIVALENT

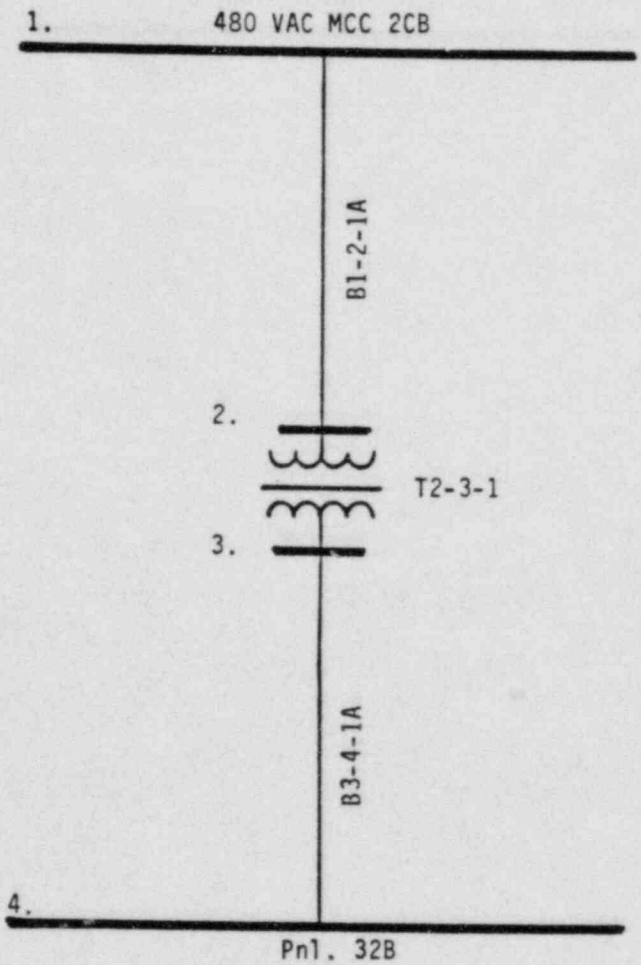
-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #2



ASDOP MODEL #5

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #5
Pnl. 32B

STATIC LOADS

DATA INPUT CODE	Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	0.819	0.85	LAG	LOCA RUN
L-4-2	0.208	3.420	0.5	LAG	LOCA RUN
L-4-1	0.208	0.786	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.225	0.5	LAG	LIGHTLY LOADED RUN

Note: Revision 1 of this calculation reduced the LOCA run value (L-4-2) given above. With this reduced load value, the actual panel voltage would be slightly greater than the value derived in this calculation. Since this was a more conservative treatment of the model, new ASDOP runs were not performed.

Performed by: CRC 7-27-
Checked by: SC 7-27-8

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #5
Pnl. 32B

2 - WINDING TRANSFORMERS

DATA

INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.02043	0.480	0.208	30	30	0.95	LOCA RUN
T2-3-1	0.01758	0.480	0.208	30	30	0.95	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP - Unit #2

CASE TITLE: Model #5
Pnl. 32B

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0057	0.0750
B3-4-1A	Cable	0.0008	0.0026

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY DATE = 05/10/84

CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #5(PNL 328) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000004 0.000003

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	2.094	2.941	3.611	0.005
2	1	-2.089	-2.941	3.607	0.005
2	3	2.089	2.941	3.607	0.005
3	2	-2.079	-2.930	3.593	0.011
3	4	2.081	2.930	3.594	0.011
4	3	-2.080	-2.930	3.593	0.011

BUS DATA

**********LOAD**********

AS-BUILT WITH XFMR TAPPED AT -2.5%

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCC2CB	0.9107	-10.34	0.480	2.09	2.94	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9099	-10.28	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0001	-0.0009
3	XFMRS	0.9295	-10.23	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0026	-0.0004
4	PNL32B	0.9293	-10.22	0.208	0.00	0.00	0.00	0.00	2.08	2.93	-0.0025	0.0004

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-				++++CABLE OR BUS++++		++++++CABLE++++++		++++++++++++BUS++++++++++++			++REACTOR OR CAPACITOR+++		
		TYPE		----X----	----R----	NO.-SIZE	--FT--	---X/FT--	---R/FT--	--FT--	--X(PU)--	--IR--	--KV--
B 1-	2- 1A	CAB		5.70E-03	7.50E-02								
B 3-	4- 1A	CAB		8.00E-04	2.60E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-			--XT--	--KV1-	--KV2-	--KVAT-	--KVAR-	-X/R-
T 2-	3- 1		0.0204	0.48	0.21	30.00	30.00*	0.95

STATIC LOADS

-INPUT CODE-			--KV--	---KVA--	-PFL-	LEAD/LAG
L 0-	4- 1		0.21	0.82	0.85	LAG
L 0-	4- 2		0.21	3.42	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-			--FMVA--	--KV--	-X/R--
S 0-	1- 1		18.00	0.48	5.0

ENTER COMMAND

Page A103 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY

DATE = 05/10/84
CRC 5-10-84
[illegible] 5/10/84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #5(PNL 32B) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%

BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000001 0.000003

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	0.866	0.674	1.097	0.001
2	1	-0.865	-0.674	1.097	0.001
2	3	0.863	0.674	1.095	0.001
3	2	-0.863	-0.673	1.094	0.003
3	4	0.861	0.670	1.092	0.003
4	3	-0.861	-0.670	1.091	0.003

BUS DATA

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5% .

BSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

		VOLTAGE			GENERATION		MOTOR		STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	MCC2CB	1.0263	-4.28	0.480	0.87	0.67	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	1.0260	-4.27	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0018	-0.0000
3	XFMRS	1.0514	-4.27	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0014	-0.0027
4	PNL32B	1.0514	-4.27	0.208	0.00	0.00	0.00	0.00	0.86	0.67	0.0016	0.0026

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

			CABLE OR BUS		CABLE	BUS		REACTOR OR CAPACITOR		
-INPUT CODE-		TYPE	X	R	NO.-SIZE	FT	X/FT	R/FT	FT	X(PU)	IR	KV
B 1- 2- 1A		CAB	5.70E-03	7.50E-02								
B 3- 4- 1A		CAB	8.00E-04	2.60E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	XT	KV1	KV2	KVAT	KVAR	X/R
T 2- 3- 1	0.0176	0.48	0.21	30.00	30.00	0.95

STATIC LOADS

-INPUT CODE-	KV	KVA	PFL	LEAD/LAG
L 0- 4- 1	0.21	0.79	0.85	LAG
L 0- 4- 2	0.21	0.22	0.50	LAG

SYSTEM EQUIVALENT

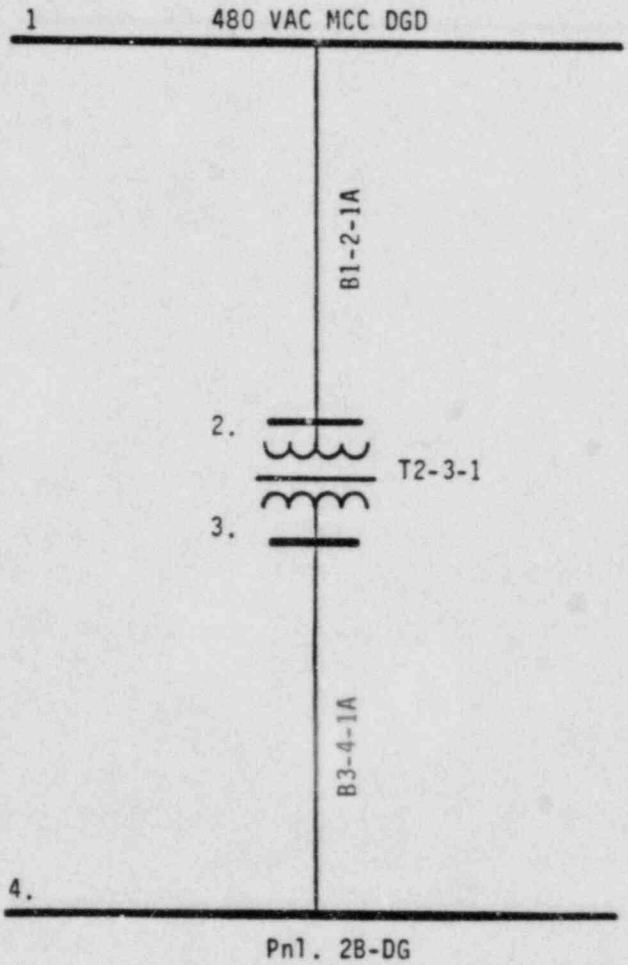
-INPUT CODE-	FMVA	KV	X/R
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Page A105 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

BSEP - Unit #2



ASDOP MODEL #6

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #6
Pnl. 2B-DG

STATIC LOADS

INPUT CODE	DATA Rated Voltage KV	Rated KVA at Rated Voltage KVA	Load Power Factor PFL	Lead or Lag PF LEAD/LAG	Comments
L-4-1	0.208	12.919	0.85	LAG	LOCA RUN
L-4-2	0.208	0.897	0.5	LAG	LOCA RUN
L-4-1	0.208	7.357	0.85	LAG	LIGHTLY LOADED RUN
L-4-2	0.208	0.362	0.5	LAG	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP-2

CASE TITLE: Model #6
Pnl. 2B-DG

2 - WINDING TRANSFORMERS

DATA

INPUT CODE	Reactance In P.U. On KVA Rating	Voltage Rating Of Bus 1 Winding	Voltage Rating Of Bus 2 Winding	Top FOA KVA Rating	XFMR Base KVA	X to R Ratio	Comments
	XT	KV_1	KV_2	KVAT	KVATB (KVAT)	X/R (KVAT)	
T2-3-1	0.0273	0.480	0.208	30	30	0.63	LOCA RUN
T2-3-1	0.0257	0.480	0.208	30	30	0.63	LIGHTLY LOADED RUN

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

DUKE POWER COMPANY
ASDOP

STATION AND UNIT: BSEP - Unit #2

CASE TITLE: Model #6
Pnl. 2B-DG

BRANCH ELEMENTS

INPUT CODE	BRANCH TYPE	REACTANCE (OHMS) X	RESISTANCE (OHMS) R
B1-2-1A	Cable	0.0043	0.0573
B3-4-1A	Cable	0.0007	0.0043

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

```
ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL                                          00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)
```

DUKE POWER COMPANY

DATE = 05/10/84

CRC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #6(PNL 2B-DG) LOCA RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000003 0.000003

SUMMARY OF TAPS

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

LINE FLOWS

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	10.214	6.735	12.234	0.016
2	1	-10.171	-6.731	12.197	0.016
2	3	10.171	6.731	12.196	0.016
3	2	-9.935	-6.583	11.918	0.035
3	4	9.935	6.582	11.917	0.035
4	3	-9.918	-6.580	11.902	0.035

BUS DATA

LOAD

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

05/10/84

BSEP UNIT #2 208/120 VOLT LOAD STUDY

NO.	NAME	VOLTAGE MAG(PU)	VOLTAGE ANG(DEG)	VOLTAGE BASE(KV)	GENERATION KW	GENERATION KVAR	MOTOR KW	MOTOR KVAR	STATIC KW	STATIC KVAR	MISMATCH KW	MISMATCH KVAR
1	MCCDGD	0.9335	-10.09	0.480	10.21	6.73	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRP	0.9306	-9.99	0.480	0.00	0.00	0.00	0.00	0.00	0.00	-0.0000	-0.0001
3	XFMRS	0.9327	-9.96	0.208	0.00	0.00	0.00	0.00	0.00	0.00	-0.0003	-0.0004
4	PNL2BDG	0.9315	-9.93	0.208	0.00	0.00	0.00	0.00	9.92	6.58	0.0003	0.0004

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

-INPUT CODE-	TYPE	++++CABLE OR BUS++++ ----X----	----R----	+++++CABLE++++++ NO.-SIZE	--FT--	++++++++++++BUS++++++++++++ ---X/FT--	---R/FT--	--FT--	++REACTOR OR CAPACITOR+++ --X(PU)--	--IR--	--KV--
B 1- 2- 1A	CAB	4.30E-03	5.73E-02								
B 3- 4- 1A	CAB	7.00E-04	4.30E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	--XT--	--KV1-	--KV2-	--KVAT-	--KVAB-	-X/R-
T 2- 3- 1	0.0273	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	--KV--	---KVA--	-PFL-	LEAD/LAG
L 0- 4- 1	0.21	12.92	0.85	LAG
L 0- 4- 2	0.21	0.90	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	--FMVA--	--KV--	-X/R--
S 0- 1- 1	18.00	0.48	5.0

ENTER COMMAND

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

ENTER COMMAND

NOW IN RUN MODE
DO YOU WANT TO MODIFY THE LOAD-FLOW DATA? (1=YES,0=NO)
GIVE TITLE OF RUN. IT HAS TO BE <80 CHARACTERS
LOAD FLOW AND LIST ALL 00000
DO YOU WANT TO CHANGE THE ABOVE DATA? (0=NO,C=CHANGE)
DO YOU WANT ALL BUSES OUTPUTED? (0=NO,1=YES,2=DEFAULT)

DUKE POWER COMPANY DATE = 05/10/84

RPC 5-10-84

AUXILIARY SYSTEM DESIGN
OPTIMIZATION PROGRAM
(ASDOP)
BSEP UNIT #2 208/120 VOLT LOAD STUDY
MODEL #6(PNL 2B-DG) LIGHTLY LOADED RUN

AS-BUILT WITH XFMR TAPPED AT -2.5%
BUS VOLTAGES,CURRENTS,AND POWER FLOWS

CASE TITLE:LOAD FLOW AND LIST ALL 00000
NO. OF BUSES= 4 NO. OF LINES= 3
SWING BUS NO.= 1
NO. OF ITERATIONS= 4
ABS VOLTAGE ERROR= 0.000001 0.000000

---SUMMARY OF TAPS---

FROM-BUS	TO-BUS	%TAPS
2	3	-2.50

--- LINE FLOWS ---

FROM-BUS	TO-BUS	LINE POWER FLOW KW	KVAR	KVA	LINE CURRENT MAG(KA)
1	2	7.216	4.683	8.602	0.010
2	1	-7.199	-4.681	8.587	0.010
2	3	7.199	4.682	8.587	0.010
3	2	-7.110	-4.626	8.482	0.022
3	4	7.111	4.625	8.483	0.022
4	3	-7.104	-4.624	8.477	0.022

---BUS DATA---

**********LOAD**********

Page A112 of 113
Performed by: CRC 6-6-84
Checked by: SC 6-6-84

AS-BUILT WITH XFMR TAPPED AT -2.5%

RSEP UNIT #2 208/120 VOLT LOAD STUDY PAGE 2 05/10/84

		VOLTAGE			GENERATION		MOTOR		STATIC		MISMATCH	
NO.	NAME	MAG(PU)	ANG(DEG)	BASE(KV)	KW	KVAR	KW	KVAR	KW	KVAR	KW	KVAR
1	MCCBGD	1.0396	-4.15	0.480	7.22	4.6	0.00	0.00	0.00	0.00	0.0000	0.0000
2	XFMRS	1.0378	-4.09	0.480	0.00	0.0[illegible]	0.00	0.00	0.00	0.00	0.0002	0.0000
3	XFMRS	1.0514	-4.08	0.208	0.00	0.00	0.00	0.00	0.00	0.00	0.0007	-0.0003
4	PNL2BDG	1.0507	-4.07	0.208	0.00	0.00	0.00	0.00	7.10	4.62	-0.0011	0.0001

RELEASE 9, 10/1/79
ENTER COMMAND

BRANCH ELEMENTS

			CABLE OR BUS		CABLE	BUS		REACTOR OR CAPACITOR		
-INPUT CODE-	TYPE	X	R	NO.-SIZE	FT	X/FT	R/FT	FT	X(PU)	IR	KV
B 1- 2- 1A	CAB	4.30E-03	5.73E-02								
B 3- 4- 1A	CAB	7.00E-04	4.30E-03								

2-WINDING TRANSFORMERS

-INPUT CODE-	XT	KV1	KV2	KVA1	KVAB	X/R
T 2- 3- 1	0.0257	0.48	0.21	30.00	30.00*	0.63

STATIC LOADS

-INPUT CODE-	KV	KVA	PFL	LEAD/LAG
L 0- 4- 1	0.21	7.36	0.85	LAG
L 0- 4- 2	0.21	0.36	0.50	LAG

SYSTEM EQUIVALENT

-INPUT CODE-	FMVA	KV	X/R
S 0- 1- 1	18.00	0.48	5.0

**** tso will be coming out in 5 min. please log off. *** CN(02)
ENTER COMMAND****

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

Performed By: CRC 6-7-84
Checked By: SC 6-7-84

APPENDIX B

Hand Calculations

TABLE OF CONTENTS

Performed By: CRC 6-7-84
Checked By: SC 6-7-84

BSEP
Appendix B-1.0
Sample Hand Calculation

The following is an example of a hand calculation of terminal voltage for a 120 VAC single phase load. The circuit investigated is Circuit #9 of Panel 1A-TB. This Unit 1 panel is powered from Unit Substation 1E5. This example demonstrates the procedure followed in obtaining the results summarized in the tables that follow.

From ASDOP, (Appendix A Page A8)

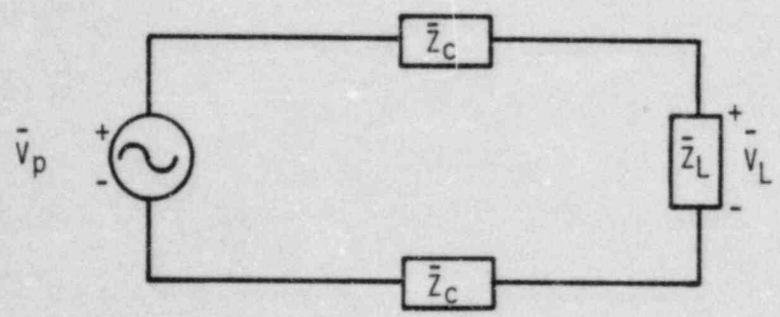
$V_p = 0.9295$ p.u. @ 120V base.

$V_p = 0.9295 \times \frac{120}{115} = 0.9699$ p.u. @ 115V base.

Longest Cable

Circuit #9
$R_{1_X} = 0.5683$ ohm
$X_{1_X} = 0.0125$ ohm
Load = 21.0 VA @ V = 115V and pf = 0.50 or 60° lagging

The circuit representing Panel 1A-TB and Circuit #9 is shown below.



The load impedance ($\bar{Z}_L$) and load terminal voltage ($\bar{V}_L$) are determined as follows:

$\bar{Z}_L = \frac{(\bar{V} \text{ rated})^2}{S} = R_L + jX_L$ where $\bar{V}$ rated is the device nominal voltage and S is the device Volt-Amp rating

$\bar{Z}c = R_{1_X} + jX_{1_X}$ where $\bar{Z}_C$ is the cable impedance

$\bar{V}_L = \bar{V}_p \times \frac{\bar{Z}_L}{2(Z_C) + Z_L}$ where $\bar{V}_p$ is the panel voltage

$$V_L = V_p \frac{Z_L}{[[2(R_{1_X}) + R_L]^2 + [2(X_{1_X}) + X_L]^2]^{\frac{1}{2}}}$$

BSEP
Appendix B-1.0 (Cont'd)
Sample Hand Calculation

Therefore:

$$Z_L = \frac{(115)^2}{21\angle -60} = 629.7619\angle 60 = 314.8810 + j\ 545.3898$$

$$V_L = 0.9699 \quad \frac{629.7619}{\left[\,[2(0.5683) + 314.8810]^2 + [2(0.0125) + 545.3898]^2\,\right]^{\frac{1}{2}}}$$

$$V_L = 0.9690 \text{ p.u. @ 115V base.}$$

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 1 Model #1, PNL 1A-TB, 31AB, 1C, 1A, 1AB-RX, 1AB, 1A-RX (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE Z_c (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
1A-TB/#9	(1)	275	21 /-60	314.8810+j545.3898	0.5683 + j0.0125	0.9699	0.9690	No problem
1A-TB/#8	(2)	239	545 /-60	12.1330+j21.0150	0.4939 + j0.0109	0.9699	0.9493	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0928	Vp<1.10	No problem
31AB/#13	(1)	97	500 /-60	13.2250+22.9064	0.2004+j0.0044	0.9718	0.9641	No problem
None	(2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0938	Vp<1.10	No problem
1C/#10	(1)	2174	84 /-60	78.7202+j136.3475	4.4929+j0.0991	0.9718	0.9428	No problem
See Ckt #10	(2)	See Ckt #10	See Ckt #10	See Ckt #10	See Ckt #10	See Ckt #10	Compare with Ckt #10	No problem
1C/#6	(3)	2129	42 /-60	N/A	N/A	0.9718	Compare with Ckt #10	No problem
1C/#24	(3)	1509	40 /-60	N/A	N/A	0.9718	Compare with Ckt #10	No problem
N/A	(4)	N/A	N/A	N/A	N/A	1.0938	Vp<1.10	No problem
1A/#22	(1)	2287	16 /-60	413.2813+j715.8241	4.7264+j0.1043	0.9716	0.9658	No problem
1A/#27	(2)	1564	84 /-60	78.7202+j136.3475	3.2322+j0.0713	0.9716	0.9508	No problem
None	(3)	N/A	N/A	N/A	N/A	0.9716	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0938	Vp<1.10	No problem
1A/#29	N/A	2180	32 /-60	206.6406+j357.9121	4.5053+j0.0994	0.9716	0.9606	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 1 Model #1, PNL 1A-TB, 31AB, 1C, 1A, 1AB-RX, 1AB, 1A-RX (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	S (VA)	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
1AB-RX/#31	(1)	661	21 /-60	314.8810+j545.3898	1.3660+j0.0301	0.9706	0.9685	No problem
1AB-RX/#5	(2)	116	59 /-60	112.0763+j194.1218	^.2397+j0.0053	0.9706	0.9696	No problem
None	(3)	N/A	N/A	N/A	N/A	0.9706	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0937	Vp<1.10	No problem
1AB/#19	(1)	169	600 /-60	11.0208+j19.0886	0.3492+j0.0077	0.9716	0.9555	No problem
1AB/#14	(2)	84	960 /-60	6.8880+j11.9304	0.1092+j0.0038	0.9716	0.9634	No problem
None	(3)	N/A	N/A	N/A	N/A	0.9716	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0938	Vp<1.10	No problem
1A-RX/#6	(1)	1072	17 /-60	388.9706+j673.7168	2.2154+j0.0488	0.9700	0.9671	No problem
1A-RX/#24	(2)	221	21 /-60	314.8810+j545.3898	0.4567+j0.0101	0.9700	0.9693	No problem
None	(3)	N/A	N/A	N/A	N/A	0.9700	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0928	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-7-
Checked by: SC 6-7-

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 1 Model #2, PNL 1AB-TB, 1B-TB, 1B-RX,1D, 1B (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\frac{S}{}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
1AB-TB/#2	(1)	1090	23 /-60	287.5000+j497.9646	2.2526+j0.0497	0.9658	0.9619	No problem
1AB-TB/#18	(2)	908	882 /-60	7.4972+j12.9855	1.8765+j0.0414	0.9658	0.8398	Below 0.9
1AB-TB/#18	with 2 #12 Cables	908	882 /-60	7.4972+j12.9855	0.9383+j0.0207	0.9658	0.9023	Solution to Ckt #18
1AB-TB/#3	(22)	427	528 /-60	12.5237+j21.6916	0.3824+j0.0195	0.9658	0.9302	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0922	Vp<1.10	No problem
1B-TD/#9	(1)	251	21 /-60	314.8810+j545.3898	0.5187+j0.0114	0.9712	0.9703	No problem
None	(2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0950	Vp<1.10	No problem
1B-RX/#32	(1)	399	21 /-60	314.8810+j545.3898	0.8246+j0.0182	0.9707	0.9694	No problem
None	(2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0948	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(22) Next Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 1 Model #2, PNL 1AB-TB, 1B-TB, 1B-RX, 1D, 1B (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
1D/#12	(1)	1580	240 /-60	27.5521+j47.7216	3.2653+j0.0720	0.9718	0.9113	No problem
None	(2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0953	Vp<1.10	No problem
1B/#27	(1)	2280	32 /-60	206.6406+j357.9121	4.7119+j0.1040	0.9715	0.9600	No problem
1B/#18	(2)	169	500 /-60	13.2250+j22.9064	0.3492+j0.0077	0.9715	0.9581	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0951	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-
Checked by: SC 6-6-

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

UNIT 1 Model #3, PNL 31A (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE $\bar{Z}c$ (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
31A/#11	(1)	194	$32\ \underline{/-60}$	206.6406+j357.9121	0.4009+j0.0088	0.9549	0.9539	No problem
31A/#1	(2)	70	$52.8\ \underline{/-60}$	125.2367+j216.9164	0.1446+j0.0032	0.9549	0.9543	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0802	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-7-84
Checked by: SC 6-7-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

UNIT 1 Model #4, PNL 1A-DG (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE $\bar{Z}c$ (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
1A-DG/#1	(1)	229	21 /-60	314.8810+j545.3898	0.4733+j0.0104	0.9554	0.9547	No problem
1A-DG/#24	(2)	96	147.6 /-60	44.8001+j77.5961	0.1983+j0.0044	0.9554	0.9532	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0793	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-8
Checked by: SC 6-6-8

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 1 Model #5, PNL 31B (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	S (VA)	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
31B/#8	(1)	790	353 /-60	18.7323+j32.4453	1.6450+j0.0363	0.9548	0.9108	No problem
31B/#1	(11)	156	52.8 /-60	125.2367+j216.9164	0.3224+j0.0071	0.9548	0.9535	No problem
31B/#23	(2)	85	886 /-60	7.4633+j12.9268	0.1756+j0.0038	0.9548	0.9431	No problem
None	(3)	N/A	N/A	N/A	N/A	0.9548	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0863	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(11) Next Longest Cable (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Note: Total load on this panel was decreased in Revision 1 of this calculation and, therefore, the actual panel voltage would be greater than the originally calculated value. Since the previously derived value provides a more conservative panel voltage, it was used in the above hand calculations.

Performed by: CRC 7-27-84
Checked by: SC 7-27-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 1 Model #6, PNL 1B-DG (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\frac{S}{(VA)}$	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
1B-DG/#15	(1)	858	9.4 /-60	703.4575+j1218.424	1.7732+j0.0391	0.9472	0.9460	No problem
1B-DG/#24	(2)	122	148 /-60	44.6791+j77.3864	0.2521+j0.0055	0.9472	0.9444	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0823	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-
Checked by: SC 6-6-

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #1, PNL 2A-TB, 32AB, 2C, 2A, 2AB-RX, 2AB, 2A-RX (MODIFIED WITH XFMR TAPS SWITCHED TO NOMINAL)

PANEL Ckt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE Z_c (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
2A-TB/#7	(1)	1661	31.2 /-60	211.9391+j367.0893	3.4327+j0.0757	0.9607	0.9526	No problem
2A-TB/#6	(2)	127	545 /-60	12.1330+j21.0150	0.2624+j0.0058	0.9607	0.9499	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0753	Vp<1.10	No problem
32AB/#7	(1)	209	21 /-60	314.8810+j545.3898	0.4318+j0.0095	0.9639	0.9632	No problem
32AB/#22	(2)	111	500 /-60	13.2250+j22.9064	0.2294+j0.0051	0.9639	0.9552	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0771	Vp<1.10	No problem
2C/#10	(1)	2293	42 /-60	157.4405+j272.6949	4.7388+j0.1045	0.9640	0.9489	No problem
2C/#19	(2)	940	80.5 /-60	82.1429+j142.2756	1.9426+j0.0428	0.9640	0.9521	No problem
2C/#6	(3)	1549	42 /-60	Less than Ckt #10	3.2012+j0.0706	0.9640	See Ckt #10	No problem
N/A	(4)	N/A	N/A	N/A	N/A	1.0771	Vp<1.10	No problem
2A/#29	(1)	2150	32 /-60	206.6406+j357.9121	4.4433+j0.0980	0.9639	0.9531	No problem
2A/#27	(2)	1574	84 /-60	78.7202+j136.3475	3.2529+j0.0717	0.9639	0.9431	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0771	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-7-84
Checked by: SC 6-7-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #1, PNL 2A-TB, 32AB, 2C, 2A, 2AB-RX, 2AB, 2A-RX (MODIFIED WITH XFMR TAPS SWITCHED TO NOMINAL)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE Z_c (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
2AB-RX/#5	(1)	115	59 /-60	112.0763+j194.1218	0.2376+j0.0052	0.9633	0.9622	No problem
None	(2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0769	Vp<1.10	No problem
2AB/#19	(1)	136	600 /-60	11.0208+j19.0886	0.2810+j0.0062	0.9637	0.9509	No problem
2AB/#14	(2)	84	960 /-60	6.8880+j11.9304	0.1735+j0.0038	0.9637	0.9510	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0770	Vp<1.10	No problem
2A-RX/#6	(1)	1083	17 /-60	388.9706+j673.7168	2.2382+j0.0494	0.9632	0.9603	No problem
2A-RX/#27	(2)	302	31 /-60	213.3065+j369.4576	0.6241+j0.0138	0.9632	0.9617	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0768	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-
Checked by: SC 6-6-

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #2, PNL 2AB-TB, 2B-TB, 2B-RX, 2D, 2B (MODIFIED WITH XFMR TAPS SWITCHED TO NOMINAL)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\frac{S}{}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
2AB-TB/#16	(1)	648	882 /-60	7.4972+j12.9854	1.3388+j0.0295	0.9634	0.8732	Below 0.9
2AB-TB/#16	With 2 #12 Cables	648	882 /-60	7.4972+j12.9854	0.6694+j0.0148	0.9634	0.9183	Solution to Ckt #16
2AB-TB/#2	(11)	573	23 /-60	287.5000+j497.9646	1.184+j0.0261	0.9634	0.9613	No problem
2AB-TB/#3	(2)	425	528 /-60	12.5237+j21.6916	0.8780+j0.0194	0.9634	0.9280	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0783	Vp<1.10	No problem
2B-TB/#9	(1)	277	21 /-60	314.8810+j545.3898	0.5723+j0.0126	0.9658	0.9649	No problem
None	(2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0794	VP<1.10	No problem
2B-RX/#30	(1)	557	21 /-60	314.8810+j545.3898	1.1511+j0.0254	0.9654	0.9636	No problem
None	(2)	N/A	N/A	N/A	N/A	0.9654	N/A	N/A
None	(3)	N/A	N/A	N/A	N/A	0.9654	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0792	VP<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(11) Next longest cable (LOCA)
(3) More than 50% of the longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-94
Checked by: SC 6-6-94

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #2, PNL 2AB-TB, 2B-TB, 2B-RX, 2D, 2B (MODIFIED WITH XFMR TAPS SWITCHED TO NOMINAL)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
2D/#12	(1)	1961	240 $\angle -60$	27.5521+j47.7216	4.0527+j0.0894	0.9676	0.8929	Below 0.9
2D/#12	With 2 #12 Cables	1961	240 $\angle -60$	27.5521+j47.7216	2.0264+j0.0447	0.9676	0.9303	Solution to Ckt #12
2D/#21	(11)	1812	68 $\angle -60$	97.2427+j168.4292	3.7447+j0.0826	0.9676	0.9481	No problem
2D/#22	(2)	574	96 $\angle -60$	68.8802+j119.3040	1.1862+j0.0262	0.9676	0.9589	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0803	Vp<1.10	No problem
2B/#27	(1)	2260	32 $\angle -60$	206.6406+j357.9121	4.6706+j0.1030	0.9674	0.9560	No problem
2B/#10	(2)	162	500 $\angle -60$	13.225+j22.9064	0.3348+j0.0074	0.9674	0.9546	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0802	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)
(11) Next Longest Cable (LOCA)

Performed by: CRC 6-6-89
Checked by: SC 6-6-89

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #3, PNL 32A (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\bar{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\bar{S}}$ (Ohms)	CABLE IMPEDANCE $\bar{Z}c$ (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
32A/#6	(1)	1239	17 /-60	388.9706+j673.7168	** 2.5606+j0.0564	0.9789	0.9756	No problem
32A/#1	(2)	76	52.8 /-60	125.2367+j216.9164	0.0987+j0.0034	0.9789	0.9785	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0986	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)
** See page B24

Performed by: CRC 6-6-84
Checked by: SC 6-6-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #4, PNL 2A-DG (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	$\overline{S}$ (VA)	LOAD IMPEDANCE $\frac{(115)^2}{\overline{S}}$ (Ohms)	CABLE IMPEDANCE Z_c (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
2A-DG/#4	(1)	429	42 /-60	157.4403:j272.6949	0.8866+j0.0195	0.9711	0.9682	No problem
2A-DG/#24	(2)	123	147.6 /-60	44.8001+j77.5961	0.2541+j0.0056	0.9711	0.9682	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0940	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-8
Checked by: SC 6-6-8

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #5, PNL 32B (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	S (VA)	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
32B/#22	(1)	2877	32 /-60	206.6406+j357.9121	5.9457+j0.1312	0.9697	0.9551	No problem
32B/#14	(2)	875	353 /-60	18.7323+j32.4453	1.8076+j0.0399	0.9697	0.9206	No problem
32B/#11	(22)	116	886 /-60	7.4633+j12.9268	0.2397+j0.0053	0.9697	0.9536	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0971	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Note: Total load on this panel was decreased in Revision 1 of this calculation and, therefore, the actual panel voltage would be greater than the originally calculated value. Since the previously derived value provides a more conservative panel voltage, it was used in the above hand calculations.

Performed by: CRC 7-27-84
Checked by: SC 7-27-84

APPENDIX B-1.0
LOAD TERMINAL VOLTAGE HAND CALCULATIONS

Unit 2 Model #6, PNL 2B-DG (AS-BUILT WITH XFMR TAPPED AT - 2.5%)

PANEL CKt	PARAMETERS *	CABLE LENGTH (FT)	S (VA)	LOAD IMPEDANCE $\frac{(115)^2}{S}$ (Ohms)	CABLE IMPEDANCE Zc (Ohms)	PANEL VOLTAGE @ 115V (p.u.)	LOAD TERMINAL VOLTAGE @ 115V (p.u.)	Comments
2B-DG/#2,9, 11,16,17,19 20	(1)	1016	33.6 /-60	196.8006+j340.8686	2.0990+j0.0463	0.9720	0.9666	No problem
2B-DG/#24	(2)	144	I48 /-60	44.6791+j77.3864	0.2976+j0.0066	0.9720	0.9686	No problem
None	(3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	(4)	N/A	N/A	N/A	N/A	1.0964	Vp<1.10	No problem

*(1) Longest Cable (LOCA)
(2) Largest Load (LOCA)
(3) More than 50% of the Longest Cable and more than 50% of the Largest Load (LOCA)
(4) Shortest Cable (Light Load)

Performed by: CRC 6-6-8
Checked by: SC 6-6-8

BSEP
Appendix B-2.0
ASDOP Model Transformer Impedances

In these studies transformer worst case impedances were used in all cases (i.e., for LOCA Run models, transformer impedance was assumed to be at its maximum possible value and for LIGHTLY LOADED (Shutdown) models, the impedance was assumed to be at a minimum). These assumptions provided lowest (worst case) panel voltages for LOCA Run models and highest (worst case) panel voltages for LIGHTLY LOADED (Shutdown) models. The calculation of these values is shown below.

- 150 KVA 208/120 Transformers GF4 & GF6

  $X''_{nominal}$ = 3.1% with a ±7.5% tolerance

  Therefore, for LOCA Run cases, X" was assumed to be:

  $X''_{LOCA} = 0.031 + (0.031 \times 0.075) = 0.0333$ p.u.

  For Lightly Loaded (Shutdown) cases, X" was assumed to be:

  $X''_{LITE} = 0.031 - (0.031 \times 0.075) = 0.0287$ p.u.

- 30 KVA 208/120 Transformers GF2, HE1, FN3, GF3, (Unit 1) and GE7, GE8, (Unit 2)

  $X''_{nominal}$ = 2.62% with a tolerance of +4%, -2%

  This yielded:

  $X''_{LOCA} = 0.0273$ p.u.

  $X''_{LITE} = 0.0257$ p.u.

- 3-10 KVA 208/120 Transformer banks FJ6 & FJ7 (Unit 2)

  $X''_{nominal}$ = 1.9% with a tolerance of ±7.5%

  This yielded:

  $X''_{LOCA} = 0.0204$ p.u.

  $X''_{LITE} = 0.0176$ p.u.

BSEP Units 1 and 2
Appendix B-3.0
Cable Impedance Calculations by Duke Power Company

- For Circuit #18 of Panel 1AB-TB, U.E. & C. provided the cable impedance of one #12 cable as R = 1.8765 ohms, X = 0.0414 ohms. The equivalent impedance of two parallel #12's was found from the following relationship:

$$R_{equivalent} = \frac{1}{\frac{1}{R_{\#12}} + \frac{1}{R_{\#12}}} = \frac{R_{\#12}}{2}$$

$$X_{equivalent} = \frac{1}{\frac{1}{X_{\#12}} + \frac{1}{X_{\#12}}} = \frac{X_{\#12}}{2}$$

Therefore,

$R_{2\#12's} = 0.9383$ ohms

$X_{2\#12's} = 0.0207$ ohms

- A similar procedure was followed in calculating the impedance of four parallel #12 cables for Circuit #8 of Panel 31B:

$$R_{equivalent} = \frac{1}{\frac{1}{R_{\#12}} + \frac{1}{R_{\#12}} + \frac{1}{R_{\#12}} + \frac{1}{R_{\#12}}} = \frac{R_{\#12}}{4}$$

$$X_{equivalent} = \frac{1}{\frac{1}{X_{\#12}} + \frac{1}{X_{\#12}} + \frac{1}{X_{\#12}} + \frac{1}{X_{\#12}}} = \frac{X_{\#12}}{4}$$

Therefore:

$R_{4\#12's} = 0.4113$ ohms

$X_{4\#12's} = 0.0091$ ohms

In calculating the impedance of the single #6 cable, Table 1.20 was used along with the cable length provided by U.E.& C. This yielded:

$$R_{\#6} = (796 \text{ feet}) \left(\frac{0.0493 \text{ ohms}}{100 \text{ feet cable}}\right) (1.048) = 0.4113 \text{ ohms}$$

where 1.048 was the temperature correction factor used to derate the cable for operation at a 90°C ambient temperature. Similarly:

$$X_{\#6} = (796 \text{ feet}) \left(\frac{0.00391 \text{ ohms}}{100 \text{ feet cable}}\right) = 0.0311 \text{ ohms}$$

- For Circuit #16 of Panel 2AB-TB, U.E. & C. provided the impedance of one #12 cable as R = 1.3388 ohms and X = 0.0295 ohms. As previously derived, the equivalent impedance of two parallel #12 cables is:

$$R_{2\#12's} = \frac{1.3388}{2} = 0.6694 \text{ ohms}$$

$$X_{2\#12's} = \frac{0.0295}{2} = 0.0148 \text{ ohms}$$

- Circuit #12 of Panel 2D also required a paralleling of another #12 cable with the original yielding the following resultant cable resistance and reactance:

$$R_{2\#12's} = \frac{4.0527}{2} = 2.0264 \text{ ohms}$$

$$X_{2\#12's} = \frac{0.0894}{2} = 0.0447 \text{ ohms}$$

- For Circuit #14 of Panel 32B, the recommendation was to replace the original #12 cable with a single #6 cable. The impedance of this replacement cable was calculated as shown below:

From U.E. & C. data: cable length = 875 ft.

From Table 1.20: $R_{\#6} = 0.0493$ ohms/100 ft.

$X_{\#6} = 0.00391$ ohms/100 ft.

Note: These values are at 70°C. A multiplier of 1.048 must be used to calculate cable resistance at a 90°C ambient temperature.

Therefore, for this circuit:

$$R_{\#6} = (875 \text{ feet}) \left(\frac{0.0493 \text{ ohms}}{100 \text{ feet}}\right) (1.048) = 0.4521 \text{ ohms}$$

$$X_{\#6} = (875 \text{ feet}) \left(\frac{0.00391 \text{ ohms}}{100 \text{ feet}}\right) = 0.0342 \text{ ohms}$$

BSEP
Appendix B-4.0
Overvoltage Under Light Load Conditions

For Models 1 & 2 of Unit 2 (panels powered from Unit Substations 2E7 & 2E8), the worst case overvoltage before implementing the tap change to the transformers feeding these panels was:

- Panels 2A & 2C (fed from Unit Substation 2E7)

  The voltage at the panel during Light Load operation was 1.0586 p.u. on a 120VAC base or 1.1046 p.u. on a 115VAC base. This yielded:

  (1.1046 - 1.10) x 100 = 0.46% overvoltage.

- Panel 2D (fed from Unit Substation 2E8)

  The voltage at the panel during Light Load operation was 1.0618 p.u. on a 120VAC base or 1.1080 p.u. on a 115VAC base. This yielded:

  (1.1080 - 1.10) x 100 = 0.80% overvoltage.

BSEP
Appendix B-5.0
Correction to U.E. & C. Calculation #7453-227-3-ED00-01

- Panel 32A, Circuit #6

  The LOCA resistance is recorded on page 38 of 48 as R_{1X} = 2.506 ohms

  From Table 1.20, the resistance of a #12 cable is:

  $$R_{\#12} = 0.1972 \text{ ohms/100 ft.}$$

  Therefore, for this 1239 ft. long cable, the resistance at 70°C is:

  $$R = \left(\frac{0.1972 \text{ ohms}}{100 \text{ ft.}}\right)(1239 \text{ feet}) = 2.4433 \text{ ohms}$$

  For use in this calculation, the cable must be derated to operate at a 90°C ambient temperature. Per U.E. & C. data on page 48 of 48, this correction factor is 1.048.

  Therefore, the resistance of this cable should be:

  $$R_{1X} = (1.048)\ (2.4433) = 2.5606 \text{ ohms}$$

Performed By: CRC 6-7-84
Checked By: SC 6-7-84

ATTACHMENT #1

Transformer Data

Cable Data

Load Data

Attachment #1
BSEP - Units 1 & 2
Miscellaneous Information Used in 208/120 Volt Load Studies

The following information was obtained from CP&L letter # ED-202 dated May 27, 1984. Transformer tap settings were obtained from memorandum from H. Nguyen to A. Benge dated 04/19/84.

- Units 1 & 2: 150 KVA 480/208/120 VAC Transformers GF4 and GF6

  Taps presently set on - 2.5%.
  X = 3.1%
  R = 1.1%
  Z = 3.3%
  Tolerance = ±7.5%

- Unit 2: Cable Impedances @ 90°C

From	To	Z (Ω)
Transformer GF4	Panel 2E7	0.001071+j0.0010325
Transformer GF6	Panel 2E8	0.0007038+j0.0006785

- Unit 1: 30 KVA 480/208/120 VAC Transformers GF2, HE1, FN3 & GF3
  Unit 2: 30 KVA 480/208/120 VAC Transformers GE7 & GE8

  Taps presently set on - 2.5%
  X = 2.62%
  R = 4.18%
  Z = 5%
  Tolerance = +4, -2%

- Unit 2: 3-10KVA 480/208/120VAC Transformer banks F56 & F57

  Taps presently set on -2.5%
  X = 1.9%
  R = 2%
  Z = 2.76%
  Tolerance = ±7.5%

- Unit 2: Cable Inpedances @ 90°C

From	To	Z (Ω)
Unit Substation 2E7	Transformer GF4	0.01962+j0.01822
Unit Substation 2E8	Transformer GF6	0.03235+j0.02941

Performed By: CRC 7-27-
Checked By: 3C 7-27-

Attachment #1
BSEP - Units 1 & 2
Miscellaneous Information Used in 208/120 Volt Load Studies

- Unit 1: Cable Impedances @ 90°C

From	To	Z (Ω)
Unit Substation 1E6	Transformer GF6	0.01773+j0.01587
Transformer GF6	Distribtuion Panel 1E6	0.000735+j0.000708
Unit Substation 1E5	Transformer GF4	0.02594+j0.02382
Transformer GF4	Distribution Panel 1E5	0.00107+j0.00103

- Units 1 & 2: Bus Voltages from ASDOP model runs for both LOCA Run and Shutdown conditions for busses powering 480/208/120 VAC transformers.

Load Data

U.E. & C. calculations 7453-127-3-ED00-01 and 7453-227-3-ED00-01 are included as part of this attachment. Load data used in this study was taken from these calculations which consist of:

- Calculation 7453-127-3-ED00-01
  - Cover Sheet ---------- 1 page
  - Calculation Notes ---------- 6 pages
  - Load Tabulations for Unit 1 ----------47 pages
- Calculation 7453-227-3-ED00-01
  - Cover Sheet ---------- 1 page
  - Calculation Notes ---------- 6 pages
  - Load Tabulations for Unit 2 ----------42 pages

Revision 1

Revision 1 to Duke Power Calculation MTS-2076-1808.04-00-0001 was based on a revision of the 1X-LOCA load value for circuits 31B-8 and 32B-14 (from 1621 VA to 353 VA). These values are documented on Revision 1 to pages 45 of 53 and 40 of 48 of U.E&C. Calculations 7453-127-3-ED00-01 and 7453-227-3-ED00-01, respectively. 1

united engineers & constructors inc

CALCULATION CONTROL SHEET

CALC. SET NO.	
PRELIM.	
FINAL	✓
VOID	

PROJECT TITLE CPEL-BSEP NO. 1 DISCIPLINE ELECTRICAL

SYSTEM 208/120 VOLT DISTRIBUTION SYSTEM

SUBJECT 1X LOCA-208/120VOLT SYSTEM DATA

DESIGN CLASSIFICATION CLASS 1E (SAFETY RELATED)

STARTED BY R. ABDUL DATE 04/16/84

AUTHORIZED BY K.L. BAR DATE 04/16/84

PROBLEM STATEMENT

PREPARE LOAD DATA FOR BSEP UNIT#1 208/120 VOLT DISTRIBUTION SYSTEM BASED ON

a) NORMAL PLANT OPERATION, AND

b) A LOSS OF COOLANT ACCIDENT (LOCA) FOR ONE UNIT AND AN ORDERLY SHUTDOWN OF THE OTHER UNIT.

DESIGN BASIS

- UPDATED FSAR DATED 7/19/82
- REFER TO SECTION 3 FOR ADDITIONAL CRITERIA

TOTAL NUMBER OF SET COMPUTATION SHEETS 53 (EXCLUDING CALC. CONTROL SHEET)

FINISHED BY Rashid abdul 4/28/84 CHECKED BY [illegible] 4/28/84

	CHECKER	DESIGN SUPER	COGNIZANT ENG'R	DESIGN REVIEW
BY	[illegible]	[illegible]	[illegible]	
DATE	4/28/84		4/28/84	

REVISION 1 STARTED DATE _____ BY _____

united engineers & constructors inc.

CALCULATION SUMMARY & REFERENCE SHEET

PROJECT TITLE CP&L - BSEP NO.1 DISCIPLINE ELECTRICAL

CALC. SET NO.

PRELIM. | FINAL ✓ | VOID

SHEET 1 OF 53

J.O. 7453-127

SYSTEM 208/120 VOLT DISTRIBUTION SYSTEM

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

DESIGN CLASSIFICATION CLASS 1E (SAFETY RELATED)

REV	COMP. BY	CHK'D BY
0	RA DATE 4/21/84	NKS DATE 4/25/84
	DATE	DATE

SUMMARY/CONCLUSIONS

REFER TO SECTION 4.0 OF THE CALCULATION - "SYSTEM LOAD DATA"

REFERENCES: (SPECIFICATIONS, DRAWINGS, CODES, CALCULATION SETS, TEXTS, REPORTS, COMPUTER DATA PSAR ETC.)

1. CALC. NO. 9527-001-3-ED00-53-F, TITLED "VOLTAGE DROP STUDY, 208/120 VOLT SAFETY RELATED LOADS" - REV. 1, DATED 5/25/81
2. NOTES OF TELEPHONE CONVERSATIONS T-1000 DATED 3/13, 16/84 AND T-961 DATED 2/28/84.
3. DRAWING SCHEDULES DATED 12/30/83
4. INDUSTRIAL POWER SYSTEM HANDBOOK BY D. BEEMAN, EDITOR, FIRST EDITION, MCGRAW HILL BOOK COMPANY, INC., 1955
5. DRAWINGS AS LISTED IN THE CIRCUIT EVALUATION TABLES FOR VARIOUS LOADS
6. CP&L WORK AUTHORIZATION NO. XS32340023 TO CONTRACT NO. XM 32340000, 3/9/84 (FILE HBR/C6)

GENERAL COMPUTATION SHEET

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(DISCIPLINE: ELECTRICAL)

NAME OF COMPANY CP&L, RSEP UNIT # 1

SUBJECT IX LOCA - 208/120 VOLT SYSTEM DATA

7453-127-3-EDOO-[illegible]

CALC SET NO		REV	COMP BY	CHKD BY
PRELIM		0	RA	
FINAL	✓		DATE 4/21/84	DATE 4/[illegible]/84
VOID				
SHEET 2 OF 53			DATE	DATE
JO 7453-127				

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united engineers & constructors inc

7453-127-3-EDOO-01

CALC SET NO		REV	COMP BY	CHK'D
PRELIM		0	RA	
FINAL	✓		DATE 4/26/84	DATE 4/30/84
VOID				
SHEET 3 OF 53			DATE	DATE
JO 7453-127				

(DISCIPLINE) ELECTRICAL

NAME OF COMPANY CP&L, BSEP UNIT # 1

SUBJECT IX. LOCA - 208/120 VOLT SYSTEM DATA

1. PURPOSE:

Provide 208/120 VOLT AC Load data for a loss of Coolant accident (LOCA) in one Unit with an orderly shutdown of the other Unit.

2. SCOPE:

1. (a) To provide the maximum load data on each 208/120 VOLT distribution Panel and/or bus, based on a loss of Coolant accident (LOCA) on one Unit and an orderly Shutdown of the other Unit

(b) Load data will be updated with the "As Built" plant modifications through November 1983.

2. Cable data, including number of Conductors, Cable size, length, and impedance for feeder cables to 120/208 VOLT panels/buses and for the cables to the load terminals.

3. Transformer impedances and X/R ratio for all 480 — 208/120 VOLT transformers.

(NOTE: Refer to CP&L Work Authorization No. XS32340023 TO CONTRACT NO. XM32340000 as modified by

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(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

7453-127-3-EDOO-01

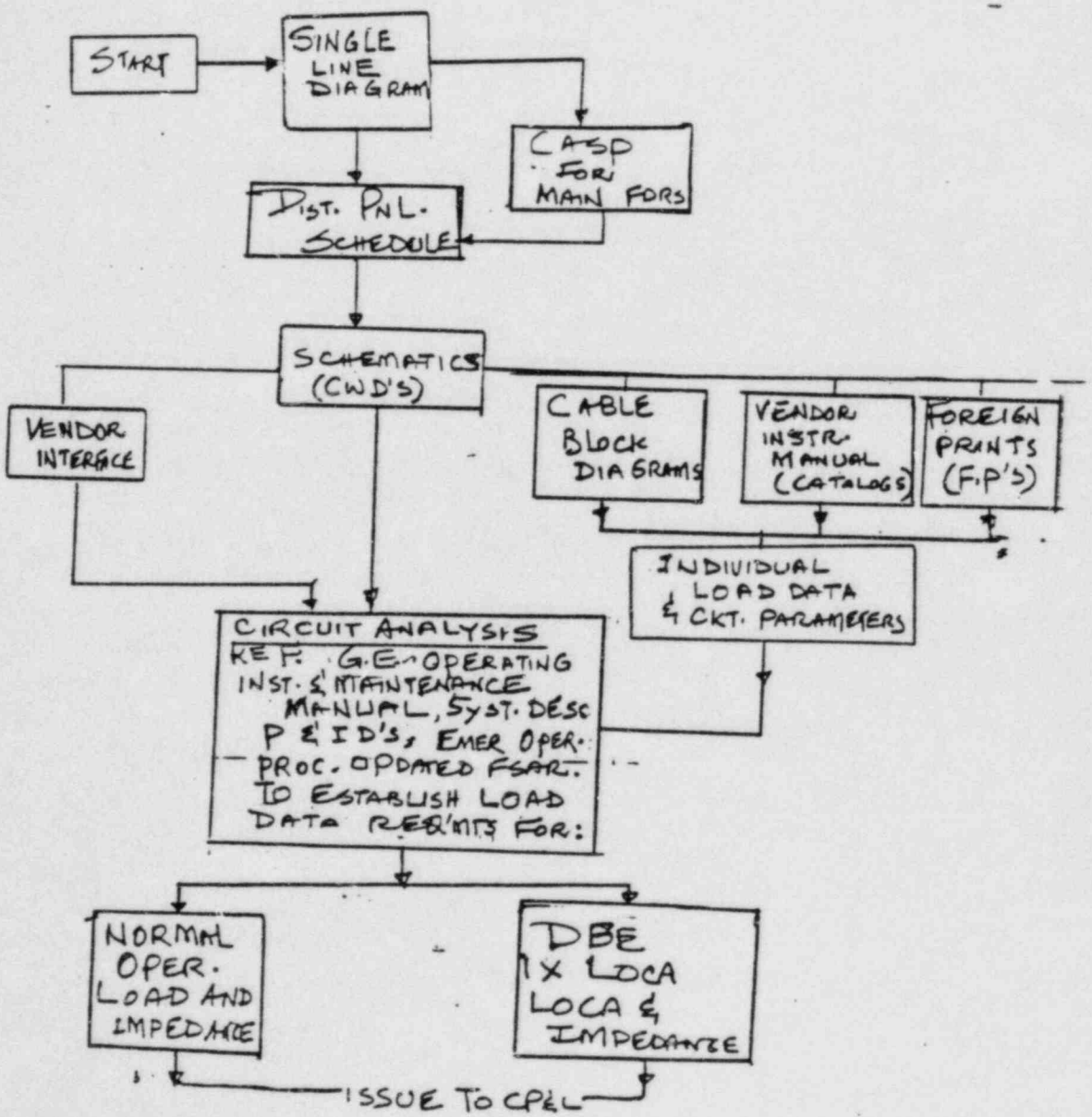
CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	
FINAL	✓		DATE 4/26/84	DATE 4/28/84
VOID				
SHEET 4 OF 53			DATE	DATE
JC 7453-127				

NAME OF COMPANY CP&L, BSEP UNIT# 1

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

NOTES OF TELEPHONE CONVERSATION NO. T-961 dated 2/28/84).

3. REVIEW METHODOLOGY/CRITERIA



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GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

7453-127-3-EDOO-01

CALC SET NO		REV	COMP BY	CHK D
PRELIM		0	RA	
FINAL	✓		DATE 4/21/84	DATE 4/2[illegible]
VOID				
SHEET 5 OF 53			DATE	DATE
JO 7453-127				

NAME OF COMPANY CP&L, BSEP UNIT # 1

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

A GENERAL FLOW DIAGRAM IS SHOWN ON PREVIOUS PAGE TO INDICATE THE VARIOUS ELEMS OF TASK. SOME LOAD DATA ARE TAKEN FR THE EXISTING CALC. NO. 9527-001-3-EDOO-53-F REV. 1, DATED 2/25/81. VARIOUS MANUFACTURERS WE CALLED TO OBTAIN LOAD DATA WHEN F.P OR INST. MANUALS DID NOT PROVIDE THE REQUIRED INFORMA

THE FOLLOWING APPROACH WAS ADOPTED AS NOTED IN THE TELEPHONE CONVERSATION NO T-1000 DATED 3/16/84:

1. CONCURRENT SHUTDOWN: MEANS ORDERLY SHUTD WITH "LOCA" IN ONE UNIT NO OPERATOR ACTION WILL BE TAKEN AT LEAST WITHIN A MINUTE FOLLOWING THE EVENT TO SHUT THE OTHER UNIT.

2. TRANSFERABLE LOADS: TRANSFERABLE LOA SHOULD BE ANALYZED TO DETEMINE THE WORST CASE LOADING CONDITION FORTHE VOLTAGE DROP STUDY.

3. BUS LOADS: SAFETY RELATED BUS LOADS WITH CABLE AND TRANSFORMER DATA ARE TO BE PROVIDED FOR LIGHT LOAD (UAT)/SHUT DOWN (SAT) CONDITIONS. IDENTIFICATIONS OF INDIVIDUAL LOADS BY TAG NOS. OR FUNCTIONAL IDENTIFICATION NO. IS NOT INTENDED. TOTAL CONNECTED LOAD

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GENERAL COMPUTATION SHEET

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7453-127-3-EDOO-01

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	
FINAL	✓		DATE 4/21/84	DATE 4/28/84
VOID				
SHEET 6 OF 53			DATE	DATE
JO 7453-127				

NAME OF COMPANY CP&L, BSEP UNIT # 1

SUBJECT X LOCA - 208/120 VOLT SYSTEM

TO THE BUS UNDER VARIOUS CONDITIONS OF OPERATION IS TO BE COLLECTED.

4. CONNECTED LOAD: CONNECTED LOADS MEAN LOADS THAT ARE REQUIRED TO BE ENERGIZED DURING THE PLANT CONDITION, FOR WHICH THE VOLTAGE DROP IS INTENDED. ALL CIRCUITS ARE ANALYZED TO DETERMINE THE TOTAL CONNECTED LOADS FOR VARIOUS MODES OF PLANT OPERATION, UNLESS NOTED OTHERWISE IN THE "SYSTEM LOAD DATA" TABULATIONS

5. ALL RESISTANCE(AC) VALUES ARE CALCULATED BASED ON TABLE 1.20, PAGE 53 & CORRECTED TO 90°C CONDUCTOR TEMPERATURE.

(REFERENCE: PAGE 98 OF INDUSTRIAL POWER SYSTEM HANDBOOK BY D. BEEMAN,, FIRST EDITION, 1955, EDITOR, McGRAW HILL BOOK COMPANY, INC.)

6. FOR ADDITIONAL REVIEW CRITERIA REFER TO "REVIEW NOTES" ON SECTION 4, PAGE NO. 53 OF 53

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7453-127-3-ED00-01, SEC-A

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO	REV.	COMP BY	CHKD BY
PNL'S	0	RA	
E.M. ✓		DATE 4/23/84	DATE 4/27/84
VDD			
SHEET 7 OF 53			
ID 7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1A DWG NO. 0527-LL-93041 SH. 4 REV. 11 DATED 5/16/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	NORMAL DIST FROM PNL. IN FT.	1X-LOCA LOAD IN VA	1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
1	(D12) PROCESS RAD MON. 1-D12-V27A	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
2	1-RIP-PV-343B CAC-MONITORING SYS	15.6(5)	1016	5	SEE NOTE #1	2.0997	.0463	2.1002	—	—	—	
3	RHR (E11) 1H12-P601 E11-R604	55	SEE NOTE #1	55	SEE NOTE #1	—	—	—	—	—	—	
4	RHR 1H12-P613, 1E11-K600A, K605A S600A, K605A	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
5	RHR 1H12-P617, E11-F051A, F053A	0	—	0	—	—	—	—	—	—	—	
6	RX RECIRC. (B32) 1H12-P603 & P612 M/A TRANSFORMER STA	42	SEE NOTE #1	42	SEE NOTE #1	—	—	—	—	—	—	
7	CAC INSTRUMENT PANEL XU-60 (RECTIFIER SUPPLY)	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
8	SPARE											
9	CAC INSTRUMENT PANEL XU-60 (120V SUPPLY)	106	SEE NOTE #1	106	SEE NOTE #1	—	—	—	—	—	—	
10	SPARE											
11	HPCI (E41) 1H12-P601 TURB. TEST & VIBRATION CKTS	32	SEE NOTE #1	32	SEE NOTE #1	—	—	—	—	—	—	
12	24/48 VDC BATTERY CHARGER "21A-2"	2000	SEE NOTE #1	2000	SEE NOTE #1	—	—	—	—	—	—	
13	CTL BLDG VENT. SYS FILTER "A"											NO CABLE AS PER CASP.
14	BRIDGE IND UNIT 1-VA-TI-1299	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

7453-127-3-ED00-01 SEC-A

CALC SET NO		REV	COMP BY	CHKD BY
PRELIM		0	RA	
FINAL	✓		DATE 4/23/84	DATE
VOID				
SHEET	5 OF 53		DATE	DATE
ID	7453-127			

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO 1A DWG NO 9527-LL-93041 SH. 4 REV. 11 DATED 5/16/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
15	24/48 VDC BATTERY CHARGER "21A-1"	2000	-	2000	-	-	-	-	-	-	-	
16	PUMP 1A COOLING WATER SOL. VLV. 1-RCC-V74	21	1667	21	1667	3.4451	.0760	3.4459	3.4451	.0760	3.4459	
17	SPARE											
18	SEAL COOLING EXCH. DISCH. VLVS V130 & V131	31.2	SEE NOTE #1	0	-	-	-	-	-	-	-	
19	VACUUM BKRS 1-CAC-X1BA TO 1-CAC-X1BE TEST CKT	25	SEE NOTE #1	25	SEE NOTE #1	-	-	-	-	-	-	
20	SPARE											
21	BRIDGE IND UNIT 1-VA-TI-130B-2 & 1-VA-TI-130B-1	100	SEE NOTE #1	100	SEE NOTE #1	-	-	-	-	-	-	
22	SW RHR PMPS 1A-1C AUX. CONTROL	16(56)	2287	16(56)	2287	4.7264	.1043	4.7276	4.7264	.1043	4.7276	
23	RHR PMPS WELL WTR SUPPLY VLV V-143	0	-	0	-	-	-	-	-	-	-	
24	RX BLDG CLOSED COOLING WTR SYS 1-RCC-PS-672	0	-	84	696	1.4384	.0317	1.4387	1.4384	.0317	1.4387	
25	VITAL HEAD WELL WTR SUPPLY VLV V41	52.6	SEE NOTE #1	5	SEE NOTE #1	-	-	-	-	-	-	
26	RX BLDG CLOSED COOLING WTR SYS SOL. VLV 1-RCC	16(21)	688	16(21)	688	1.4218	.0314	1.4220	1.4218	.0314	1.4220	
27	TURB TRIP AIR RELAY DUMP VLV CTL HDR PRESS LO PLY CKT	64(32)	1090	84(84)	1564	2.2526	.0497	2.2532	3.2322	.0713	3.2330	
28	1-RIP-PV-3442 & 3440 CAC MONITORING SYS	21(10)	SEE NOTE #1	10	SEE NOTE #1	-	-	-	-	-	-	

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7453-127-3-ED00-01, SEC-4

DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: IX LOCA - 208/120V SYSTEM DATA

CALC SET NO	REV	COMP BY	CHKD BY
PREL. #	0	RR	
FINAL ✓		DATE 4/23/84	DATE 4/30/84
VOID			
SHEET 9 OF 53		DATE	DATE
TO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO. 1A DWG NO. 9527-LL-93041 SH. 4 REV. 11 DATED 5/16/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
29	TEMP SW - TEST & CONTROL CAB	32(160)	2180	32(160)	2180	4.5053	.0994	4.5064	4.5053	.0994	4.5064	
30	SPARE											
31	BATTERY GROUND DET	38.4	SEE NOTE "1	38.4	SEE NOTE "1	—	—	—	—	—	—	
32	SPARE											
33	SPARE											
34	SPARE											
35	SPARE											
36	SPARE											

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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7453-127-3-ED00-01, SEC-4

CALC SET NO		REV.	COMP BY	CHKD BY
PROJ #		0	RA	
SYS	✓		DATE 4/23/84	DATE 4/26/84
SUB				
SHEET 10 OF 53			DATE	DATE
ID 7453-127				

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA-208/120V SYSTEM DATA

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO 1B DWG NO. 9527-LL-93041 SH. 5 REV. 16 DATED 8/24/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	ANNUN XU-59 "RIP CKT FOR 4.E	0	–	0	–	–	–	–	–	–	–	
2	SPARE											
3	RHR (E11) 1H12-P601	140	SEE NOTE #1	140	SEE NOTE #1	–	–	–	–	–	–	
4	CHR 1H12-P612, 1E-K605B, K606B, K603B, K604, S6003	35	SEE NOTE #1	35	SEE NOTE #1	–	–	–	–	–	–	
5	RHR 1H12-P618 2E11-F074, F051B, F053B	21	502	21	502	1.0374	.0229	1.0377	1.0374	.0229	1.0377	
6	RX RECIRC.(B32) 1H12-P603 MV/I TRANSFORMER STA	42	SEE NOTE #1	42	SEE NOTE #1	–	–	–	–	–	–	
7	SPARE											
8	SPARE											
9	BATTERY GROUND DETECTION	38.4	SEE NOTE #1	38.4	SEE NOTE #1	–	–	–	–	–	–	
10	SPARE											
10A	SPARE											
11	(E11-B8A&B4D) H12-P624 SENCH BRD AUX. RELAY CAB H12-P624 IWD	20	SEE NOTE #1	20	SEE NOTE #1	–	–	–	–	–	–	
12	24/48 VDC BATTERY CHARGER "22B-2"	2000	SEE NOTE #1	2000	SEE NOTE #1	–	–	–	–	–	–	
13	24/48 VDC BATTERY CHARGER "22B-1"	2000	↓	2000	↓	–	–	–	–	–	–	

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GENERAL COMPUTATION SHEET

united engineers

DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

7453-127-3-ED00-01, SEC-4

CALC SET NO	REV.	COMP BY	CHKD BY
PREL.	0	RA	
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VOID			
SHEET 11 OF 53		DATE	DATE
TO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO. 1B DWG NO. 9527-LL-93041 SH. 5 REV. 16 DATED 8/24/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
14	RCIC (E51) 1H12-P601 (E51-K602)	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
15	RX BLDG VENT. FLOW MEASURING EQUP XU-62	206	SEE NOTE #1	206	SEE NOTE #1	—	—	—	—	—	—	
16	PUMP 1B COOLING WTR SOL. VLV 1-RCC-V73	21	1217	21	1217	2.5151	.0555	2.5157	2.5151	.0555	2.5157	
17	VACUUM BKRS 1-CAC-X1SF TO 1-CAC-X1SJ TEST CKT.	25	SEE NOTE #1	25	SEE NOTE #1	—	—	—	—	—	—	
18	DIV. II ISOLATOR CAB. XU-76	500	169	500	169	.3492	.0077	.3493	.3492	.0077	.3493	
19	SW RHR BOOSTER PUMPS 1B&1D AUX. CTL	16(56)	1454	16(56)	1454	3.0049	.0663	3.0056	3.0049	.0663	3.0056	
20	SPACE HEATER FOR LTG. & COMM. INVERTER	600	SEE NOTE #1	600	SEE NOTE #1	—	—	—	—	—	—	
21	SW SEAL COOLING EXCH. DISCH. VLVS V-126 & V-125	31.2	SEE NOTE #1	0	—	—	—	—	—	—	—	
22	REHEATER SB V97 & CONDENSER V98 SOLENOID VLV.	31	↓	10	SEE NOTE #1	—	—	—	—	—	—	
23	RHR PMPS WELL WTR SUPPLY VLV. V-103	127(5)	259	127(5)	259	.5352	.0118	.5354	.5352	.0118	.5354	
24	RX BLDG. CLOSED COOLING WTR. SYS SV-1-RCC-V51	16(21)	448	16(21)	448	.9258	.0204	.9261	.9258	.0204	.9261	
25	SPARE											
26	1-CAC-PV-3441 GASEOUS ANALYZER	132	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
27	TEMP. SW TEST & CONTROL CAB	32(160)	2280	32(160)	2280	4.7119	.1040	4.7131	4.7119	.1040	4.7131	

7453-127-3-ED00-01, SEC-4

GENERAL COMPUTATION SHEET

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DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC SET NO: 7453-127

SHEET 12 OF 93

REV. 0

COMP BY: RA DATE 11/22/84

CHKD BY: DATE

APPD BY: DATE

SYSTEM LOAD DATA

UNIT SUB STN DISTRIBUTION PANEL NO. 1B DWG NO. 9527-LL-93041 SH. 5 REV. 16 DATED 8/24/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
28	1-CAC-PV-3437 & 3439 GASEOUS ANALYZER	132	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
29	FRIDGE IND. UNIT 1-VA-TI-1309-1	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

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7453-127-3-ED00-01, Sec-4

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO.	REV.	COMP BY	CHKD BY
PRELIM		RA	
FINAL	✓	DATE 4/29/84	DATE 7/1/84
VOID			
SHEET 13 OF 53		DATE	DATE
JO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1AB DWG NO. 9527-LL-93041 SH. 6 REV. 9 DATED 9/30/76

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	1X LOCA R_{1X}	1X LOCA X_{1X}	1X LOCA Z_{1X}	REMARKS
1	SPARE											
2	1-H12-P616 CRD RELAY LOGIC (C11)	1080	SEE NOTE #1	722	SEE NOTE #1	-	-	-	-	-	-	
3	SPARE											
4	SPARE											
5	JET PUMP SYS H12-P619 B21-K601 TO B21-K607	253	SEE NOTE #1	253	SEE NOTE #1	-	-	-	-	-	-	
6	(532) RX RECIRC. SYS. 1-H12-P603 & H12-P612 SPEED CTL R620, K615	7.4	SEE NOTE #1	7.4	SEE NOTE #1	-	-	-	-	-	-	
7	CTL ROD HYD SYS 1-H12-P613 1-C11-K600 THRU K604 & N600	44	SEE NOTE #1	44	SEE NOTE #1	-	-	-	-	-	-	
8	SPARE											
9	REACTOR CONTROL PANEL (C11-R600) H12-P603	679	SEE NOTE #1	679	SEE NOTE #1	-	-	-	-	-	-	
10	1-H12-628 CRD HYD SYS VALVES C11-F002A & C11-F002B	20	SEE NOTE #1	20	SEE NOTE #1	-	-	-	-	-	-	
11	STNBY LIQ CTL SYS (C41) 1-H12-P613, 1-C41-N600, K600	19	SEE NOTE #1	19	SEE NOTE #1	-	-	-	-	-	-	
12	CTNBY LIQ. CTL SYS (C41) 1-H12-P628	30	SEE NOTE #1	30	SEE NOTE #1	-	-	-	-	-	-	
13	SPARE											
14	TRAVERING INCORE PROBE SYS (C51) 1H12-P607	960	84	960	84	.1092	.0038	.1093	.1092	.0038	.1093	

GENERAL COMPUTATION SHEET

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CALC SET NO.

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SHEET 14 OF 43

JOB 7453-127

BY: COMP. RP DATE 4-27-84 | CHKD. JWT DATE 4-30-84

BY: DATE | CHKD. DATE

NAME OF COMPANY CP&L BSEP UNIT # 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1AB DWG NO. 9527-LL-93041 SH. 6 REV. 9 DATED 9/30/76

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	DEMIN SUPPLY LINE SOL VLV 1-SW-SV-3745	0	—	0	—	—	—	—	—	—	—	
16	SPARE											
17	SPARE											
18	SPARE											
19	AREA RADIATION MONITOR (D22) 1-D22-P600, K603A	600	169	600	169	.3492	.0077	.3493	.3492	.0077	.3493	LOAD ASSUMED BASED ON PNL. SCH. LL-93041 SH 6
20	PROCESS RECORDERS 1-D12-R601, R602 R603, R604 & OFF GAS PURGE CKT	71	SEE NOTE #1	71	SEE NOTE #1	—	—	—	—	—	—	
21	SPARE											
22	PROCESS RAD MON. (D12) XU-3 R001B	18	SEE NOTE #1	18	SEE NOTE #1	—	—	—	—	—	—	
23	SPARE											
24	SPARE											
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

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CALC SET NO | REV | CHKD BY | CHKD BY
PREL. | | | |
FINAL | ✓ | CA 4/23/84 | JDJ 4/23/84
VOID | | | |
SHEET 15 OF 53 | | DATE | DATE
TO 7453-127 | | | |

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1A6 DWG NO. 7453-LL-5041 SH. 6 REV. 9 DATED 9/30/76

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
29	SPARE											
30	SPARE											
31	SPARE											
32	SPARE											
33	SPARE											
34	N.I.C. BOILER PROT. INST. SYS (B21) 1-B32-K600, K604A, K604B, K609A, K609B, 1-H12-P612	85	SEE NOTE #1	85	SEE NOTE #1	—	—	—	—	—	—	
35	SPARE											
36	N.I. BOILER PROT. INST. SYS (B21) XMTR CHASIS Z1A & Z1B 1-H12-P614	33	SEE NOTE #1	33	SEE NOTE #1	—	—	—	—	—	—	
37	SPARE											
38	SPARE											
39	SPARE											
40	SPARE											
41	SPARE											
42	N.I.C. STM. SUP. SHUTOFF (A71) RESET CKT. 1-H12-P601	15	SEE NOTE #1	15	SEE NOTE #1	—	—	—	—	—	—	

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DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

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CALC SET NO	REV	COMP BY	CHKD BY
PREL.	0	RP 4/23/84	4/24/84
FINAL ✓			
VOID		DATE	DATE
SHEET 16 OF 53			
JO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO. 1ARX DWG NO. 0527-LL-93041 SH. 7 REV. 17 DATED 6/7/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	SPARE											
2	SPARE											
3	RHR SYS (E11) 1-H21-P018	28	SEE NOTE #1	28	SEE NOTE #1	—	—	—	—	—	—	
4	SPARE											
5	RADIATION DETECTOR 1-SW-RT-5B-4	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
6	RX BLDG. VA-CTL. PNL 1VA-M3. RB PWR SUPPLY	17(117)	1072	17(117)	1072	2.2154	.0488	2.2160	2.2154	.0488	2.2160	
7	SPARE											
8	RX BLDG VA RHR PMP RM A UNIT 1-VA-TT-1602A	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
9	HPCI ROOM 1-VA-SV-1590 CTL CKT	0	—	0	—	—	—	—	—	—	—	
10	RHCU (G31) CONTROL PANEL 1-G31-2002-26	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
11	SPARE											
12	SPARE											
13	SPARE											
14	SPARE											

GENERAL COMPUTATION SHEET

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7453-127-3-ED00-01, SEC-4

CALC. NO.		NO.	COMP. BY	CHKD. BY
PRELIM		0	RB	MS
FINAL	✓		DATE 6/23/84	DATE 7.25.84
ADD				
SHEET	17 OF 53		DATE	DATE
TO	7453-127			

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1A-RX DWG NO. 9527-E-93041 SH. 7 REV. 17 DATED 6/7/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	SPARE											
16	SPARE											
17	SPARE											
18	SPARE											
19	REACT. PROT. SYS. (C71) 1-H21-P003 ACCUM MONITORS	84	SEE NOTE #1	96	SEE NOTE #1	—	—	—	—	—	—	
20	FUEL PLATFORM OPERATING FLOOR PANEL	13	SEE NOTE #1	13	SEE NOTE #1	—	—	—	—	—	—	
21	CTL PNL G31-2002-26	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON VC31983
22	RX BLDG VA-CORE SPRAY PUMP ROOM A BRIDGE IND UNIT 1-VA-TT-1603	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
23	RHR CHECK VLV 1-E11-F050A	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
24	RX BLDG AIRLOCK DOORS 301 & 302	21	221	21	221	.4567	.0101	.4568	.4567	.0101	.4568	
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											

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GENERAL COMPUTATION SHEET

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NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA - 208/120V SYSTEM DATA

CALC SET NO		NO.	COMP BY	CHKD BY
PRELIM		0	RA	
FINAL	✓		DATE 9/12/83	DATE 9/12/83
VOID				
SHEET 18 OF 53			DATE	DATE
ID 7453-127				

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1A-RX DWG NO. 9527-LL-93041 SH. 7 REV. 17 DATED 6/7/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
29	DRYWELL EQ. DRAIN HV-IN VLV 1-RCC-V54	0	–	0	–	–	–	–	–	–	–	
30	STANDBY COMP 1A REFRIG. AFTER COOLER MOTOR	587	SEE NOTE #1	587	SEE NOTE #1	–	–	–	–	–	–	
31	DRYER UNIT FOR CAC-AT-1263	1737	SEE NOTE #1	1737	SEE NOTE #1	–	–	–	–	–	–	
32	RADIATION DETECTOR 1-SW-RT-58-3	50	SEE NOTE #1	50	SEE NOTE #1							ASSUMED LOAD
33	RX BLDG CONTAINMENT ATMOS MONITOR AT-1263											NO CABLE IN CASP
34	DRYWELL COOLER 1A RID INSTRUMENT POWER	78	SEE NOTE #1	78	SEE NOTE #1	–	–	–	–	–	–	
35	SPARE											
36	AREA RAD. MON (D22) ALARM 1-19 EL. 20'-0" RX BLDG AIR LOCK	38	SEE NOTE #1	38	SEE NOTE #1	–	–	–	–	–	–	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: IX LOCA - 208/120V SYSTEM DATA

7453-127-3-ED00-01, SEC-4

CALC SET NO		NO.	COMP BY	CHKD BY
PRELIM				
FINAL	✓	0	RE	W
VOID			DATE 4/23/14	DATE 8/31/14
SHEET	14 OF 53			
TO	7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO 1B-RX DWG NO 5527-LL-93041 SH. 8 REV. 17 DATED 6/7/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	SPARE											
2	CTL PNL 1-G31-Z002-26	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON UC31983
3	RESIDUAL HEAT REM. (E11) 1-H21-P021	14	SEE NOTE #1	14	SEE NOTE #1	—	—	—	—	—	—	
4	RX BLDG VA-RHR PMP B BRIDGE IND UNIT IVA-TT-1602A	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
5	RHR CHECK VLV 1-E11-F050 1B	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
6	RX BLDG VA CORE SPRAY P.R.B. 1-VA-TT-1604	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
7	SPARE											
8	RX BLDG CONTAINMENT ATMOS. MONITOR AT-1259											NO CABLE IN CASP.
9	SPARE											
10	RWCU SYS CONTROL PNL 1-G31-Z002-26	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
11	SPARE											
12	SPARE											
13	SPARE											
14	IPCLRT TEST STATION	0	—	0	—	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY CP&L BSEP UNIT # 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

7453-127-3-ED00-01, SEC-4

CALC SET NO		REV.	COMP BY	CHKD BY
PREL.		0	DA 4/23/84	DATE 4/23/84
FINAL	✓			
VOID				
SHEET	20 OF 53		DATE	DATE
TO	7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO 1B-RX DWG NO. 9527-LL-93041 SH. 8 REV. 17 DATED 6/7/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	SPARE											
16	SPARE											
17	SPARE											
18	SPARE											
19	STANDBY COMPR IS REFRIG AFTER COOLER MOTOR	587	SEE NOTE #1	587	SEE NOTE #1	—	—	—	—	—	—	
20	DRYWELL COOLERS 1B & 1C INSTRUMENT POWER	58	SEE NOTE #1	58	SEE NOTE #1	—	—	—	—	—	—	
21	REACT. PROT. SYS (C71) LH21-P012 ACCUM. MONITORS	700	SEE NOTE #1	800	SEE NOTE #1	—	—	—	—	—	—	
22	RADIATION DETECTOR 1-SW-RT-58-5	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
23	REMOTE SHUTDOWN PANEL 1-SW-V141	0	—	0	—	—	—	—	—	—	—	
24	FLOW SWITCH B32-N002B (I61)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
25	SPARE											
26	FLOW SWITCH B32-N004B (I63)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
27	REACTOR BLDG FIRE DETECTOR PNL SUPPLY	600	SEE NOTE #1	600	SEE NOTE #1	—	—	—	—	—	—	
28	FLOW SWITCH B32-N007B (I65)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

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DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC SET NO	REV	COMP BY	CHKD BY
PRELIM			
FINAL ✓	P	DATE 4/23/84	DATE 5/1/84
VOID			
SHEET 21 OF 52		DATE	DATE
TO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO. 1B-RX DWG NO. 9527-LL-93041 SH. 8 REV. 17 DATED 6/7/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
29	RX BLDG FIRE DETECTOR PNL SUPPLY	600	SEE NOTE #1	600	SEE NOTE #1	—	—	—	—	—	—	
30	RX BLDG AIRLOCK DOORS 203 & 204	21(5)	359	21(5)	359	.7419	.0619	.7421	.7419	.0164	.7421	
31	DRYER UNIT FOR CAC-AT-1259	1737	SEE NOTE #1	1737	SEE NOTE #1	—	—	—	—	—	—	
32	RX BLDG AIRLOCK DOORS 308 & 309	21	399	21	399	.8246	.0182	.8248	.8246	.0182	.8248	
33	SOL. VLV. OG-SV-4104 OFFGAS DRAIN TANK	0	-	0	-	-	-	-	-	-	-	
34	RX BLDG SPR. SYS. DELUGE VLV. 1-FP-DV20	0	—	0	—	—	—	—	—	—	—	
35	RX BLDG FIRE PROT. ANNUN. 1-UA-38	34	SEE NOTE #1	34	SEE NOTE #1	—	—	—	—	—	—	
36	DIV II TERM CAB. XU-28 FP SYS. DELUGE VLV 1-FP-DV 319	0	—	0	—	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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CALC SET NO.		REV.	COMP BY	CHKD BY
PRELIM		0	RF	J.
FINAL	✓		DATE 11/29/84	DATE 12/2/84
VOID				
SHEET 22 OF 53				
TO 7453-127			DATE	DATE

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1E5-EX DWG NO. 9527-LL-93041 SH. 9 REV. 12 DATED 11/11/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	SPARE											
2	SPARE											
3	SPARE											
4	(D22) AREA RAD MONITOR ALARM 1-21-26 INSIDE NEW VAULT	0	—	240	SEE NOTE "1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 9
5	(G31) RWCU H21-P002, G31-N002A OR B & (A11) 1-H21-P002 TEMP SW.	59	116	59	116	.2397	.0053	.2398	.2397	.0053	.2398	
6	(C51) START UP RANGE DETCTR DRIVE CTL SYS 1-H21-P008	100	SEE NOTE "1	100	SEE NOTE "1	—	—	—	—	—	—	
7	FUEL POOL 1-G41-P001											NO CABLE IN CASP
8	SPARE											
9	FUEL SERVICE EQUIPT. VAC. PMP 1-F11-E006											NO CABLE IN CASP
10	FUEL SERVICE EQUIPT. SAMPLER 1-F14-E014											NO CABLE IN CASP
11	1-H21-P007 RECEP. FOR B21-R007	30	SEE NOTE "1	30	SEE NOTE "1	—	—	—	—	—	—	
12	AREA RAD MON (D22) RAD ALARM 1-27 NORTH OF FUEL STOR.	0	—	240	SEE NOTE "1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 9
13	AREA RAD MON (D22) RAD. ALARM 1-21 IN T.I.P. ROOM	0	—	240	SEE NOTE "1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 9
14	AREA RAD MON (D22) RAD ALARM 1-29 CASK WASH DN AREA	0	—	240	SEE NOTE "1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 9

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GENERAL COMPUTATION SHEET

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DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

7453-127-3-ED00-01 > SEE-9

CALC SET NO.

SHEET 23 OF 53

JO 7453-127

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO 1A5-EX DWG NO. 9527-LL-93041 SH. 9 REV. 12 DATED 11/11/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
15	SUPPRESSION POOL VACUUM BREAK SOV'S (12)	—										NO CABLE IN CASP.
16	SUPPRESSION POOL TAP SOV'S (4)	—										NO CABLE IN CASP.
17	SUPP. POOL & PRI CONTMNT O_2 ANALYZER SOV'S (8)	—										NO CABLE IN CASP.
18	DRYWELL COOLING CRD AREA CONTROL DAMP'S 1E & 1F	—										NO CABLE IN CASP.
19	SPARE											
20	DRYWELL COOLING VOLUME CONTROL DAMPERS 1G & 1A	—										NO CABLE IN CASP.
21	1-H12-P001 RECEPTACLE FOR C11-R018, B21-R006	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
22	FLOW XMTR 1-CAC-FT-2567	25	SEE NOTE #1	25	SEE NOTE #1	—	—	—	—	—	—	
23	SPARE											
24	AREA RAD MON (D22) RAD ALARM 1-28 EL 117'-6" BETWEEN RX & FUEL POOL	0	—	240	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 9
25	NEUTRON MONITORING (C51) INSTR RACK 1H12-P008 START-UP RANGE DRIVE CTL	0	—	0	—	—	—	—	—	—	—	
26	SPARE											
27	SPARE											
28	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE ELECTRICAL

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7453-127-3-ED00-01, SH-4

CALC SET NO

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA-208/120V SYSTEM DATA

SHEET 29 OF 53

ID 7453-127

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO 1A3-EX DWG NO 9527-LL-93041 SH. 9 REV. 12 DATED 11/11/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
29	SPARE											
30	SPARE											
31	RX BLDG AIRLOCK 209 & 210	21	661	21	661	1.3660	.0301	1.3664	1.3660	.0301	1.3664	
32	FLOW SWITCH B32-N00[illegible] (U)	—	—	2	SEE NOTE #1	—	—	—	—	—	—	
33	SPARE											
34	FLOW SWITCH B32-N004A (I62)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
35	HPCI ROOM DOOR ALARM	19	SEE NOTE #1	19	↓	—	—	—	—	—	—	CONTINUED LOAD NO CABLE ANALYSIS REQUIRED.
36	FLOW SWITCH B32-N007A (I64)	0	—	2	↓	—	—	—	—	—	—	
37	SPARE											
38	SPARE											
39	SPARE											
40	SPARE											
41	SPARE											
42	RWCU(G31) INSTR RACK 1H21-P023	588	SEE NOTE #1	588	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

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DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC. SHEET NO.		REV.	CHKD BY
PREL.			EA
FINAL	✓	0	DATE 4/23/84
VOID			
SHEET	25 OF 53		DATE
TO	7453-127		DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO. 1A TB DWG NO. 9527-LL-93041 SH. 10 REV. 9 DATED 12/13/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX-LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	SPARE											
2	SCOOP TUBE POSITIONER (B32) SI 11A	1250	SEE NOTE #1	1250	SEE NOTE #1	—	—	—	—	—	—	
3	FLUID DRIVE CASE BREATHER FAN UNIT 'A'	828	SEE NOTE #1	828	SEE NOTE #1	—	—	—	—	—	—	
4	PDC2A & PD03A WINDG OVERTEMP GEN & MTR (K19A & K20A) & XFMR TSA	266	SEE NOTE #1	266	SEE NOTE #1	—	—	—	—	—	—	
5	SPARE											
6	TURBINE BLDG ROLL TYPE FILTER 1A-SAF-TB	545	94	545	94	.1942	.0043	.1943	.1942	.0043	.1943	
7	SPARE											
8	TURBINE BLDG ROLL TYPE FILTER 1B-SAF-TB	545	239	545	239	.4939	.0109	.4940	.4939	.0109	.4940	
9	TURBINE BLDG AIRLOCK DOORS 354 .355	21	275	21	275	.5683	.0125	.5684	.5683	.0125	.5684	
10	SPARE											
11	SPARE											
12	TURBINE BLDG CHILLER MACHINE 'A' OIL HEATER	1500	SEE NOTE #1	1500	SEE NOTE #1	—	—	—	—	—	—	
13	TURBINE BLDG AIRLOCK DOORS 358.360.361, 362	21	250	21	250	.5166	.0114	.5168	.5166	.0114	.5168	
14	TURBINE BLDG CHILLER MACHINE 'A' CONTROL CONSOLE	398	SEE NOTE #1	398	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

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DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO	REV.	COMP. BY	CHK'D BY
PNL-A	0	RA	
PNL-B		12-2-84	12/12/83
MCC			
SHEET 26 OF		DATE	DATE
TO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1A-TB DWG NO 9527-LL-93041 SH. 10 REV. 9 DATED 12/13/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	TURBINE BLDG VENT. AIR FLOW - RECIRC. SYSTEM	8.2	SEE NOTE #1	8.2	SEE NOTE #1	—	—	—	—	—	—	
16	SAMPLE DETECTOR SKID INCREASED RAD	2800	SEE NOTE #1	2800	SEE NOTE #1	—	—	—	—	—	—	
17	LIFT PUMP MOTORS SYSTEM	0	—	0	—	—	—	—	—	—	—	
18	SAMPLING SKIDS HEAT TRACING CABLES	340	SEE NOTE #1	340	SEE NOTE #1	—	—	—	—	—	—	
19	SPARE											
20	SPARE											
21	SPARE											
22	SPARE											
23	SPARE											
24	SPARE											
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA - 208/120V SYSTEM DATA

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CALC SET NO: 7453-127

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SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1A-T5 DWG NO. 9527-LL91041 SH 10 REV. 9 DATED 12/13/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
29	SPARE											
30	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC SET NO	REV.	COMP BY	CHK'D BY
PRE-W	0	RA	
P.W.		DATE 4-7-84	DATE 4/24/84
W.O.			
SHEET 28 OF 53		DATE	DATE
TO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO [illegible]-7B DWG NO. 9527-LL-93041 SH. 11 REV. 5 DATED 5/4/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX-LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	SPARE											
2	SCOOP TUBE POSITIONER (B32) SD015	1250	SEE NOTE #1	1250	SEE NOTE #1	—	—	—	—	—	—	
3	FLUID DRIVE CASE BREATHER FAN (B32)	828	SEE NOTE #1	828	SEE NOTE #1	—	—	—	—	—	—	
4	PD028 & PD029 B WIND CVEE TEMP. GEN. & MTR (KM08 & K20E) & XFMR T5B	266	SEE NOTE #1	266	SEE NOTE #1	—	—	—	—	—	—	
5	CFPT 1A TURNING GEAR MTR CONTROL	0	—	0	—	—	—	—	—	—	—	
6	SPARE											
7	CONDENSATE LEVEL CONT 1-CO-LT-2,3,4,5	11	SEE NOTE #1	11	SEE NOTE #1	—	—	—	—	—	—	
8	BRIDGE IND UNIT 1-VA-TT-129B	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
9	TURBINE BLDG AIRLOCK DOORS 356 & 357	21	251	21	251	.5187	.0114	.5188	.5187	.0114	.5188	
10	SPARE											
11	SPARE											
12	SPARE											
13	SPARE											
14	SPARE											

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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74[illegible]-127-3-ED00-01, Sec-4

CALC SET NO	REV.	COMP BY	CHKD BY
PRELIM	0	RP	NL
FINAL ✓		DATE 4/27/83	DATE 4/28/83
VOID			
SHEET 29 OF 53		DATE	DATE
JO 7453-127			

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SYSTEM LOAD DATA

UNIT SUB STN DISTRIBUTION PANEL NO 1B-TB DWG NO. 7[illegible]93041 SH. 11 REV. 5 DATED 5/4/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	SPARE											
16	SPARE											
17	SPARE											
18	SPARE											
19	SPARE											
20	SPARE											
21	SPARE											
22	SPARE											
23	SPARE											
24	SPARE											
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC. NO. 7453-127

SHEET 30 OF 56

REV. 0

CHK'D BY: RA DATE 4/23/84

SYSTEM LOAD DATA

UNIT SUB STN DISTRIBUTION PANEL NO 1B-TB DWG NO. 9527-LL-93041 SH. 11 REV. 5 DATED 5/4/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST FROM PNL-IN FT.	LOAD IN VA	DIST. FROM PNL IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
-9	SPARE											
30	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE ELECTRICAL

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NAME OF COMPANY CP&L BSEP UNIT # 1

SUBJECT 1X LOCA - 208/120V SYSTEM DATA

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CALC SET NO. | REV. # 0 | SHEET 31 OF 53 | JO 7453-127

ORIG. BY EF DATE 4/2/84

CHK'D BY DATE

DATE

DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1AB-TB DWG NO 5527-U-93041 SH. 12 REV. 9 DATED 7/25/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	RFPT. 1B-TURNING GEAR MTR CONTROL	0	—	0	—	—	—	—	—	—	—	
2	AIR COMPRESSOR SV-581 & USV	132	371	23	1090	.7667	.0169	.7669	2.2526	.0497	2.2532	
3	TURBINE BLDG EXHAST ROLL TYPE FILTER 1A-EAF-TB	528	427	528	427	.8824	.0195	.8827	.8824	.0195	.8827	
4	SPARE											
5	SPARE											
6	SPARE											
7	(D22) AREA RADIATION MON. ALARM 1-E" WEST EL. 45'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	
8	(D22) AREA RADIATION MON ALARM 1-B" EAST EL. 45'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	
9	(D22) AREA RADIATION MON ALARM 1-9" ACCESS DOOR CDR EL. 20'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	
10	(D22) AREA RADIATION MON. ALARM 1-H" SAMPL'G STA EL. 20'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	
11	REACT. FEED PUMP TURB 1A VIBRATION MONITORING	30	225	30	225	.4649	.0102	.4651	.4649	.0102	.4651	
12	REACT. FEED PUMP TURB 1B VIBRATING MONITORING	30	189	30	189	.3906	.0086	.3907	.3906	.0086	.3907	
13	SPARE											
14	1-OG-SV-7050 SJAE SAMPLE SOL. VLV	132	167	132	167	.3451	.0076	.3452	.3451	.0076	.3452	MAY BE MODIFIED OR DELETED BY PM 80-228; 229

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP BY: J. I

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC SET NO	BY	CHKD BY	CHKD BY
PRELIM		RP	JI
FINAL	✓	DATE 6-3-94	DATE 6-6-94
REV			
SHEET 32 OF 53		DATE	DATE
JOB 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. IES DISTRIBUTION PANEL NO 2E-7B DWG NO 9527-LL-93041 SH. 12 REV. 9 DATED 7/25/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS IX-LOCA LOAD IN VA	CIRCUIT LOADS IX-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	IX LOCA R_{IX}	X_{IX}	Z_{IX}	REMARKS
15	123' HEAT TRACE CABLE LINE # 1-RXS-24	1450	SEE NOTE #1	1450	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 12
16	113' HEAT TRACE CABLE LINE # 1-RXS-23	1200	SEE NOTE #1	1200	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 12
17	147' HEAT TRACE CABLE LINE # 1-RXS-28	1600	SEE NOTE #1	1600	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 12
18	4 CONTACTORS & 4 CONTROLLERS 92' HEAT TRACE CABLE FOR LINE # 1-RXS-23	882	908	882	908	1.8765	.0414	1.8770	1.8765	.0414	1.8770	
19	126' HEAT TRACE CABLE LINE # 1-RXS-28	1600	SEE NOTE #1	1600	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041. SH. 12
20	131' HEAT TRACE CABLE LINE # 1-RXS-24	1450	SEE NOTE #1	1450	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 12
21	117' HEAT TRACE CABLE LINE # 1-RXS-24	1400	SEE NOTE #1	1400	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 93041 SH. 12
22	SPARE											
23	SPARE											
24	SPARE											
25 27 29	RFPT LO CARTRIDGE FILTER RECIRC. PUMP 1A	864	SEE NOTE #1	864	SEE NOTE #1	—	—	—	—	—	—	3Ø LOAD
26 28 30	RFPT LO CARTRIDGE FILTER RECIRC. PUMP 1B	864	SEE NOTE #1	864	SEE NOTE #1	—	—	—	—	—	—	3Ø LOAD

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

7453-127-3-ED00-01, SH-4

CALC SET NO 7453-127

SHEET 33 OF 53

JO 7453-127

0 RA 4/23/84

DATE

DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 1A-DG DWG NO. 9527-LL-93041 SH. 15 REV. 7 DATED 5/16/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	1X LOCA R_{1X}	1X LOCA X_{1X}	1X LOCA Z_{1X}	REMARKS
1	NORTH DOOR AIRLOCK DG BLDG	21	229	21	229	.4733	.0104	.4734	.4733	.0104	.4734	
2	SPARE											
3	REMOTE SHUTDOWN PANEL	0	–	0	–	–	–	–	–	–	–	
4	SPARE											
5	SPARE											
6	SPARE											
7	DIESEL GEN #1-ENGINE CTL PNL SPACE HEATERS	500	SEE NOTE #1	500	SEE NOTE #1	–	–	–	–	–	–	
8	DIESEL GEN #1 EXCITER CTL PNL LIGHTS & RECEPTACLES	0	–	0	–	–	–	–	–	–	–	
9	BUS DUCT HTR FOR BUSES E1-E3	0	–	0	–	–	–	–	–	–	–	SEE T-1052
10	DIESEL GEN #1-EXCITER CTL PNL SPACE HEATERS	1000	SEE NOTE #1	1000	SEE NOTE #1	–	–	–	–	–	–	
11	SPARE											
12	DIESEL GEN #1 GENERATOR CTL PNL INSTRUMENTATION	48	SEE NOTE #1	48	SEE NOTE #1	–	–	–	–	–	–	
13	480V UNIT SUBSTATION "E7" HEATER & FAN CKTS	0	–	0	–	–	–	–	–	–	–	
13A	SPARE											

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

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CALC SET NO			
PREL. W			
W.W.	✓		
W.D.			
SHEET 38 of 53			
JO 7453-127		DATE	DATE

	ORIG BY	CHKD BY
	RP	
DATE	4/23/80	
	DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO. 1A-DG DWG NO. 9527-LL-93041 SH. 15 REV. 7 DATED 5/16/80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS IX-LOCA LOAD IN VA	CIRCUIT LOADS IX-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	IX LOCA R_{IX}	IX LOCA X_{IX}	IX LOCA Z_{IX}	REMARKS
14	DIESEL GEN#1 GENERATOR CTL PNL LIGHTS & SPACE HTRS	500	SEE NOTE #1	500	SEE NOTE #1	-	-	-	-	-	-	
15	RHR SW PP 1C CONTROL PNL H80 BUS E-1	7.8	40	7.8	40	.0826	.0018	.0827	.0826	.0018	.0827	
16	SPARE											
17	SPARE											
18	RHR SW PP 1A CONTROL PNL H82 BUS E-3	7.8	120	7.8	120	.2480	.1055	.2481	.2480	.0055	.2481	
19	SPARE											
20	SPARE											
21	SPARE											
22	SPARE											
23	4160V SWITCHGEAR E1 HTR & CONTROL BUS	14810	SEE NOTE #1	10315	SEE NOTE #1	—	—	—	—	—	—	
24	DIESEL GEN#1 ENGINE CTL PNL INSTRUMENTATION	0	—	147.6(245)	96	—	—	—	.1983	.0044	.1984	

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NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA-208/120V SYSTEM DATA

CALC. START		COMP. BY	CHKD. BY
REV. #			
PREL.	✓	RA 4/3/84	JHD 8/1/84
FINAL			
SHEET	35 of 53		
JO 7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO. 1B-D6 DWG NO. 9527-LL-93041 SH. 16 REV. 10 DATED 4/17/81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	1X LOCA R_{1X}	1X LOCA X_{1X}	1X LOCA Z_{1X}	REMARKS
1	REMOTE SHUTDOWN PANEL	167	SEE NOTE #1	167	SEE NOTE #1	—	—	—	—	—	—	
2	SPARE											
3	SPARE											
4	SPARE											
5	SPARE											
6	SPARE											
7	DIESEL GEN #2 ENGINE CTL PNL SPACE HTRS	505	SEE NOTE #1	505	SEE NOTE #1	—	—	—	—	—	—	
8	DIESEL GEN #2 EXCITER CTL PNL LIGHTS & RECEPTACLES	0	—	0	—	—	—	—	—	—	—	
9	SUS DUCT HEATER FOR TIE BUS E2-E1	0	—	0	—	—	—	—	—	—	—	
10	DIESEL GEN. #2 EXCITER CTL PNL SPACE HTRS	1000	SEE NOTE #1	1000	SEE NOTE #1	—	—	—	—	—	—	
11	SPARE											
12	DIESEL GEN. #2 GENERATOR CTL PNL INSTRUMENTATION	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
13	480V UNIT SUBSTA "E6" HTR & FAN CKT	0	—	0	—	—	—	—	—	—	—	
13A	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO: 7453-127

SHEET 36 OF 53

REV. C

COMP BY: RP DATE 4/23/84

CHKD BY: DATE 8/5/83

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO 15-DG DWG NO 9527-LL-93041SH. 16 REV. 10 DATED 4/17/81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
14	DIESEL GEN #2 GENERATOR CTL PNL LIGHTS & SPACE HTRS	500	SEE NOTE #1	500	SEE NOTE #1	—	—	—	—	—	—	
15	RHR SW PP 1D CTL PNL H61 BUS E-2	9.4(7.8)	858	9.4(7.8)	858	1.7732	.0391	1.7736	1.7732	.0391	1.7736	
16	SPARE											
17	SPARE											
18	RHR SW PP 1B CTL PNL H61 BUS E-4	7.8	120	7.8	120	.2480	.0055	.2481	.2480	.0055	.2481	
19	SPARE											
20	SPARE											
21	SPARE											
22	SPARE											
23	4160V SWITCHGEAR E2 HTR & CTL BUS	11310	SEE NOTE #1	10410	SEE NOTE #1	—	—	—	—	—	—	
24	DIESEL GEN #2 ENGINE CTL PNL INSTRUMENTATION	0	—	148(245)	122	—	—	—	.2521	.0055	.2522	

GENERAL COMPUTATION SHEET

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NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO. | REV. | CHKD BY | DATE

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SHEET 37 OF 53 | | | |

ID 7453-127 | | | |

RF 1/13/76 | 4/2/76

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1C DWG NO [illegible] SH. 17 REV. 7 DATED 1/13/76

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	1-RIP-CS-1200	8(5)	SEE NOTE #1	8(5)	SEE NOTE #1	—	—	—	—	—	—	
2	1-RIP-CS-1201	40	SEE NOTE #1	40	SEE NOTE #1	—	—	—	—	—	—	
3	1-RIP-CS-1202(FUTURE)											
4	1-RIP-CS-1203	40	SEE NOTE #1	40	SEE NOTE #1	—	—	—	—	—	—	
5	1-RIP-CS-1204	0	—	0	—	—	—	—	—	—	—	
6	1-RIP-CS-1205	60	SEE NOTE #1	42(60)	2129	4.3979	.0971	4.4009	4.3999	.0971	4.4009	
7	1-RIP-CS-1206	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
8	1-RIP-CS-1207	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
9	1-RIP-CS-1208	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
10	1-RIP-CS-1209	60	SEE NOTE #1	84(60)	2174	—	—	—	4.4929	.0991	4.4940	
11	1-RIP-CS-1210	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
12	1-RIP-CS-1211	89	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
13	1-RIP-CS-1212	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
14	1-RIP-CS-1213(FUTURE)											

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GENERAL COMPUTATION SHEET

DISCIPLINE ELECTRICAL

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NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC. SET NO.		BY	COMP. BY	CHKD BY
PRELIM.			EA	NH
FINAL	✓		DATE 4/24/84	DATE 4/25/84
VOID				
SHEET 33 OF 53			DATE	DATE
JO 7453-127				

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO 2 DWG NO 5[illegible]-11-93041 SH. 17 REV. 7 DATED 1/13/76

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
15	1-RIP-CS-1214	40	SEE NOTE #1	40	SEE NOTE #1	—	—	—	—	—	—	
16	1-RIP-CS-1215	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
17	PWR SUPPLY FOR GASEOUS ANALYZER PNL XU-55	0	—	0	—	—	—	—	—	—	—	
18	FAN COOLING C.S. PUMP RM 'IA' DISCH VLV V-12B	16	SEE NOTE #1	0	—	—	—	—	—	—	—	
19	1A TORNADO CHECK VLV CONT & IND	20	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
20	RHR PUMP RM COOLER 'IA' DISCH VLV V-129	16	SEE NOTE #1	0	—	—	—	—	—	—	—	
21	1A SYSTEM BATTERY P.M & CABLE SPREAD RM 1	232.4	SEE NOTE #1	762(80)	588	—	—	—	1.2152	.0268	1.2155	
22	DEEP WELL PMP SYSTEMS	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
23	VENT RX BLDG EXH FANS 1A&1C CTL CKT	104.4	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
24	VENT RX BLDG ISOL DMPR 1A&1C CTL CKT	32(95.4)	1509	40(152)	1509	3.1186	.0688	3.1193	3.1186	.0688	3.1198	
25	VENT RX BLDG FANS 1A & 1C SBGT SYS 'A'	168.4	SEE NOTE #1	36	SEE NOTE #1	—	—	—	—	—	—	
26	CONTROL BLDG V.A. SYS CTL RM AC	17(35.2)	842	17(35.2)	842	1.7401	.0384	1.7405	1.7401	.0384	1.7405	
26A	CAC-MONITOR PV-1260 SOLENOID VLV CKT	40	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
27	BOP TERM CAB XU-3 TURB ALARM CKT	0	—	0	—	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC. NO.	NO.	CHK'D BY
PREL.	0	RA
FINAL ✓		DATE 4/20/82
VOID		
SHEET 39 OF 53		DATE
TO 7453-127		DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1C DWG NO. 9527-LL-93041 SH. 17 REV. 7 DATED 1/13/76

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
28	480V UNIT SUBSTA. COM 'C' HTR & FAN CKT	0	—	0	—	—	—	—	—	—	—	
29	TURB BLDG VENT SYS MISC. CKTS CTL	0	—	0	—	—	—	—	—	—	—	
30	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC. SET NO.		BY	CHKD BY
PREL.		0	RA
FINAL	✓	DATE	DATE
NOT		6/20/84	8/5/84
SHEET 40 OF 53			
TO 7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO. D DWG NO 9527-LL93041 SH. 18 REV. 9 DATED 8/5/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	1-RIP-CS-1216	10	SEE NOTE "1	10	SEE NOTE "1	—	—	—	—	—	—	
2	1-RIP-CS-1217	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
3	1-RIP-CS-1218	20	SEE NOTE "1	20	SEE NOTE "1	—	—	—	—	—	—	
4	1-RIP-CS-1219	30	SEE NOTE "1	30	SEE NOTE "1	—	—	—	—	—	—	
5	1-RIP-CS-1220	30	SEE NOTE "1	30	SEE NOTE "1	—	—	—	—	—	—	
6	1-RIP-CS-1221	20	SEE NOTE "1	20	SEE NOTE "1	—	—	—	—	—	—	
7	1-RIP-CS-1222	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
8	1-RIP-CS-1223	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
9	1-RIP-CS-1224	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
10	1-RIP-CS-1225	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
11	1-RIP-CS-1226	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
12	1-RIP-CS-1227	128	SEE NOTE "1	240(55)	1530	—	—	—	3.2653	.0720	3.2661	
13	1-RIP-CS-1228	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	
14	1-RIP-CS-1229	60	SEE NOTE "1	60	SEE NOTE "1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC SET NO	SHT	CHKD BY	CHKD BY
PREL.			
FINAL	✓	EB 11/24/80	AP 5/26/83
REV			
SHEET 41 OF 53		DATE	DATE
JO 7453-127			

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO. 1D DWG NO. 9527-LL-93041 SH. 1B REV. 9 DATED 8/8/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
15	1-RIP-CS-1230 (FUTURE)	—	—	—	—	—	—	—	—	—	—	
16	1-RIP-CS-1231	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
17	1-RIP-CS-1232	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
18	FAN COOLING CS PMP RM "1B" DISCH. VLV. 1-SW-V123	16	SEE NOTE #1	0	—	—	—	—	—	—	—	
19	VENT RX BLDG-EXH. FAN 1B BID CTL CKT	100	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
20	RHR PMP RM COOLER "1B" DISCH. VLV. 1-SW-V124	16	SEE NOTE #1	16	SEE NOTE #1	—	—	—	—	—	—	
21	VENT. RX BLDG EXH. FAN DMPR'S 1B BID CTL CKT	104	SEE NOTE #1	68(182)	964	—	—	—	1.9922	.0439	1.9927	
22	VA SYSTEM BATTERY ROOM "1B"	32(80)	676	32(80)	676	1.3970	.0308	1.3973	1.3970	.0308	1.3973	
23	VENT RX BLDG SUPPLY FAN 1B&1D &SBGT EYS "B" CTL CKT.	164	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
24	SPARE											
25	1-OG-CS-375	—	—	—	—	—	—	—	—	—	—	NO INFO. AVAIL. ASSUME 1/0 LOAD
26	SPARE											
27	FCV 2720 1-CAC-CS-2720-1 & 2-CAC-CS-2720-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
28	CAC MONITOR AT-1261 & 1262 SOL. VLV'S	75.2	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

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DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT # 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC. SET NO.		BY	CHKD BY
PRELIM.		RA	
FINAL	✓	11-4-94	11-4-94
ADD			
SHEET 42 OF 53			
ID 7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E6 DISTRIBUTION PANEL NO. 1D DWG NO. 9517-LL-93041 SH. 15 REV. 9 DATED 8/6/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
29	CV 2714 1-CAC-CS-2714-1 & 2-CAC-CS-2714-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
30	460V UNIT SUBSTA "1L" HTR & FAN CKT	0	—	0	—	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

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NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

		RP	
	✓	4/23/84	
SHEET 43 of 53			
JO 7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 5A DWG NO. 9527-LL-93041 SH. 23 REV. 10 DATED 9/26/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	1X LOCA R_{1X}	1X LOCA X_{1X}	1X LOCA Z_{1X}	REMARKS
1	STEAM LEAK DETECTION SYS EC1)412-P614 HPCI LOGIC TIMER	52.5(58)	70	52.5(58)	70	.1446	.0032	.1447	.1446	.0032	.1447	
2	PWR SUPPLY MISC. INSTR. RACK XU-62	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
3	TERM. CAB XU-53 FOR 1-CAC-CS-2986	16(21)	G41	0	—	1.3247	.0292	1.3250	—	—	—	
4	SPARE											
5	DC SWBD 1A STRIP HTR'S	560	SE. NOTE #1	560	SEE NOTE #1	—	—	—	—	—	—	
6	SPARE											
7	SPARE											
8	RTG BOARD-PM2 PLUG MOLD FOR RECORDERS	170	SEE NOTE #1	170	SEE NOTE #1	—	—	—	—	—	—	
9	RTG BOARD-PM1 PLUG MOLD FOR RECORDERS	96	SEE NOTE #1	96	SEE NOTE #1	—	—	—	—	—	—	
10	SPARE											
11	OFF GAS SYSTEM RADIATION MONITOR TRIP	0	—	32	194	.4009	.0088	.4010	.4009	.0088	.4010	
12	RTG BOARD-PM3 PLUG MOLD FOR RECORDERS	92	SEE NOTE #1	92	SEE NOTE #1	—	—	—	—	—	—	
13	RTG BOARD XU-51 1-CAC-LSHL-4177	6	SEE NOTE #1	6	SEE NOTE #1	—	—	—	—	—	—	
14	RTG BOARD-PM7 PLUG MOLD FOR RECORDERS	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

NAME OF COMPANY CP&L BSEP UNIT 1

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC. SET NO. | BY: EA | CHKD BY: [illegible]

SHEET 44 of 53

JOB 7453-127

DATE | DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 31A DWG NO. 9E17LL-93041 SH. 23 REV. 10 DATED 9/26/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	SPARE											
16	RTG BOARD - PN11 PLUG MOLD FOR RECORDERS	65	SEE NOTE #1	65	SEE NOTE #1	—	—	—	—	—	—	
17	SPARE											
18	RTG BOARD - PM5 PLUG MOLD FOR RECORDERS	35	SEE NOTE #1	35	SEE NOTE #1	—	—	—	—	—	—	
19	SPARE											
20	1-AOG CONTROL VALVE 1-HCV-102											NO CABLE IN CASP
21	SPARE											
22	TREND RECORDER C91-UR-B76	0	—	0	—	—	—	—	—	—	—	
23	SPARE											
24	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA - 208/120V SYSTEM DATA

CALC SET NO: 7453-127

SHEET 45 of 57

NO.	COMP BY	CHK'D BY
0	RA 8/24/84	[illegible]
1	[illegible] 9/24/84	[illegible]

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO. 51B DWG NO 9527-LL-93041 SH. 24 REV. 9 DATED 7/1/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST FROM PNL-IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL IN FT	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	1X LOCA R_{1X}	1X LOCA X_{1X}	1X LOCA Z_{1X}	REMARKS
1	STEAM LEAK DETECTION SYS (B21) H12-P614 HPCI TIMER LOGIC	52.8(45)	156	52.8(45)	156	.3224	.0071	.3225	.3224	.0071	.3225	
2	IND CKT FOR FLOOD STATUS SERV WTR INTAKE STRUTURE	0	—	0	—	—	—	—	—	—	—	
3	TERM CAB. XU-56 FOR 1-CAC-CS-4179	117	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
4	VAC BRK CONT. ISOL VLV. V17 1-CAC-CS-4223	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
5	DC SWBD 1B STRIP HTRS	560	SEE NOTE #1	560	SEE NOTE #1	—	—	—	—	—	—	
6	SPARE											
7	TERM CAB. XU-56 FOR 1-CAC-CS-3452	69	SEE NOTE #1	0	—	—	—	—	—	—	—	
8	TORUS DRAIN & KEEPFILL SYS. 1-TD-SV-3897 & SV-3894	182	682	A 353	796	1.4094	.0311	1.4098	1.6450	.0363	1.6454	
9	PWR SUPPLY FOR GASEOUS ANALYZER PNL XU-61	0	—	0	—	—	—	—	—	—	—	
10	MSIV PIT TEMPERATURE SWITCHES TESTING CKT	0	—	0	—	—	—	—	—	—	—	
11	REHEATER 5A V91 & CONDENSER V92 SOLENOID VALVE	31	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
12	VOLTAGE INPUT FOR 1-SCW-LRA-285-1	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
13	REHEATER 5A V93 & CONDENSER V94 SOLENOID VALVE	31	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
14	REHEATER 5B V95 & CONDENSER V96 SOLENOID VALVE	31	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

united engineers

DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

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SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 1B DWG NO. 9527-LL-936-1 SH 24 REV. 9 DATED 7/1/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
15	RX BLDG TERM CAB XU-56 1-H12-P606, P623	107	SEE NOTE #1	0	—	—	—	—	—	—	—	
16	RX BLDG TERM CAB XU-56 1-CAC-CS-1538	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
17	RX BLDG TERM CAB XU-56 1-CAC-CS-1539	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
18	RX BLDG TERM CAB XU-56 1-CAC-CS-1533	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
19	RX BLDG TERM CAB XU-56 1-CAC-CS-1534	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
20	RX BLDG TERM CAB XU-56 1-CAC-CS-1541	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
21	RX BLDG TERM CAB XU-56 1-CAC-CS-1542	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
22	CONT. BLDG XU-79 CONT. RAD MON	150	SEE NOTE #1	150	SEE NOTE #1	—	—	—	—	—	—	
23	FLUID FLOW DETECTOR CAB. 1-CB-XU-73 CONTROL RM	640	SEE NOTE #1	886(753)	85	—	—	—	.1756	.0038	.1757	
24	SPARE											

PAGE 1,150 OF 106

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC. NO.	REV.	CHKD BY	CHKD BY
PROJ.	✓	KA	
FUNC.		DATE 7/1/84	DATE
SYST.			
SHEET 47 OF 53			
ID 7453-127		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 1ES DISTRIBUTION PANEL NO 1EB DWG NO 9527-LL-93041 SH. 25 REV. 7 DATED 7/1/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST FROM PNL IN FT.	LOAD IN VA	DIST FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	RX BLDG TERM CAB XU-53 1-H12-P600, F022	72	SEE NOTE "1	0	—	—	—	—	—	—	—	
2	RX BLDG TERM CAB XU-53 1-CAC-CS-4175	133	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
3	RX BLDG TERM CAB XU-53 1-CAC-CS-1699	42	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
4	RX BLDG TERM CAB XU-53 1-CAC-CS-1527	21	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
5	RX BLDG TERM CAB XU-53 1-CAC-CS-1531	21	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
6	RX BLDG TERM CAB XU-53 1-CAC-CS-1530	5	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
7	RX BLDG TERM CAB XU-53 1-CAC-CS-2711	21	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
8	RX BLDG TERM CAB XU-53 1-CAC-CS-2710	21	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
9	RX BLDG TERM CAB XU-53 1-CAC-CS-2572	5	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
10	RX BLDG TERM CAB XU-53 1-CAC-CS-2571	5	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
11	RX BLDG TERM CAB XU-53 1-CAC-CS-2573	5	SEE NOTE "1	5	SEE NOTE "1	—	—	—	—	—	—	
12	CONT. BLDG XU-75 CONT RAD MON.	150	SEE NOTE "1	150	SEE NOTE "1	—	—	—	—	—	—	ASSUMED LOAD
13	DIV I ISOLATOR CAB XU-77	500	97	500	97	.2004	.0044	.2005	.2004	.0044	.2005	ASSUMED LOAD BASED ON PNL SCH. 93041 SH 25
14	SPARE											

7453-127-3-ED00-01, SEC-4

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT: 1

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

SHEET: 48 of 53

JO 7453-127

SYSTEM LOAD DATA

UNIT SUB STN. 1E5 DISTRIBUTION PANEL NO 31AB DWG NO 9527-LL-93041SH 25 REV. 7 DATED 7/1/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	SPARE											
16	SPARE											
17	SPARE											
18	SEISMIC MONITORING SYSTEM	69	SEE NOTE #1	69	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
19	SPARE											
20	SPARE											
21	SPARE											
22	SPARE											
23	VAC BRK CONT ISOL VLV V16 1-CAC-CS-4222	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
24	SPARE											

GENERAL COMPUTATION SHEET

united engineers & constructors inc

(DISCIPLINE) ELECTRICAL

NAME OF COMPANY CP&L, BSEP UNIT/S 1

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

CALC SET NO		REV	COMP BY	CH
PRELIM		0	RA	
FINAL	X		DATE 4/21/84	DATE 4/2
VOID				
SHEET 49 OF 53			DATE	DATE
JO 7453.127				

Review Notes

1. The following criteria were used in preparation of the load tabulations and in determining the circuit impedances:
   a. load distance was not determined for circuits having no operating relays and solenoids (120 volts AC).
   b. Within individual circuits, the relays and/or solenoids which are expected to experience the maximum Voltage Drop have been tabulated outside the parenthesis in the load column. The remaining loads are summed up and tabulated within the parenthesis. Therefore, total load for the circuit is a summation of loads outside and within the parenthesis.
   c. Circuits loads such as indicating lights, recorders, resistance heaters, cabinet fans, low voltage power transformer, instrument power, supplies, etc. have not been analyzed for load distance from panel board.
   d. No load distance analysis was made on circuits in which the relays and/or solenoids are deenergized under 1X LOCA Condition.
   e. Manually initiated test circuits were not analyzed for load and load distances.

2. Power factor is assumed to be .85 lagging for all ac inductive loads.

3. Cable impedances were calculated based on cable length and size available in the CASP "A" Report with resistance and reactances data from the Industrial Power Systems Handbook by Donald Beenan. (See Reference list and Sheet 53 of 53.

4. Transformer impedance is based on information derived from manufacturer. Refer to Tele-notes T-1015, T-1066, where manufacturer's test data and foreign print records are not available.

5. Loads for which precise information was not available at all in any drawing, were assumed and are so noted in the System Load Data and/or circuit evaluation Tables.

6. The following assumptions were used to assess individual circuit component loading:
   a. For low voltage control transformers without size or load data, 80% of the fuse size was assumed to be the load on the transformer (conservative estimate).
   b. Solenoids or Relays for which exact manufacturers information was not available, load was assumed to be similar to devices for which load characteristic is available.
   c. Panel schedule load listing (Dwg. 9527-LL-93041)is assumed for circuits on which no component information or detail drawing is available.
   d. For power supplies, convertors, the loading is assumed to be the maximum rated Power Consumptions (conservative approach).
   e. No fire concurrent with a LOCA is assumed
   f. Radiation alarms and proper isolation of appropriate sys due to high radiation following a LOCA are assumed for areas.

7. All assumed loads should be verified at a later date when information is available. These assumed loads are conservative enough to provide reasonable voltage profiles at their terminals.

7453-127-3-ED00-01, SEC.5

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL — united engineers & constructors inc

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	NRS
FINAL	✓		DATE 4/21/84	DATE 4/28/82
VOID				
SHEET 50 OF 53			DATE	DATE
JO 7453-127				

NAME OF COMPANY CP&L, BSEP UNIT/S 1

208/120V SYSTEM DATA

SUBJECT FEEDER CABLE IMPEDANCE DATA

REF. DWG. 9527-F-93031, REV. 4, DATED 8/19/81

CABLE	CABLE SIZE	LENGTH(FT)	R	X	Z
HGØ-LG3	3/C # 1/0	40	.0052	.0014	.0054
H14-HG3	1-3/C-250MCM	319	.0183	.0103	.0210
H14-HG3/1	1-1/C-250MCM	319	—	—	—
HØ7-HG3	1-3/C-500MCM	65	.0020	.0019	.0027
HØ7-HG3/1	1-1/C-250MCM	65	—	—	—
HG3-HY1	1-3/C-250MCM	55	.0032	.0018	.0036
HG3-HY1/1	1-1/C-250MCM	55	—	—	—
H1Ø-HG3	1-3/C-250MCM	155	.0089	.0050	.0102
H1Ø-HG3/1	1-1/C-250MCM	155	—	—	—
H13-HG3	1-3/C-250MCM	184	.0105	.0059	.0121
H13-HG3/1	1-1/C-250MCM	184	—	—	—
BV4-GE1	1-4/C # 6	50	.0258	.0020	.0259
GE1-HQ4	1-4/C # 2	24	.0050	.0008	.0050
D45-GF2	1-4/C # 6	119	.0615	.0047	.0617
GF2-H32	1-4/C # 2	32	.0066	.0011	.0067
C74-HE1	1-4/C # 6	75	.0387	.0029	.0389
HE1-HE2	1-4/C # 2/0	30	.0031	.0010	.0033
C82-FN3	1-4/C # 6	160	.0827	.0063	.0829
FN3-HC8	1-4/C # 2	25	.0051	.0009	.0052
D89-GF3	1-4/C # 6	111	.0573	.0043	.0575
GF3-H33	1-4/C # 2	21	.0043	.0007	.0044
BY9-GE2	1-4/C # 6	60	.0310	.0023	.0311
GE2-HQ5	1-4/C # 2	24	.0050	.0009	.0050

7453-127-3-ED00-01, SEC

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

united engineers & constructors inc

(DISCIPLINE) ELECTRICAL

NAME OF COMPANY CP&L BSEP UNIT # 1

SUBJECT 208/120V SYSTEM DATA
FEEDER CABLE IMPEDANCE DATA
REF. DWG. 9527-F-93031, REV. 4, DATED 8/19/81

CALC SET NO		REV	COMP BY	CHK'D
PRELIM		0	RA	
FINAL	✓		DATE 4/21/84	DATE 4/28
VOID				
SHEET 51 OF 53			DATE	DATE
JO 7453-127				

CABLE	CABLE SIZE	LENGTH (FT)	R	X	Z
H12-HGØ	1-3/C-250MCM	159	.0091	.0051	.0105
H12-HGØ/1	1-1/C-250MCM	159	—	—	—
HØ9-SB6	1-3/C-250MCM	235	.0135	.0076	.015
HØ9-HGØ/1	1-1/C-250MCM	373	—	—	—
HGØ-SB6	1-3/C-250MCM	168	.0096	.0054	.011
HGØ-HYØ	1-3/C-250MCM	80	.0046	.0026	.005
HGØ-HYØ/1	1-1/C-250MCM	80	—	—	—
HØ6-HGØ	1-3/C-500MCM	70	.0021	.0021	.003
HØ6-HGØ/1	1-1/C-250MCM	70	—	—	—
HØ8-HGØ	1-3/C-250MCM	55	.0032	.0018	.003
HØ8-HGØ/1	1-1/C-250MCM	55	—	—	—
H11-HGØ/1	1-1/C-250MCM	373	—	—	—
H11-SB7	1-3/C-250MCM	70	.0040	.0023	.004
HGØ-SB7	1-3/C-250MCM	333	.0191	.0107	.021
HC7-HGØ	1-3/C-250MCM	125	.0072	.0040	.0082
HC7-HGØ/1	1-1/C-250MCM	125	—	—	—

7453-127-3-ED00-01, SEC.5

FORM 9.007 REV 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	
FINAL	✓		DATE 4/21/84	DATE 4/22/84
VOID				
SHEET 52 OF 53			DATE	DATE
JO 7453-127				

NAME OF COMPANY CP&L & SEP UNIT # 1

SUBJECT 208-120V SYSTEM DATA
FEEDER CABLE IMPEDANCE DATA
REF. DWG. 9527-F-93031, Rev. 4, DATED 8/19/81

CABLE	CABLE SIZE	LENGTH (FT)	R	X	Z
H14-HGØ	1-3/c-250MCM	316	.0181	.0102	.0208
H14-HGØ/1	1-1/c-250MCM	316	—	—	—
HG3-LG3	1-3/c#1/0	45	.0059	.0015	.0061
HC7-HG3	1-3/c-250MCM	80	.0046	.0026	.0053
HC7-HG3/1	1-1/c-250MCM	80	—	—	—
HØ8-HG3	1-3/c-250MCM	45	.0026	.0014	.0030
HØ8-HG3/1	1-1/c-250MCM	45	—	—	—
H11-HG3/1	1-1/c-250MCM	371	—	—	—
HG3-SB8	1-3/c-250MCM	156	.0089	.0050	.0103
H11-SB8	1-3/c-250MCM	255	.0146	.0082	.0168
GF4-HGC	1-3/c-500MCM	35	.0011	.0010	.0015
GF6-HG3	1-3/c-500MCM	24	.0007	.0007	.0010

GENERAL COMPUTATION SHEET

united engineers & constructors inc

(DISC. PLINE) ELECTRICAL

NAME OF COMPANY CP&L BSEP UNIT/S 1

SUBJECT 208/120 V SYSTEM DATA
FEEDER CABLE IMPEDANCE DATA

7453-127-3-EDOO-01, SEC

CALC SET NO		REV	COMP BY	CHK
PRELIM		0	RA	
FINAL	✓		DATE 4/21/84	DATE 4/2
VOID				
SHEET 53 OF 53			DATE	DATE
JO 7453-127				

TABLE 1.20 Approximate Resistance, Reactance, and Impedance of 600-volt Cables in Magnetic Ducts per 100 Ft

Cable size	Three single-conductor cables per duct, ohms per 100 ft			Three-conductor cable including interlocked armor cable, ohms per 100 ft		
	R*	X	Z	R*	X	Z
No. 14 Awg..	0.3135	0.00765	0.3135	0.3135	0.00468	0.31352
No. 12 Awg..	0.1972	0.00710	0.1972	0.1972	0.00456	0.19720
No. 10 Awg..	0.1240	0.00687	0.1240	0.1240	0.00448	0.12418
No. 8 Awg...	0.0779	0.00638	0.0782	0.0779	0.00427	0.07460
No. 6 Awg...	0.0498	0.00598	0.0500	0.0493	0.00391	0.04899
No. 4 Awg...	0.0318	0.00531	0.0322	0.0312	0.00362	0.03140
No. 2 Awg...	0.0203	0.00513	0.0209	0.0197	0.00344	0.02000
No. 1 Awg...	0.0163	0.00500	0.0171	0.0157	0.00342	0.01606
No. 1/0 Awg..	0.0131	0.00493	0.0140	0.0125	0.00340	0.01296
No. 2/0 Awg..	0.0106	0.00490	0.0117	0.0100	0.00336	0.01054
No. 3/0 Awg..	0.00860	0.00486	0.00986	0.00800	0.00333	0.00866
No. 4/0 Awg	0.00700	0.00482	0.00850	0.00640	0.00327	0.00721
250 MCM....	0.00698	0.00480	0.00778	0.00547	0.00322	0.00632
300 MCM....	0.00520	0.00474	0.00704	0.00460	0.00316	0.00557
350 MCM....	0.00461	0.00469	0.00658	0.00400	0.00310	0.00510
400 MCM....	0.00419	0.00462	0.00625	0.00354	0.00304	0.00469
500 MCM....	0.00359	0.00450	0.00573	0.00292	0.00295	0.00412
750 MCM....	0.00280	0.00438	0.00520	0.00208	0.00284	0.00346

* Based on 75 C.

RESISTANCE AT 90 °C = RESISTANCE AT 75°C x $\frac{234.5+90}{234.5+75}$

Rx 1.048

Form 56IM

united engineers & constructors inc

CALCULATION CONTROL SHEET

CALC. SET NO.	
PRELIM.	
FINAL	✓
VOID	

PROJECT TITLE CP&L – BSEP No. 2 DISCIPLINE ELECTRICAL

SYSTEM 208/120 VOLT DISTRIBUTION SYSTEM

SUBJECT 1X LOCA – 208/120 VOLT SYSTEM DATA

DESIGN CLASSIFICATION CLASS 1E (SAFETY RELATED)

STARTED BY R. ABDUL DATE 03/19/84

AUTHORIZED BY K. L. BAR DATE 03/19/84

PROBLEM STATEMENT

PREPARE LOAD DATA FOR ESEP UNIT #2 208/120 VOLT DISTRIBUTION SYSTEM BASED ON (a) NORMAL PLANT OPERATION & (b) A LOSS OF COOLANT ACCIDENT (LOCA) FOR ONE UNIT AND AN ORDERLY SHUTDOWN OF THE OTHER UNIT.

DESIGN BASIS

- UPDATED FSAR DATED 7-19-82
- REFER TO SECTION 3 FOR ADDITIONAL CRITERIA.

TOTAL NUMBER OF SET COMPUTATION SHEETS 48 (EXCLUDING CALC. CONTROL SHEET)

FINISHED BY R. A. 4/17/84 CHECKED BY [illegible] 4/26/84

	CHECKER	DESIGN SUPER	COGNIZANT ENG'R	DESIGN REVIEW
BY	[illegible]	[illegible]	[illegible]	
DATE	4/26/84	[illegible]	11/17/84	

REVISION 1 STARTED DATE _____ BY _____

Form 5603

united engineers & constructors inc

CALCULATION SUMMARY & REFERENCE SHEET

PROJECT TITLE CP&L, BSEP NO. 2 DISCIPLINE ELECTRICAL

CALC. SET NO.

PRELIM.

FINAL ✓

VOID

SHEET 1 OF 48

J.O. 7453-227

SYSTEM 208/120 VOLT DISTRIBUTION SYSTEM

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

DESIGN CLASSIFICATION CLASS 1E (SAFETY RELATED)

REV	COMP. BY	CHK'D BY
0	RA DATE 4/17/84	NJS DATE 4/26/84
	DATE	DATE

SUMMARY/CONCLUSIONS

REFER TO SECTION 4.0 OF THE CALCULATION — "SYSTEM LOAD DATA"

REFERENCES: (SPECIFICATIONS, DRAWINGS, CODES, CALCULATION SETS, TEXTS, REPORTS, COMPUTER DATA PSAR ETC.)

1. CALC. NO. 9527-001-3-ED00-53-F, TITLED "VOLTAGE DROP STUDY, 208/120 VOLT SAFETY RELATED LOADS" — REV. 1, DATED 5/25/81
2. NOTES OF TELEPHONE CONVERSATIONS T-100C DATED 3/13, 16/84 & T-961 DATED 2/28/84.
3. DRAWING SCHEDULES DATED 12/30/83.
4. INDUSTRIAL POWER SYSTEM HANDBOOK BY D. BEEMAN, EDITOR, FIRST EDITION MCGRAW HILL BOOK COMPANY, INC., 1955
5. DRAWINGS AS LISTED IN THE CIRCUIT EVAL. TABLES FOR VARIOUS LOADS.
6. CP&L WORK AUTHORIZATION NO. XS32340023 TO CONTRACT NO. XM32340000. 3/9/84 (File HBR/C6)

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

7453-227-3-EDOO-01

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	
FINAL	✓		DATE 4/17/82	DATE
VOID				
SHEET 2 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L - BSEP UNIT# 2

SUBJECT 1% LOCA - 208/120VOLT SYSTEM DATA

INDEX

FORM 5007 REV. 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

7453-227-3-EDOO-01

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	MB
FINAL	✓		DATE 4/18/84	DATE 4/24/84
VOID				
SHEET 3 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L, BSEP UNIT # 2

SUBJECT IX LOCA - 208/120VOLT SYSTEM DATA

1. PURPOSE:

Provide 208/120 VOLT AC Load data for a loss of Coolant accident (LOCA) in one unit with an orderly shutdown of the other Unit.

2. SCOPE:

1. (a) To provide the maximum load data on each 208/120 VOLT distribution Panel and/or bus, based on a loss of Coolant accident (LOCA) on one Unit and an orderly Shutdown of the other Unit

(b) Load data will be updated with the "As Built" plant modifications through November 1983.

2. Cable data, including number of Conductors, Cable Size, length, and impedance for feeder cables to 120/208 VOLT panels/buses and for the cables to the load terminals.

3. Transformer impedances and X/R ratio for all 480 — 208/120 VOLT transformers.

(NOTE: Refer to CP&L Work Authorization No. XS32340023 TO CONTRACT NO. XM32340000 as modified by

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

7453-227-3-EDOO-01

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

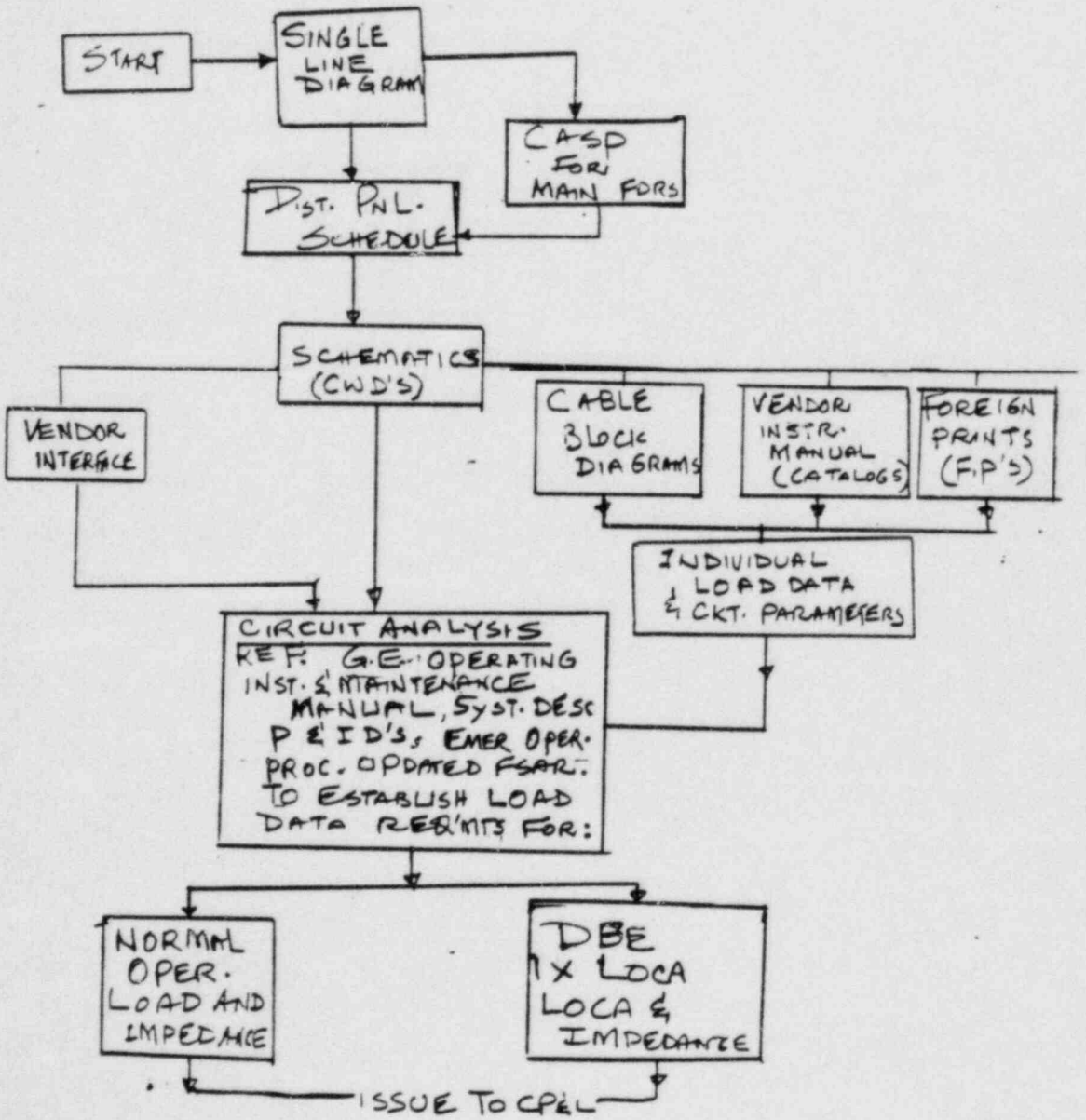
CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	NJS
FINAL	✓		DATE 4/12/84	DATE 4/12/84
VOID				
SHEET 4 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L, BSEP UNIT# 2

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

NOTES OF TELEPHONE CONVERSATION NO. T-961 dated 2/28/84).

3. REVIEW METHODOLOGY/CRITERIA



FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

CALC SET NO.		REV	COMP BY	CHK'D BY
PRELIM		0	RA	NB
FINAL	✓		DATE 4/17/84	DATE 5/22/84
VOID				
SHEET 5 OF 48			DATE	DATE
JO 7453-227				

7453-227-3-EDOO-01

NAME OF COMPANY CP&L, BSEP UNIT# 2

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

A GENERAL FLOW DIAGRAM IS SHOWN ON PREVIOUS PAGE TO INDICATE THE VARIOUS ELEMENT OF TASK. SOME LOAD DATA ARE TAKEN FRO THE EXISTING CALC. NO. 9527-001-3-EDOO-53-F REV. 1, DATED 2/25/81. VARIOUS MANUFACTURERS WER CALLED TO OBTAIN LOAD DATA WHEN F.P OR INST. MANUALS DID NOT PROVIDE THE REQUIRED INFORMA

THE FOLLOWING APPROACH WAS ADOPTED AS NOTED IN THE TELEPHONE CONVERSATION NOT T-1000 DATED 3/16/84:

1. CONCURRENT SHUTDOWN: MEANS ORDERLY SHUTD WITH "LOCA" IN ONE UNIT NO OPERATOR ACTION WILL BE TAKEN AT LEAST WITHIN A MINUTE FOLLOWING THE EVENT TO SHUT THE OTHER UNIT.

2. TRANSFERABLE LOADS: TRANSFERABLE LOA SHOULD BE ANALYZED TO DETEMINE THE WORST CASE LOADING CONDITION FOR THE VOLTAGE DROP STUDY.

3. BUS LOADS: SAFETY RELATED BUS LOADS WITH CABLE AND TRANSFORMER DATA ARE TO BE PROVIDED FOR LIGHT LOAD (UAT)/SHUTDOWN (SAT) CONDITIONS. IDENTIFICATIONS OF INDIVIDUAL LOADS BY TAG NOS. OR FUNCTIONAL IDENTIFICATION NO. IS NOT INTENDED. TOTAL CONNECTED LOAD

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

NAME OF COMPANY CP&L, BSEP UNIT # 2

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

7453-227-3-EDOO-01

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	
FINAL	✓		DATE 4/17/84	DATE
VOID				
SHEET 6 OF 48			DATE	DATE
JO 7453-227				

TO THE BUS UNDER VARIOUS CONDITIONS OF OPERATION IS TO BE COLLECTED.

4. CONNECTED LOAD: CONNECTED LOADS MEAN LOADS THAT ARE REQUIRED TO BE ENERGIZED DURING THE PLANT CONDITION, FOR WHICH THE VOLTAGE DROP IS INTENDED. ALL CIRCUITS ARE ANALYZED TO DETERMINE THE TOTAL CONNECTED LOADS FOR VARIOUS MODES OF PLANT OPERATION, UNLESS NOTED OTHERWISE IN THE "SYSTEM LOAD DATA" TABULATIONS

5. ALL RESISTANCE (AC) VALUES ARE CALCULATED BASED ON TABLE 1.20, PAGE 48 & CORRECTED TO 90°C CONDUCTOR TEMPERATURE.

(REFERENCE: PAGE 98 OF INDUSTRIAL POWER SYSTEM HANDBOOK BY D. BEEMAN, FIRST EDITION, 1955. EDITOR, McGRAW HILL BOOK COMPANY, INC.)

6. FOR ADDITIONAL REVIEW CRITERIA REFER TO "REVIEW NOTES" ON SECTION 4, PAGE NO. 44 OF 48.

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

7453-227-3-ED00-01, SEC-4

NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC NO.	REV.	ORIG BY	CHKD BY
PROJ NO.		RA	JAS
FILE	✓	DATE 4/16/84	DATE 4/16/84
NO.			
SHEET 7 OF 48			
JO 7453-227		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 2A DWG NO. LL-9341 SH 4 REV. 13 DATED 5-12-80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
1	LOCA SIGNAL FOR CAC	69	—	0	—	—	—	—	—	—	—	
2	2-RIP-PV-3438 CAC MONITORING SYS	15.6 (S)	441'	5	SEE NOTE #1	.9114	.0201	.9116	—	—	—	
3	RHR (E11) 2-H12-PG01	66	SEE NOTE #1	66	SEE NOTE #1	—	—	—	—	—	—	
4	RHR 2-H12-PG13 2-E11-KG00A, KG08A, SG00A, KG05A	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
5	RHR 2-H12-PG17 2-E11-F051A & E11-F053A	0	—	0	—	—	—	—	—	—	—	
6	RX. RECIRC. (B32) 2-H12-PG03 & PG12, M/A TRANSFORMER STA.	42	SEE NOTE #1	42	SEE NOTE #1	—	—	—	—	—	—	
7	CAC INSTRUMENT PANEL XU-60 (RECTIFIER SUPPLY)	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
8	RX RECIRC (B32) SUBFEED PNL 2A-TB MG SET 2A	—	—	—	—	—	—	—	—	—	—	
9	CAC INSTRUMENT PANEL XU-60 (120V SUPPLY)	106	SEE NOTE #1	106	SEE NOTE #1	—	—	—	—	—	—	NO CABLE AS PER CASP
10	SPARE					—	—	—	—	—	—	
11	HPCI (E41) 2-H12-PG01 TURBINE TEST & VIBRATION CKTS.	32	SEE NOTE #1	32	SEE NOTE #1	—	—	—	—	—	—	
12	24/48 V. DC BATTERY CHARGER "2SA-2"	2000	SEE NOTE #1	2000	SEE NOTE #1	—	—	—	—	—	—	
13	CTL BLDG VENT SYS. FILTER "A"	—	—	—	—	—	—	—	—	—	—	
14	BRIDGE IND UNITS 2-VA-TI-1299 2-VA-TI-1647-2, 2-VA-TI-1310-2	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	NO CABLE AS PER CASP
15	24/48 V. DC BATTERY CHARGER "2SA-1	2000	SEE NOTE #1	2000	SEE NOTE #1	—	—	—	—	—	—	

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DISCIPLINE: ELECTRICAL

GENERAL COMPUTATION SHEET

united engineers

NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC. NO.		REV.	CHKD BY
PROJ. NO.			RP
UNIT	✓		DATE 2/8/80
SHEET	8 ~ 48		
TO 7453-227		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 2A DWG NO LL-9341 SH 4 REV. 13 DATED 5-12-80

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX-LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
16	PUMP 2A COOLING WATER SOL. VALVE 2-RCC-V74	21	1428'	21	1428	2.9511	.0651	2.9519	2.9511	.0651	2.9519	
17	GENERATOR & MAIN XFMR RELAY PANEL	—	—	—	—	—	—	—	—	—	—	
18	SEAL COOLING EXCH'R DISCH VLV'S V130 & V131	31.2	SEE NOTE #1	0	—	—	—	—	—	—	—	NO CABLE AS PER CASP
19	VACUUM BREAKERS 2-CAC-X18A TO 2-CAC-X18E TEST CIRCUIT	25	SEE NOTE #1	25	SEE NOTE #1	—	—	—	—	—	—	
20	SPARE											
21	BATTERY GROUND DET.	38.4	SEE NOTE #1	38.4	SEE NOTE #1	—	—	—	—	—	—	
22	SW. RHR PUMPS 2A & 2C AUXILIARY CONTROL	16(56)	1920	16(56)	1920	3.9679	0.0876	3.9689	3.9679	0.0876	3.9689	
23	RHR PUMPS WELL WTR. SUPPLY VALVE V143	0	—	0	—	—	—	—	—	—	—	
24	RX BLDG CLOSED COOLING WATER SYS. - RCC-PS 672	0	—	84	582'	—	—	—	1.4328	.0265	1.2030	
25	VITAL HEAD WELL WTR. SUPPLY VALVE V41	52.6	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
26	RX BLDG CLOSED COOLING WATER SYS. SOL VALVE 2-RCC-V185	16 (21)	388'	16 (21)	388'	.8018	.0177	.8020	.8018	.0177	.8020	
27	TURB TRIP AIR RELAY DUMP VLV CTL HDR PRESS LO REL CKT	64 (32)	565'	84 (84)	1574'	1.1676	.0258	1.1679	3.2529	.0717	3.2537	
28	2-RIP-PY-3442 & 3440 CAC MONITORING SYS.	21 (10)	936'	10	SEE NOTE #1	1.934	.0427	1.9348	—	—	—	LAMP LOAD UNDER IX CONDITION
29	TEMP. SW. TEST & CONTROL CAB	32 (160)	2150'	32(160)	2150'	4.4433	.0980	4.4446	4.4433	.0980	4.4446	
31	PWR SUPPLY FOR GASEOUS ANALYZER PNL XU-55	0	—	0	—	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC-4

CALC SET NO.		NO.	COMP BY	CHKD BY
PRELIM			RA	NH
FINAL	✓		DATE 5/14/84	DATE 8/24/84
ADD				
SHEET 9 OF 48				
JO 7453-227			DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO 2B DWG NO LL-9341 SH 5 REV. 17 DATED 5-13-85

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL IN FT	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	(D12) PROCESS RAD MON 2-D12-V27B	23	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
2	ESS LOGIC CAB HG1 LIGHT CKT	0	—	0	—	—	—	—	—	—	—	
3	RHR (E11) 2-H12-P601	140	SEE NOTE #1	140	SEE NOTE #1	—	—	—	—	—	—	
4	RHR 2-H12-P612, 2-E11-K605B K600B, K603B, K604, 3600B	35	SEE NOTE #1	35	SEE NOTE #1	—	—	—	—	—	—	
5	RHR 2-H12-P618 2-E11-F074, F051B, F053B	21	856'	21	856'	1.7690	.0390	1.7694	1.7690	.0390	1.7694	
6	RX RECIRC. (B32) 2-H12-P603 PG12 M V/I XFMR STA	42	SEE NOTE #1	42	SEE NOTE #1	—	—	—	—	—	—	
7	POST ACCIDENT SAMPLE VALVES SV-4187, 4189, 4184, 4181, 4182	25	SEE NOTE #1	25	SEE NOTE #1	—	—	—	—	—	—	
7A	POST ACCIDENT SAMPLE VALVES SV-4192, 4193, 4194	15	SEE NOTE #1	15	SEE NOTE #1	—	—	—	—	—	—	
8	RESERVED FOR PM 80-033											
8A	RESERVED FOR PM80-033											
9	INSTRUMENT AIR DRYER	480	SEE NOTE #1	480	SEE NOTE #1	—	—	—	—	—	—	
10	DIV. II ISOLATOR CAB. XU-76	500	162 (NO DETAIL INFO ON LOAD AVAIL.)	500	162 (NO DETAIL INFO ON LOAD AVAIL.)	.3348	.0074	.3349	.3348	.0074	.3349	ASSUMED LOAD BASED ON PNL SCH. 9341 SH. 5
10A	RESERVED FOR PM 80-033											
11	BENCH BOARD AUX. RELAY CAB. (C12-V139 & V140) H12-P624	20	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
12	24/48 V. DC BATTERY CHARGER "24B-2"	2000	SEE NOTE #1	2000	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: 1X LOCA - 208/120V SYSTEM DATA

CALC STATUS		PREP'D	CHK'D
PRELIM		RA	NS
FINAL	✓	4/16/84	4/16/84
VOID			
SHTS	10 ~ 48		
JOB	7453-227	DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2EB DISTRIBUTION PANEL NO 2B DWG NO LL-9341 SH 5 REV 17 DATED 5-13-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	NORMAL DIST. FROM PNL. IN FT.	1X-LOCA LOAD IN VA	1X-LOCA DIST. FROM PNL IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
13	24/48V DC BATTERY CHARGER "24B-1"	2000	SEE NOTE #1	2000	SEE NOTE #1	—	—	—	—	—	—	
14	RCIC (ES1) 2-HI2-P601 (ES1-K602)	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
15	RX BLDG VENT FLOW MEASURING EQUIP XU-62	206	SEE NOTE #1	206	SEE NOTE #1	—	—	—	—	—	—	
16	PUMP 2B COOLING WATER SOL. VALVE 2-RCC-V73	21	1902'	21	1902'	3.930	.0867	3.9817	3.930	.0867	3.9817	
17	VACUUM BREAKERS 2-CAC-X1BF TO 2-CAC-X1BJ TEST CIRCUIT	25	SEE NOTE #1	25	SEE NOTE #1	—	—	—	—	—	—	
18	BATTERY GROUND DET.	38.4	SEE NOTE #1	38.4	SEE NOTE #1	—	—	—	—	—	—	
19	SW RHR BOOSTER PMPS "2B" & "2D" AUXILIARY CONTROL	16(56)	1900	16(56)	1900	3.9266	0.0866	3.9376	3.9266	0.0866	3.9376	
20	SPACE HEATER FOR LTC & COMM INVERTER	600	SEE NOTE #1	600	SEE NOTE #1	—	—	—	—	—	—	
21	SW SEAL COOLING EXCH'R DISCH. VLVS. V126 & V125	31.2	SEE NOTE #1	0.	—	—	—	—	—	—	—	
22	MD SCAVANGERS STM RE HEATER & CONDENSER VALVES	124	SEE NOTE #1	40	SEE NOTE #1	—	—	—	—	—	—	
23	RHR PUMPS WELL WTR SUPPLY VALVE V143	127(5)	223	127(5)	223	.4608	.0101	.4610	.4608	.0101	.4610	
24	RX BLDG CLOSED COOLING WATER SYS SV-2-RCC-V51	16(21)	564'	16(21)	564'	1.1652	.0257	1.1655	1.1652	.0257	1.1655	
25	STACK MONITORING & PURGING EQUIPMENT	41	SEE NOTE #1	41	SEE NOTE #1	—	—	—	—	—	—	
26	2-RIP-PV-3341 CAC MONITORING SYS.	132	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
27	TEMP SW TEST & CONTROL CABINET	32(160)	2260	32(160)	2260	4.6706	.1030	4.6718	4.6706	.1030	4.6718	

GENERAL COMPUTATION SHEET

ELECTRICAL

united engineers

7453-227-3-ED00-01, SEC-4

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SHEET 11 OF 48

OF 7453-227

SYSTEM LOAD DATA

UNIT SUB STN 2EB DISTRIBUTION PANEL NO 2B DWG NO LL-9341 SH 5 REV. 17 DATED 5-13-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
28	2-RIP-PV-3437 & 3439 CAC MONITORING SYS.	132	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
29	BRIDGE IND. UNIT 2-VA-TI-1648	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DIVISION: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP

SUBJECT: IX LOCA-208/120V SYSTEM DATA

SHEET 12 OF 48

7453-227

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2AB DWG NO 9527-E-9341 SH 6 REV. 11 DATED 9-8-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST FROM PNL. IN FT.	CIRCUIT LOADS IX-LOCA LOAD IN VA	CIRCUIT LOADS IX-LOCA DIST FROM PNL. IN FT	CABLE IMPEDANCES N "C-M" NORMAL R_N	NORMAL X_N	NORMAL Z_N	IX LOCA R_{IX}	IX LOCA X_{IX}	IX LOCA Z_{IX}	REMARKS
1	SPARE											
2	2-H12-P616 CRD RELAY LOGIC (C12)	984	SEE NOTE #1	762	SEE NOTE #1	—	—	—	—	—	—	
3	SPARE											
4	SPARE											
5	JET PUMP SYSTEM H12-P619	253	SEE NOTE #1	253	SEE NOTE #1	—	—	—	—	—	—	
6	(B32) RX RECIRC SYS 2-H12-P603 2-H12 P612 SPEED CTL R620, K615	7.4	SEE NOTE #1	7.4	SEE NOTE #1	—	—	—	—	—	—	
7	CTL ROD HYD SYS 2-H12-P613, 2-C12-K600 THRU K604 AND N600	44	SEE NOTE #1	44	SEE NOTE #1	—	—	—	—	—	—	
8	SPARE											
9	REACTOR CONTROL PANEL H12-P603	98	SEE NOTE #1	98	SEE NOTE #1	—	—	—	—	—	—	
10	2-H12-624 CRD HYD. SYS.	20	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
11	STNBY LIQ. CTL SYS. (C41) 2-H12-P613, 2-C41-N600, K600	19	SEE NOTE #1	19	SEE NOTE #1	—	—	—	—	—	—	
12	STNBY LIQ CTL. SYS. (C41) 2-H12-P624	30	SEE NOTE #1	30	SEE NOTE #1	—	—	—	—	—	—	
13	NUCLEAR BOILER PROCESSING INST B21-R622 RECORDER	32.5	SEE NOTE #1	32.5	SEE NOTE #1	—	—	—	—	—	—	
14	TRAVERSING IN-CORE CAL. SYS. (C51) 2-H12-P607	960	84	960	84	.1735	.0038	.1736	.1735	.0038	.1736	

GENERAL COMPUTATION SHEET

ELECTRICAL — unitied engineers

CP&L BSEP

1X LOCA- 208/120V SYSTEM DATA

7453-227-3-EDOO-01, SEC-4

SYSTEM LOAD DATA

UNIT SUB STN DISTRIBUTION PANEL NO 2AB DWG NO 9527-LL-9341 SH 6 REV 11 DATED 9-8-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST FROM PNL-IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST FROM PNL IN FT	CABLE IMPEDANCES N "C-M" NORMAL R_N	X_N	Z_N	CABLE IMPEDANCES N "C-M" 1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
15	DEMIN SUPPLY LINE SOL VLV 2-SW-SV-3745	0	—	0	—	—	—	—	—	—	—	
16	SPARE											
17	SPARE											
18	SPARE											
19	AREA RADIATION MON. (D22) 2-D22-P600, K603A	600	136	600	136	.2810	.0062	.2811	.2810	.0062	.2811	LOAD ASSUMED RADIOON PNL SCHEDULE 9527-LL-1341,SH.6,REV 11,9/8/83
20	PROCESS RAD MON 2-XU-3 2-D12-R601,R602,R603,R604 & R001A	71	SEE NOTE #1	71	SEE NOTE #1	—	—	—	—	—	—	
21	SPARE											
22	PROCESS RAD MON (D12) XU-3	18	SEE NOTE #1	18	SEE NOTE #1	—	—	—	—	—	—	
23	SPARE											
24	PROCESS RAD MON XU-3 2-D12-F011 (PNL J006)	0	—	0	—	—	—	—	—	—	—	
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											

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GENERAL COMPUTATION SHEET

DIVISION ELECTRICAL — united engineers

NAME OF COMPANY CP&L BSEP — JOB 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SHEET 14 OF 48

JOB 7453-227

SYSTEM LOAD DATA

UNIT SUB STN — DISTRIBUTION PANEL NO 2AB — DWG NO 9527-LL-9341 SH 6 REV. 11 DATED 9-8-83

CKT. NO	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST FROM PNL. IN FT.	CABLE IMPEDANCES N OHM NORMAL R_N	X_N	Z_N	CABLE IMPEDANCES N OHM 1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
29	SPARE											
30	ENV RAD MON STATION 'C' 2-P62-P001 VAC PMP & TIME METER	1200	SEE NOTE #1	1200	SEE NOTE #1	—	—	—	—	—	—	
31	SPARE											
32	SPARE											
33	ENV RAD MON STATION 'B' 2-P62-P001 VAC. PMP & TIME METER	1200	SEE NOTE #1	1200	SEE NOTE #1	—	—	—	—	—	—	
34	NUC BOILER PROC INST SYS. (B21) 2-B21-K600, K640A, K640B, K609A, K609B, 2-H12-P612	85	SEE NOTE #1	85	SEE NOTE #1	—	—	—	—	—	—	
35	SPARE											
36	NUC. BOILER PROC INST SYS. (B21) MTR CHASIS 21A & 21B, 2-H12-P614	33	SEE NOTE #1	33	SEE NOTE #1	—	—	—	—	—	—	
37	SPARE											
38	SPARE											
39	SPARE											
40	SPARE											
41	POST ACCIDENT SAMPLING VALVES SV 4180/3/5/6/8	0	—	0	—	—	—	—	—	—	—	
42	N.C. STM SUP. SHUTOFF (A71) RESET CKT. 2-H12-P601	15	SEE NOTE #1	15	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

unified engineers

7453-227-3-ED00-01, SEC-4

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

ORIG		RP	AD
CHK	✓	4/16/84	4/16/84
APP			
SHEET	15 OF 48		
JO	7453-227	DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2A-RX DWG NO LL-9341 SH 7 REV. 19 DATED 9/3/82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN OHM						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	SPARE											
2	SPARE											
3	RHR SYS (E11) 2H21-P018	28	SEE NOTE #1	28	SEE NOTE #1	—	—	—	—	—	—	
4	SPARE											
5	SPARE											
6	RX BLDG VA CTL PNL 2-VA-M3-RB POWER SUPPLY	17(117)	1083	17(117)	1083	2.2382	.0494	2.2387	2.2382	.0494	2.2387	ASSUMED LOAD
7	SPARE											
8	RX BLDG VA RHR PUMP RM-A BRIDGE IND UNIT 2-VA-TT-1602A	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
9	HPCI ROOM 2-VA-CV-1590 CTL CKT	0.0	—	0.0	—	—	—	—	—	—	—	
10	2-G31-2002-26 CONT PNL FILTER "A" CONTROL CKT	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON UC31983
11	2-XU-83 CONTROL PNL FILTER "A" CONTROL CKT	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
12	SPARE											
13	SPARE											
14	SPARE											
15	SPARE											
16	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO. | ORIG BY: RF | CHKD BY: JH

SHEET 16 OF 48

TO 7453-227

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2A-RX DWG NO LL-9341 SH 7 REV. 19 DATED 9/3/82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
17	SPARE											
18	SPARE											
19	REACT. PROT. SYS. (C72) 2H21-P003 ACCUM. MONITORS	84	SEE NOTE #1	96	SEE NOTE #1	—	—	—	—	—	—	
20	FUEL PLATFORM OPERATING FLOOR PANEL	13	SEE NOTE #1	13	SEE NOTE #1	—	—	—	—	—	—	
21	2G31-2002 CONTROL PNL FILTER "A" IND LIGHT CKT	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON VC 31983
22	RX BLDG VA-CORE SPRAY PUMP PM A-BRIDGE IND. UNIT 2-VA-TT-1603	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
23	TESTABLE CHECK VLV 2-E11-F050A	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
24	FLOW SWITCH B32-N002A (I60)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
25	SPARE											
26	FLOW SWITCH B32-N004A (I62)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
27	AIRLOCK INTERCONN	31	302	31	302	.6241	.0138	.6243	.6241	.0138	.6243	
28	FLOW SWITCH B32-N007A I64	—	—	2	SEE NOTE #1	—	—	—	—	—	—	
29	DRYWELL EQUIP DR. HX IN. VLV 2-RCC-V54	0	—	0	—	—	—	—	—	—	—	
30	COMPR. 2A REFRIGERATED AFTER COOLER MOTOR	587	SEE NOTE #1	587	SEE NOTE #1	—	—	—	—	—	—	
31	RHR PUMPS A&C RAD DETECTOR 2-SW-RT-58-4	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
32	RADIATION DETECTOR 2-SW-RT-58-5	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

unitec engineers

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC-4

CALC. NO. | REV. | ORIG. | CHKD.
CALC. NO. | ✓ | RA 1/16/90 | JP 2/12/90
SHT. 17 OF 48
IP 7453-227 | DATE | DATE

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2A-RX DWG NO LL-9341 SH 7 REV. 19 DATED 9/3/82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX-LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
33	SPARE											
34	DRYWELL COOLER 2A & 2D INSTRUMENT POWER	78	SEE NOTE #1	78	SEE NOTE #1	—	—	—	—	—	—	
35	AREA RAD MON.(D22) ALARM 2-19. EL 20'-0" RX BLDG AIR LOCK	38	SEE NOTE #1	38	SEE NOTE #1	—	—	—	—	—	—	
36	DRYER UNIT FOR CAC-AT-1263	1737	SEE NOTE #1	1737	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

NAME OF COMPANY: CP&L BSEP — JOB NO. 2

SUBJECT: 1X LOCA-208/120V SYSTEM DATA

SHEET 18 OF 48

7453-227

SYSTEM LOAD DATA

UNIT SUB STN. 2E8 DISTRIBUTION PANEL NO 2B-RX DWG NO 9527-LL-9341 SH 8 REV. 19 DATED 9-3-82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST FROM PNL IN FT.	LOAD IN VA	DIST FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	SPARE											
2	2-G31-Z002-26 CONT. PNL FILTER "B" IND LIGHT CKT	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON UC 3/1983
3	RESIDUAL HEAT REM (E11) 2-H21-P021	14	SEE NOTE #1	14	SEE NOTE #1	—	—	—	—	—	—	
4	RX BLDG VA RHR PUMP RHB BRIDGE IND. UNIT	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
5	LHR TESTABLE CHECK VLV 2-E11-F050B	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
6	RX BLDG VA CORE SPRAY PUMP RM "B" BRIDGE IND UNIT 2-VA-TT-1604	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
7	SPARE											
8	RX BLDG FIRE PROT. ANNUN. 2-UA-39	34	SEE NOTE #1	34	SEE NOTE #1	—	—	—	—	—	—	
9	SPARE											
10	G31-Z002-26 CONT. PNL FILTER B CONT. CKT. 2-VA-TT-1601A	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON UC 3/1983
11	2-XU-83 CONT. PNL. RWCU FILTER "B" CONTROL CKT.	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
12	SPARE											
13	SPARE											

GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

7453-227-3-ED00-01, SEC-4

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SHEET 19 OF 48

TO 7453-227

RA 4/27/84 — NB 4/26/84

SYSTEM LOAD DATA

UNIT SUB STN. 2EB DISTRIBUTION PANEL NO 2B-RX DWG NO 9527-LL-9341 SH. 8 REV. 19 DATED 9-3-82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
14	SPARE											
15	SPARE											
16	SPARE											
17	SPARE											
18	SPARE											
19	RX BLDG SPR. SYSTEM 2-FP-DV20	11	SEE NOTE #1	11	SEE NOTE #1	—	—	—	—	—	—	
20	DRYWELL COOLER 2B & 2C INSTRUMENT POWER	58	SEE NOTE #1	58	SEE NOTE #1	—	—	—	—	—	—	
21	REACT. PROT. SYS (C72) 2-H21-P012 ACCUM. MONITORS	700	SEE NOTE #1	800	SEE NOTE #1	—	—	—	—	—	—	
22	RHR PUMPS B & D RAD. DETECTOR 2-SW-RT-58-3	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
23	REMOTE SHUTDOWN PNL. RS4	0	—	0	—	—	—	—	—	—	—	
24	FLOW SWITCH B32-N002B (I61)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
25	SPARE											
26	FLOW SWITCH B32-N004B (I63)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

7453-227-3-ED00-01, SEE-4

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC SHT.	NO.	COMP BY	CHKD BY
PRIM. NO.	0	RB 2/17/84	DA 4/26/84
SUB.	✓		
SUB-SUB			
SHEET 20 OF 48		DATE	DATE
JO 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN. 2E8 DISTRIBUTION PANEL NO 2B-RX DWG NO 9527-LL-9341 SH 8 REV. 19 DATED 9-3-82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
27	COMPR 2B REFRIGERATED AFTERCOOLER MOTOR	587	SEE NOTE #1	587	SEE NOTE #1	—	—	—	—	—	—	
28	FLOW SWITCH B32-N007B (I65)	0	—	2	SEE NOTE #1	—	—	—	—	—	—	
29	SPARE											
30	AIRLOCK INTERCONN	21	557	21	557	1.1511	.0254	1.1514	1.1511	.0254	1.1514	
31	TERM. CAB XU-2B DELUGE VLV 2-FP-DV-319	11	SEE NOTE #1	11	SEE NOTE #1	—	—	—	—	—	—	
32	AIRLOCK INTERCONN	21	523	21	523	1.0809	.0238	1.0811	1.0809	.0238	1.0811	
33	SPARE											
34	SWGR 2B BRKR 4A & 4B SPACE HEATER	250	SEE NOTE #1	250	SEE NOTE #1	—	—	—	—	—	—	
35	IPCLRT TEST STATION	0	—	0	—	—	—	—	—	—	—	
36	DRYER UNIT FOR CAC-AT-1259	1737	SEE NOTE #1	1737	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE ELECTRICAL — united engineers

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC NO.		BY	CHK'D BY
NO.	✓	RA 4/17/84	4/18/84
NO.			
SHEET 21 OF 48		DATE	DATE
JO 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2AB-RX DWG NO 9527-LL-9341 SH 9 REV. 9 DATED 3-5-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	NORMAL DIST. FROM PNL. IN FT.	1X-LOCA LOAD IN VA	1X-LOCA DIST. FROM PNL. IN FT	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
1	SPARE											
2	SPARE											
3	(B21) 2-H12-P007 R006	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
4	(D22) AREA RAD MON.-ALARM No 2-26 INSIDE NEW VAULT	240	SEE NOTE #1	240	SEE NOTE #1	—	—	—	—	—	—	
5	(G31) RWCU H21-P002 G31-N002 A & B	59	115	59	115	.2376	.0052	.2377	.2376	.0052	.2376	
6	(C51) START-UP RANGE DET'TOR DRIVE CTL SYS H21-P008	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	START-UP RANGE DETECTOR CTL UNITS CONSIDERED ONLY CTL REMOTE FOR IND LIGHTS ASSUMED LOAD
7	FUEL POOL 2-G41-P001	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP
8	(A71) 2-H21-P002 TEMP SWITCH	19	SEE NOTE #1	19	SEE NOTE #1	—	—	—	—	—	—	
9	FUEL SERVICE EQUIP. VAC. PMP. 2-F11-E006	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP.
10	FUEL SERVICE EQUIP. SAMPLER 2-F14-E014	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP
11	2-H12-P007 RECEPT. FOR B21-R007	30	SEE NOTE #1	30	SEE NOTE #1	—	—	—	—	—	—	
12	AREA RAD MON (D22) RAD. ALARM 2-27 NORTH OF FUEL STOR.	0	—	240		—	—	—	—	—	—	LOAD ASSUMED BASED ON PNL SCHEDULE 9527-LL-9341 SH 9 REV 9 3-5-81
13	AREA RAD MON (D22) RAD. ALARM 2-21 IN T.I.P. ROOM	0	—	240		—	—	—	—	—	—	
14	AREA RAD MON (D22) RAD. ALARM 2-29 CASK WASHDN AREA	0	—	240		—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY CP&L BSEP UNIT # 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-EDOO-01, SEC-4

CALCULATION		BY	CHK'D BY
ORIG.	✓	RA 4/7/84	JJ 4/13/84
CHK'D			
SHEET 22 OF 48		DATE	DATE
JO 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO. AB-RX DWG NO 9527-LL-9341 SH 9 REV. 9 DATED 3-5-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	SUPPRESSION POOL VACUUM BKR'S SOL. VLV'S (12)	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP
16	SUPPRESSION POOL TAP SOV'S (4)	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP
17	SUPP. POOL & PRI. CONTMNT O_2 ANALYZER SOV'S (8)	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP.
18	SPARE											
19	SPARE											
20	SPARE											
21	2-H21-P007 RECEPTACLE FOR C12-R018	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
22	FLOW TRANSMITTER 2-CAC-FT-2567	25	↓	25	↓	—	—	—	—	—	—	ASSUMED LOAD DUE TO LACK OF INFO.
23	SPARE											
24	AREA RAD MON (D22) RAD. ALARM EL 117'-4" BETWEEN RX & FUEL POOL	0	—	240	SEE NOTE #1	—	—	—	—	—	—	LOAD ASSUMED BASED ON PNL SCHEDULE 9527-LL-9341, SH 9, REV. 9, 3-5-81
25	NEUTRON MONITORING (CSI) INST. RACK 2-H21-P008 START-UP RANGE DRIVE CONTROL	0	—	0	—	—	—	—	—	—	—	START-UP LOAD OF 1000 VA AS PER PNL SCHEDULE 9527-LL-9341, SH 9, REV 9, 3-5-81
26	SPARE											
27	SPARE											
28	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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7453-227-3-EDOO-01, SEC-4

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

		RA	HC
	✓	4/13/84	4/16/84
SHEET	23 of 48		
JO	7453-227	DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2AB-RX DWG NO 9527-LL-9341 SH. 9 REV. 9 DATED 3-5-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
29	SPARE											
30	SPARE											
31	AIRLOCK INTERCONN.	105	SEE NOTE #1	105	SEE NOTE #1	—	—	—	—	—	—	24VAC CKT NO CABLE ANALYSIS REQ'D
32	SPARE											
33	SPARE											
34	SWGR 2B BRKR 3A & 3B SPACE HEATER	250	SEE NOTE #1	250	SEE NOTE #1	—	—	—	—	—	—	
35	HPCI ROOM DOOR ALARM	19	SEE NOTE #1	19	SEE NOTE #1	—	—	—	—	—	—	CONTINUED LOAD NO CABLE ANALYSIS REQ'D
36	SPARE											
37	OFF-GAS DRAIN TANK LOOP SEAL-KEEP FULL	0	—	0	—	—	—	—	—	—	—	
38	SPARE											
39	SPARE											
40	SPARE											
41	SPARE											
42	RWCU G31 INST. RACK 2-H21-P023	588	SEE NOTE #1	588	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

		RF	KB
	✓	11/16/84	11/16/84
SHEET	24 OF 48		
JO	7453-227	DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 2A-TB DWG NO LL-9341 SH 10 REV. 13 DATED 11/18/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	NORMAL X_N	NORMAL Z_N	1X LOCA R_{1X}	1X LOCA X_{1X}	1X LOCA Z_{1X}	REMARKS
1	SPARE											
2	SCOOP TUBE POSITIONER (B32) 5001A	1250	SEE NOTE #1	1250	SEE NOTE #1	—	—	—	—	—	—	
3	FLUID DRIVE CASE BREATHER FAN UNIT 'A'	828	SEE NOTE #1	828	SEE NOTE #1	—	—	—	—	—	—	
4	P002A & P003A WINDG OVERTEMP GEN & MTR (K19A & K20A) & XFMR TEMP	266	SEE NOTE #1	266	SEE NOTE #1	—	—	—	—	—	—	
5	SERVICE AIR HEADER SYS (2 PRESS HDR VLVS)	31.2(13)	1647	31.2(13)	1647	3.4038	0.0751	3.4046	3.4038	0.0751	3.4046	
6	TURBINE BLDG ROLL TYPE FILTER 2A-SAF-TB	545	127	545	127	0.2624	0.0058	0.2625	0.2624	0.0058	0.2625	
7	INSTR. AIR HEADER SYSTEM	31.2(13)	1661	31.2(13)	1661	3.4327	0.0757	3.4335	3.4327	0.0757	3.4335	
8	TURBINE BLDG ROLL TYPE FILTER 2B-SAF-TB	545	122	545	122	0.2521	0.0056	0.2522	0.2521	0.0056	0.2522	
9	AIRLOCK INTERCONN	21	321	21	321	0.6632	0.0146	0.6634	0.6632	0.0146	0.6634	
10	TURBINE BLDG STRAINER 2A-STR-TB	8(869)	216	8(869)	216	0.4463	0.0098	0.4464	0.4463	0.0098	0.4464	
11	SPARE											
12	TURBINE BLDG STRAINER 2B-STR-TB	8(869)	182	8(869)	182	0.3760	0.0083	0.3761	0.3760	0.0083	0.3761	
13	AIRLOCK INTERCONN	21	316	21	316	0.6529	0.0144	0.6531	0.6529	0.0144	0.6531	
14	TURBINE BLDG CHILLER MACH 2A-RM-TB CONTROL CONSOLE	398	SEE NOTE #1	398	SEE NOTE #1	—	—	—	—	—	—	
15	TURBINE BLDG VENT. AIR FLOW RECIRC. SYSTEM	8.2	SEE NOTE #1	8.2	SEE NOTE #1	—	—	—	—	—	—	
16	TURBINE BLDG SP. CHILLER MACH 2B-RM-TB CONTROL CONSOLE	398	SEE NOTE #1	398	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

united engineers

7453-227-3-ED00-01, SEC-4

DISCIPLINE: ELECTRICAL

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA - 208/120V SYSTEM DATA

	✓	RP 4/16/84	MD 6/14/84
SHT: 25 OF 48			
JC 7453-227		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 2A-TB DWG NO LL-9341 SH 10 REV 13 DATED 11/18/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
17	LIFT PUMPS SYSTEM	0.0	—	0.0	—	—	—	—	—	—	—	
18	SPARE											
19	SPARE											
20	SPARE											
21	SPARE											
22	HEAT TRACING - INCREASED RANGE RAD.	300	SEE NOTE #1	300	SEE NOTE #1	—	—	—	—	—	—	DUE TO LACK OF INFORM THE LOAD SHOWN ON LL-9341 SH 10 REV 13 DATED 11/18/83 IS ASSUMED AS LOAD
23	SPARE											
24	SAMPLE DETECTOR SKID INCREASED RANGE RAD.	2800	SEE NOTE #1	2800	SEE NOTE #1	—	—	—	—	—	—	DUE TO LACK OF INFORM THE LOAD SHOWN ON LL-9341 SH 10 REV 13 DATED 11/18/83 IS ASSUMED AS LOAD
25	SPARE											
26	TURBINE BLDG CHILLER MACHINE 2A-RM-TB OIL HTR	1500	SEE NOTE #1	1500	SEE NOTE #1	—	—	—	—	—	—	
27	SPARE											
28	TURBINE BLDG CHILLER MACHINE 2B-RM-TB OIL HTR	1500	SEE NOTE #1	1500	SEE NOTE #1	—	—	—	—	—	—	
29	SPARE											
30	POST ACCIDENT SAMPLE CONTROL CABINET	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

unitized engineers

NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-EDCO-01 SEQ-0

SHEET 26 OF 48

JOB 7453-227

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO 2B-TB DWG NO LL-9341 SH 11 REV. 7 DATED

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	CABLE IMPEDANCES IN "OHM" 1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
1	SPARE											
2	SCOOP TUBE POSITIONER (B32) 5001B	1250	SEE NOTE #1	1250	SEE NOTE #1	—	—	—	—	—	—	
3	FLUID DRIVE CASE BREATHER FAN (B32)	828	SEE NOTE #1	828	SEE NOTE #1	—	—	—	—	—	—	
4	F002B & F003B WINDG OVERTEMP. GEN. & MTR (E19B & 120B) & XFMR T5B	266	SEE NOTE #1	266	SEE NOTE #1	—	—	—	—	—	—	
5	2 RFA TURNING GEAR SOLENOID S1	0.0	—	0.0	—	—	—	—	—	—	—	
6	COND. IND. SW. C152647 COND. IND SW. C152597	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP.
7	CONDENSATE LEV. XMTRS 2-CO-LT-2,3,4,5	11	SEE NOTE #1	11	SEE NOTE #1	—	—	—	—	—	—	
8	2-VA-7T-129B 120V TO POWER SUPPLY	100	SEE NOTE #1	100	SEE NOTE #1	—	—	—	—	—	—	
9	AIRLOCK INTERCONN	21	277	21	277	0.5723	0.0126	0.5724	0.5723	0.0126	0.5724	
10	SPARE											
11	SPARE											
12	SPARE											
13	SPARE											
14	SPARE											
15	SPARE											

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNITS 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-EDOO-01, SEC-4

CALC SET NO.		NO.	COMP BY	CHKD BY
ORIG.		0	RP	
FINAL	✓		DATE 4/16/84	DATE 4/16/84
NO.				
SHEET	27 OF 48			
TO	7453-227		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO. 2B-TB DWG NO. LL-9341 SH. 11 REV. 7 DATED

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
16	SPARE											
17	SPARE											
18	SPARE											
19	SPARE											
20	SPARE											
21	SPARE											
22	SPARE											
23	SPARE											
24	SPARE											
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											
29	SPARE											
30	SPARE											

7453-227-3-ED00-01, SEC-B

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC SET NO.	REV.	COMP BY	CHKD BY
PNL-1A			
PNL-1B	✓	RP 4/16/84	NS 6/26/84
PNL-2			
SHEET 28 OF 48		DATE	DATE
ID 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN 2EB DISTRIBUTION PANEL NO. 2AB-TB DWG NO. LL-9341 SH. 12 REV. 7 DATED 10/26/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX-LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	2 RFB TURNING GEAR SOLENOID SI	0.0	—	0.0	—	—	—	—	—	—	—	
2	AIR COMPRESSOR SV-581 & USV	132	475	23	573	0.9817	0.02166	0.9819	1.184	0.0261	1.1843	
3	EXHAUST AIR ROLL TYPE 2A EAF-TB	528	425	528	425	0.8780	0.0194	0.8782	0.8780	0.0194	0.8782	
4	SPARE											
5	SPARE											
6	SPARE											
7	(D22) AREA RADIATION MON. ALARM "2-12" WEST EL. 45'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 9341 SH. 12
8	(D22) AREA RADIATION MON. ALARM "2-13" EAST EL. 45'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 9341 SH. 12
9	(D22) AREA RADIATION MON. ALARM "2-9" ACCESS DOOR COR. EL. 20	0	—	240	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 9341 SH. 12
10	(D22) AREA RADIATION MON. "2-11" SAMPL'G STA. EL. 20'	0	—	240	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD BASED ON PNL. SCH. 9341 SH. 12
11	2-RFA-VT-755	30	191	30	191	0.3947	0.0087	0.3948	0.3947	0.0087	0.3948	
12	2-RFB-VT-756	30	221	30	221	0.4565	0.0101	0.4566	0.4565	0.0101	0.4566	
13	SPARE											
14	2-OG-SV-7050	132	167	132	167	0.3450	0.0076	0.3451	0.3450	0.0076	0.3451	
15	INST. LINE #2-RXS-23 90' HEAT TRACE	1030	SEE NOTE #1	1030	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT # 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC-4

CALC SHT. NO.		REV.	COMP. BY	CHKD. BY
PNL-1A			RP	MB
PNL-1B	✓		DATE 4/16/84	DATE 4/16/84
PNL-2A				
SHEET 29 ~ 48			DATE	DATE
JC 7453-227				

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO 2AB-TB DWG NO LL-9341 SH 12 REV. 7 DATED 10/26/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
16	3-CONT'RS & 4-CONTR'LRS 40' HEAT TRACE #2-RX5-28	882	648	882	648	1.3388	0.0295	1.3391	1.3388	.0295	1.3391	
17	INST. LINE #2-RX5-23 97' HEAT TRACE	1140	SEE NOTE #1	1140	SEE NOTE #1	—	—	—	—	—	—	
18	INST. LINE #2-RX5-24 103' HEAT TRACE	1160	SEE NOTE #1	1160	SEE NOTE #1	—	—	—	—	—	—	
19	INST. LINE #2-RX5-23 116' HEAT TRACE	1140	SEE NOTE #1	1140	SEE NOTE #1	—	—	—	—	—	—	
20	SPARE											
21	SPARE											
22	SPARE											
23	SPARE											
24	SPARE											
25	SPARE											
26	SPARE											
27	SPARE											
28	SPARE											
29	SPARE											
30	SPARE											

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7453-227-3-ED00-01, SEC-A

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA - 208/120V SYSTEM DATA

CALC SET NO.	REV.	CHKD BY	CHKD BY
PREL.		RP	
FINAL	✓	4/13/84	4/16/84
VOID			
SHEET 30 OF 48		DATE	DATE
ID 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 2A-DG DWG NO LL-9341 SH 15 REV. 9 DATED 4-17-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	REMOTE SHUTDOWN PANEL	0	—	0	—	—	—	—	—	—	—	
2	DIESEL GENERATOR #3 INSTR. FEEDER	0	—	0	—	—	—	—	—	—	—	NO CABLE IN CASP
3	SPARE											
4	4 DAY FUEL TANK NR 1 SOL. VALVE 2-FO-SV-2012	42(17)	429	42(17)	429	.8866	.0195	.8868	.8866	.0195	.8868	
5	SPARE											
6	4 DAY FUEL TANK NR 3 SOL. VALVE 2-FO-SV-2036	42(17)	352	42(17)	352	.7274	.0160	.7276	.7274	.0160	.7276	
7	DIESEL #3 ENGINE CTL PNL SPACE HEATERS	500	SEE NOTE #1	500	SEE NOTE #1	—	—	—	—	—	—	
8	DIESEL GEN #3 - EXCITER CTL PNL LIGHTS & RECEPTACLES	0	—	0	—	—	—	—	—	—	—	
9	SPARE											
10	DIESEL GEN #3 - EXCITER CTL PNL. SPACE HEATERS	1000	SEE NOTE #1	1000	SEE NOTE #1	—	—	—	—	—	—	
11	SPARE											
12	DIESEL GEN #3 - GENERATOR CTL PNL INSTRUMENTATION	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
13	480V UNIT SUBSTA. E5 HEATER & FAN CKTS	0	-	0	-	-	—	—	—	—	—	
13A	SPARE											
14	DIESEL GEN #3 - GENERATOR CTL PNL. LIGHTS & SPACE HTRS.	500	SEE NOTE #1	500	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC. 4

CALC SERIAL | REV. | COMP BY | CHKD BY

PREL. | | RP | JW

YES | ✓ | DATE 3/16/84 | DATE 4/24/84

NO | | | |

SHEET 31 OF 48 | | |

TO 7453-227 | DATE | DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO. 2A-DG DWG NO. LL-9341 SH 15 REV. 9 DATED 4-17-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	RHR SW PUMP 2C CONTROL PNL H80 BUS E-1	7.8	120'	7.8	120'	.2479	.0055	.2480	.2479	.0055	.2480	
16	AREA RAD. MON. SENSOR 1-4 STACK FILTER HOUSE	0	—	240	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
17	D.G. BLDG. FIRE DETECT. CONTROL PNL	600	—	600	—	—	—	—	—	—	—	NO FIRE ASSUMED
18	RHR SW PUMP 2A CONTROL PNL H82 BUS E-5	7.8	SEE NOTE #1	7.8	SEE NOTE #1	—	—	—	—	—	—	
19	D.G. BLDG FIRE DETECT. CONTROL PNL.	600	SEE NOTE #1	600	SEE NOTE #1	—	—	—	—	—	—	NO FIRE ASSUMED
20	DIESEL GEN BLDG LOCAL CTL PNL	250	SEE NOTE #1	250	SEE NOTE #1	—	—	—	—	—	—	
21	BUS DUCT HTR FOR E3-E4	0	—	0	—	—	—	—	—	—	—	T-
22	DIESEL GEN. BLDG-VENT CELL -1 DAMPER CTL	8.2	371'	8.2	371'	.7665	.0169	.7667	.7665	.0169	.7667	
23	4160 V. SWITCHGEAR E3 HEATER AND CONTROL BUS	11807.5	SEE NOTE #1	10812.5	SEE NOTE #1	—	—	—	—	—	—	
24	DIESEL GEN #3-ENGINE CTL PNL INSTRUMENTATION	0	—	147.6 (2#5)	123'	—	—	—	.2541	.0056	.2542	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY CP&L BSEP UNIT # 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO.	REV.	COMP BY:	CHKD BY:
PWR. SYS.			
T.S.C.	✓	RA DATE 2/6/84	NKS DATE 4/14/84
SYS.			
SHEET 32 OF 48		DATE	DATE
TO 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO 2B-DG DWG NO LL-9341 SH 16 REV. 11 DATED 4-17-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	SOUTH DOOR AIRLOCK DG. BLDG.	21	251'	21	251'	.5186	.0114	.5187	.5187	.0114	.5187	
2	D.G. BLDG FIRE PROTECTION RELAY BOX 2-FP-DV15	33.6(48.2)	1016'	33.6(48.2)	1016'	2.0990	.0463	2.1000	2.0990	.0463	2.1000	
3	REMOTE SHUTDOWN PANEL	167	SEE NOTE #1	167	SEE NOTE #1	—	—	—	—	—	—	
4	4 DAY FUEL TANK Nº 2 SOL. VALVE 2-FO-SV-2000	42(17)	462	42(17)	462	.9548	.0210	.9550	.9548	.0210	.9550	
5	D.G. BLDG FIRE PROTECTION ANNUN. 2-UA-41	81	SEE NOTE #1	81	SEE NOTE #1	—	—	—	—	—	—	
6	4 DAY FUEL TANK Nº 4 SOL. VALVE 2-FO-SV-2024	42(17)	369	42(17)	369	.7626	.0168	.7628	.7626	.0168	.7628	
7	DIESEL GEN #4 - ENGINE CTL. PNL SPACE HEATERS	505	SEE NOTE #1	505	SEE NOTE #1	—	—	—	—	—	—	
8	DIESEL GEN #4 - EXCITER CTL PNL LIGHTS & RECEPTACLES	0	SEE NOTE #1	0		—	—	—	—	—	—	
9	D. G. BLDG. FIRE PROTECTION RELAY BOX. 2-FP-DV14	33.6(48.2)	1016'	33.6(48.2)	1016'	2.0990	.0463	2.1000	2.0990	.0463	2.1000	
10	DIESEL GEN #4 - EXCITER CTL PNL SPACE HEATERS	1000	SEE NOTE #1	1000	SEE NOTE #1	—	—	—	—	—	—	
11	D.G. BLDG. FIRE PROTECTION RELAY BOX 2-FP-DV13	33.6(48.2)	1016'	33.6(48.2)	1016'	2.0990	.0463	2.1000	2.0990	.0463	2.1000	
12	DIESEL GEN #4 - GENERATOR CTL PNL - INSTRUMENTATION	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
13	480V UNIT SUBSTA "E6" HEATER & FAN CKTS	0	—	0	—	—	—	—	—	—	—	
13A	SPARE											
14	DIESEL GEN #4 - GENERATOR CTL PNL - LIGHTS & SPACE HTRS.	500	SEE NOTE #1	500	SEE NOTE #1	—	—	—	—	—	—	

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNITS: 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO.		SHT. NO.	COMP. BY	CHKD BY
PRELIM			RF 4/16/84	MS 8/14/84
FINAL	✓			
VOID				
SHEET	33 OF 48		DATE	DATE
JO	7453-227			

SYSTEM LOAD DATA

UNIT SUB STN 2EB DISTRIBUTION PANEL NO. 2B-DG DWG NO. LL-9541 SH. 16 REV 7 DATED 4-17-81

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
15	RHR SW. PUMP 2B CONTROL PNL HB3 BUS E-4	7.8	50	7.8	50	.1033	.0023	.1034	.1033	.0023	.1034	
16	D.G. BLDG. FIRE PROTECTION RELAY BOX E-FP-DV17	33.6(45.2)	1016'	33.6(45.2)	1016'	—	—	—	—	—	—	
17	D.G. BLDG. FIRE PROTECTION RELAY BOX 2-FP-DV18	33.6(45.2)	1016'	33.6(45.2)	1016'	2.0990	.0463	2.1000	2.0990	.0463	2.1000	
18	RHR SW. PUMP 2D CONTROL PNL HB1 BUS E-2	7.8(9.4)	130	7.8(9.4)	130	.7686	.0059	.2687	.2686	.0059	.2687	
19	D.G. BLDG. FIRE PROTECTION RELAY BOX 2-FP-DV19	33.6(45.2)	1016'	33.6(45.2)	1016'	2.0990	.0463	2.1000	2.0990	.0463	2.1000	
20	D.G. BLDG. FIRE PROTECTION RELAY BOX 2-FP-DV16	33.6(45.2)	1016'	33.6(45.2)	1016'	2.0990	.0463	2.1000	2.0990	.0463	2.1000	
21	BUS DUCT HEATER FOR BUSES E2 & E4	0	—	0	—	—	—	—	—	—	—	T-
22	D.G. BLDG VENT CELL #2 DAMPER CONTROL	8.2	318	8.2	318	.6571	.0145	.6573	.6571	.0145	.6573	
23	4160 V SWITCHGEAR E4 HEATER AND CONTROL BUS	12412.5	SEE NOTE #1	10617.5	SEE NOTE #1	—	—	—	—	—	—	
24	DIESEL GEN. #4 - ENGINE CTL PNL INSTRUMENTATION	0	—	148(25)	144	—	—	—	.2976	.0066	.2977	

GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC A

CALC DETAIL ✓ SHEET 34 TO 48 JO 7453-227

CHKD BY RA 11/4/80 — DATE

CHKD BY NS 11/4/80 — DATE

SYSTEM LOAD DATA

UNIT SUB STN. 2E7 DISTRIBUTION PANEL NO 2C DWG NO LL-9341 SH 17 REV. 10 DATED 5/23/77

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
1	2-RIP-CS1200	8(5)	409	8(5)	409	.8453	.0186	.8455	.8453	.0186	.8455	
2	2-RIP-CS1201	40	SEE NOTE #1	40	SEE NOTE #1	—	—	—	—	—	—	
3	2-RIP-CS1202 (FUTURE)											
4	2-RIP-CS1203	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
5	2-RIP-CS1204	30	SEE NOTE #1	30	SEE NOTE #1	—	—	—	—	—	—	
6	2-RIP-CS1205	60	SEE NOTE #1	42(60)	1549	—	—	—	3.2012	.0706	3.2020	
7	2-RIP-CS1206	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
8	2-RIP-CS1207	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
9	2-RIP-CS1208	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
10	2-RIP-CS1209	60	SEE NOTE #1	42(102)	2293	—	—	—	4.7388	.1045	4.7399	
11	2-RIP-CS1210	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
12	2-RIP-CS1211	89	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
13	2-RIP-CS1212	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
14	2-RIP-CS1213 (FUTURE)											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

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NAME OF COMPANY: CP&L BSEP UNIT 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEQ-4

CALC SET NO		BY	COMP BY	CHKD BY
PRIL.			RA	
FINAL	✓		5/6/84	
VOID				
SHEET	35 OF 48			
TO	7453-227		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO. 2C DWG NO. LL-9341 SH. 17 REV. 10 DATED 5/23/77

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX-LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
15	2-RIP-CS1214	40	SEE NOTE #1	40	SEE NOTE #1	—	—	—	—	—	—	
16	2-RIP-CS1215	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
17	TURB. BLDG. VENT. SYSTEM MISC. CKTS	0.0	—	0.0	—	—	—	—	—	—	—	
18	FAN COOLING C.S. PMP ROOM 2A, DISCH. VLV V-128	16	SEE NOTE #1	0	—	—	—	—	—	—	—	
19	VENTILATION-EMERG. RECIRC. FAN A	95	SEE NOTE #1	80.5(564)	91.0	—	—	—	1.9426	.0428	1.9431	
20	RHR PUMP ROOM COOLER 2A, DISCH. VLV V-129	16	SEE NOTE #1	0.0	—	—	—	—	—	—	—	
21	VA SYSTEM BATTERY RM 2A & CABLE SPREADING RM 2(DIV I)	232.4	SEE NOTE #1	762(80)	444	—	—	—	.9176	.0202	.9178	
22	DISCH. CANAL TEMP. MONITORING	18	SEE NOTE #1	18	SEE NOTE #1	—	—	—	—	—	—	
23	VENTILATION, REACTOR BLDG EXHAUST FANS 2A & 2C CTL CKT	104.4	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
24	VENTILATION, REACTOR BLDG ISOL DAMPERS 2A & 2C CTL CKT	32(95.4)	1052	40(152)	1052	2.1741	0.0480	2.1740	2.1741	0.0480	2.1740	
25	VENTILATION, REACTOR BLDG FANS 2A & 2C & SBGT SYS A CTL CKT	168.4	SEE NOTE #1	36	SEE NOTE #1	—	—	—	—	—	—	
26	VENTILATION, CTL BLDG CTL ROOM AC	8.2(140.2)	1066	34(148.4)	616	2.2024	0.0486	2.2029	1.2727	0.0281	1.2730	
26A	CAC-MONITOR PV 1260 SOLENOID VALVE CKT	40	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
27	BOP TERM. CAB. XU-5 TURBINE ALARM CKT	00	—	0.0	—	—	—	—	—	—	—	
28	480V UNIT SUBSTA COMB HEATERS & FAN CKT	00	—	0.0	—	—	—	—	—	—	—	
29	BOP TERM. CAB. XU12 FANS CKT	224	SEE NOTE #1	224	SEE NOTE #1	—	—	—	—	—	—	LOAD ASSUMED BASED ON PNL SCH-9527-LL-9341 SH. 17 REV. 10 5/23/77

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GENERAL COMPUTATION SHEET

ELECTRICAL

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NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO. | CHKD BY | DATE
SHEET 36 of 48
JOB 7453-227

SYSTEM LOAD DATA

UNIT SUB STN. 2E8 DISTRIBUTION PANEL NO. 2D DWG NO. LL-9341 SH. 18 REV. 12 DATED 12/6/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	2-RIP-CS1216	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
2	2-RIP-CS1217	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
3	2-RIP-CS1218	20	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
4	2-RIP-CS1219	30	SEE NOTE #1	30	SEE NOTE #1	—	—	—	—	—	—	
5	2-RIP-CS1220	30	SEE NOTE #1	30	SEE NOTE #1	—	—	—	—	—	—	
6	2-RIP-CS1221	20	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
7	2-RIP-CS1222	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
8	2-RIP-CS1223	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
9	2-RIP-CS1224	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
10	2-RIP-CS1225	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
11	2-RIP-CS1226	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
12	2-RIP-CS1227	128	SEE NOTE #1	240(55)	1961	—	—	—	4.0527	.0894	4.0536	
13	2-RIP-CS1228	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
14	2-RIP-CS1229	60	SEE NOTE #1	60	SEE NOTE #1	—	—	—	—	—	—	
15	2-RIP-CS1230 F-9786 SPARE MODULE	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC-4

CALC SET NO		BY	CHKD BY
PRELIM			
F.S.	✓	DATE 4/10/84	DATE 4/9
REV			
SHEET 37 OF 48		DATE	DATE
TO 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN. 2E8 DISTRIBUTION PANEL NO. 2D DWG NO. LL-9341 SH 1B REV. 12 DATED 12/6/83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	NORMAL DIST. FROM PNL. IN FT.	1X-LOCA LOAD IN VA	1X-LOCA DIST. FROM PNL. IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
16	2-RIP-CS1231	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
17	2-RIP-CS1232	50	SEE NOTE #1	50	SEE NOTE #1	—	—	—	—	—	—	
18	FAN COOLING C.S. PUMP RM 2B DISCH. VLV V-123	16	SEE NOTE #1	0.0	—	—	—	—	—	—	—	
19	VENT REACTOR BLDG-EXH FANS 2B & 2D CTL CKT	100	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
20	RHR PUMP RM. COOLER 2B DISCH. VLV V-124	16	SEE NOTE #1	16	SEE NOTE #1	—	—	—	—	—	—	
21	VENT REACTOR BLDG-ISOLATION DAMPERS 2B & 2D CTL CKTS	104	SEE NOTE #1	68(182)	1812	—	—	—	3.7447	.0826	3.7456	
22	VA SYSTEM BATT RM 2B-CB EXH FAN	96(36.4)	574	96(36.4)	574	1.1862	.0262	1.1865	1.1862	.0262	1.1865	
23	VENT REACTOR BLDG-SUPPLY FANS 2B & 2D & SGAT SYS B CTL CKTS 2-OG-CS375	164	SEE NOTE #1	20	SEE NOTE #1	—	—	—	—	—	—	
24	VENTILATION-CTL BLDG CTL ROOM A/C	82(104)	1774	82(104)	1774	3.6662	0.0809	3.6671	3.6662	0.0809	3.6671	
25	SPARE											
26	VENTILATION EMERG. RECIRC. FAN "B"	17(15)	180	17(15)	180	.3720	.1082	.3721	.3720	.0082	.3721	
27	LOCA SIG. FOR CAC MONITORING	9.6	SEE NOTE #1	0.0	—	—	—	—	—	—	—	
28	CAC MONITOR PV 1261 & 1262 SOLENOID VALVES	75.2	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
29	PWR SUPPLY FOR GASEOUS ANALYZER PNL-XU-61	0	—	0	—	—	—	—	—	—	—	
30	480V UNIT SUBSTA "2L" HEATER & FAN CKTS	0.0	—	0.0	—	—	—	—	—	—	—	ALTERNATE SOURCE

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7453-227-3-ED00-01, Sec-A

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

NAME OF COMPANY: CP&L BSEP UNIT # 2

SUBJECT: 1X LOCA-208/120V SYSTEM DATA

CALC SET NO.		BY	CHK
		GA	RS
	✓	4/16/84	4/16/84
SHEET 38 OF 48			
OF 7453-227		DATE	DATE

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 32A DWG NO LL-9341 SH 23 REV. 9 DATED 11-18-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES N "OHM"						REMARKS
		NORMAL		1X - LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
1	STEAM LEAK DETECTION SYS (D21) H12-P614 NPCI LOGIC TIMER	52.8(58)	76	52.8(58)	"	.0987	.0034	.0988	.0987	.0034	.0988	
2	POWER SUPPLY MISC. INST RACK XU-62	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
3	SPARE											
4	SPARE											
5	DC. SWBD. 2A STRIP HTRS	560	—	560	—	—	—	—	—	—	—	
6	DIESEL GEN 1 & 3 EXH. FAN & DAMPER CONT	17(5)	1239	17(5)	1239	2.5606	.0564	2.5612	2.506	.0564	2.5612	IMPEDANCE DATA BASED ON #10 CABLE.
7	SPARE											
8	RTG BOARD - PM2 PLUG-MOLD FOR RECORDERS	160	SEE NOTE #1	160	SEE NOTE #1	—	—	—	—	—	—	
9	RTG BOARD - PM1 PLUG-MOLD FOR RECORDERS	96	SEE NOTE #1	96	SEE NOTE #1	—	—	—	—	—	—	
10	POWER SUPPLY 2-CAG-ES-3689	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
11	SPARE											
12	RTG BOARD - PM3 - PLUG-MOLD FOR RECORDERS	92	SEE NOTE #1	92	SEE NOTE #1	—	—	—	—	—	—	
13	RTG BOARD XU-51 2-CAC-LSHL-4177	6	SEE NOTE #1	6	SEE NOTE #1	—	—	—	—	—	—	
14	RTG BOARD - PM7 - PLUG-MOLD FOR RECORDERS	392	SEE NOTE #1	392	SEE NOTE #1	—	—	—	—	—	—	
15	SPARE											
16	RTG BOARD - PM11 - PLUG-MOLD FOR RECORDERS	125	SEE NOTE #1	125	SEE NOTE #1	—	—	—	—	—	—	
17	SPARE											

PAGE 1,96 of 106

GENERAL COMPUTATION SHEET

DISCIPLINE ELECTRICAL

united engineers

7453-227-3-EDCO-01, SEC 4

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SHEET 39 OF 48

JOB # 7453-227

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 32A DWG NO LL-9341 SH 23 REV. 9 DATED 11-18-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "Ω-M"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
18	RTG BOARD - PM5 - PLUG - MOLD FOR RECORDERS	35	SEE NOTE #1	35	SEE NOTE #1	—	—	—	—	—	—	
19	SPARE											
20	2 AOG CONTROL VALVE 2-HCV-102	—	—	—	—	—	—	—	—	—	—	NO CABLE IN CASP
21	SPARE											
22	COMPUTER - DIGITAL OUTPUT CAB. C91-P609	0.0	—	0.0	—	—	—	—	—	—	—	
23	SPARE											
24	SPARE											

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GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL — united engineers

NAME OF COMPANY: CP&L BSEP — UNIT: 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

7453-227-3-ED00-01, SEC-4

CALC SET NO		REV.	COMP. BY	CHKD. BY
ORIG.		0	RA 9/16/84	HS 9/26/84
CHG.	✓			
VOID				
SHEET	40 OF 42	1	DRD 9/24/84	HS 9/26/84
JO	7453-227			

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO 32B DWG NO LL-4341 SH. 24 REV. 13 DATED 4-26-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS IX-LOCA LOAD IN VA	CIRCUIT LOADS IX-LOCA DIST. FROM PNL IN FT.	CABLE IMPEDANCES IN "OHM" NORMAL R_N	X_N	Z_N	IX LOCA R_{IX}	X_{IX}	Z_{IX}	REMARKS
1	STEAM LEAK DETECTION SYS (B21) H12-P614 RPCI TIMER LOGIC	52.8(48)	134	52.8(48)	134	.1741	.0060	.1742	.1741	.0060	.1741	
2	IND CKT FOR FLOOD STATUS SERV. WTR INTAKE STRUCTURE	00	—	00	—	—	—	—	—	—	—	NO FLOOD
3	RX BLDG TERM CAB XU-56 2-CAC-CS-4179	117	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
4	VAC BKR ISO VLV V17 2-CAC-CS-4223	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
5	DC SWBD 2B STRIP HTR	560	SEE NOTE #1	560	SEE NOTE #1	—	—	—	—	—	—	
6	DIESEL GEN 2 & 4 EXH. FAN & DAMPER CONT.	17(5)	2358	17(5)	2358	4.8731	.1075	4.8743	4.8731	.1075	4.8743	IMPEDANCE BASED ON #10 CABLE
7	SPARE											
8	CONVERTER - ISOLATOR 2-CAC-FY-2720-4	6	SEE NOTE #1	6	SEE NOTE #1	—	—	—	—	—	—	
9	POWER SUPPLY 2-CAC-ES-3690	48	SEE NOTE #1	48	SEE NOTE #1	—	—	—	—	—	—	
10	MSIV PIT TEMPERATURE SWS TESTING CKT	0	—	0	—	—	—	—	—	—	—	
11	FLUID FLOW DETECTION CAB. CB-XU-73 CONTROL EM	640	SEE NOTE #1	886(753)	116	—	—	—	.2397	.0053	.2398	
12	VOLTAGE INPUT FOR 2-SCW-LRA-285-1	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
13	POST ACC MISC INST. CAB. 2-XU-79	150	SEE NOTE #1	150	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
14	TORUS DRAIN & KEEP FILL SYS. 2-TD-SV-3897 & SV-3894	182	697	⚠353	875	1.4400	0.0318	1.4404	1.8076	0.0399	1.8082	
15	RX BLDG TERM. CAB XU-56 2-M12-P606, P623	107	—	00	—	—	—	—	—	—	—	
16	RX BLDG TERM. CAB XU-56 2-CAC-CS-1538	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

DISCIPLINE: ELECTRICAL

united engineers

7453-227-3-ED00-01, SEC-4

NAME OF COMPANY: CP&L BSEP UNIT: 2

SUBJECT: 1X LOCA- 208/120V SYSTEM DATA

CALC SET NO.			
PROJ. NO.		COMP. BY: RP 4/16/84	CHKD BY: 4/16/84
TASK	✓		
VOL. NO.			
SHEET 41 OF 48		DATE	DATE
JOB 7453-227			

SYSTEM LOAD DATA

UNIT SUB STN 2E8 DISTRIBUTION PANEL NO 32B DWG NO LL-9341 SH. 24 REV. 13 DATED 4-26-83

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		1X-LOCA		NORMAL			1X LOCA			
		LOAD IN VA	DIST. FROM PNL. IN FT.	LOAD IN VA	DIST. FROM PNL. IN FT.	R_N	X_N	Z_N	R_{1X}	X_{1X}	Z_{1X}	
17	RX BLDG TERM CAB XU-56 2-CAC-CS-1539	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
18	RX BLDG TERM CAB. XU-56 2-CAC-CS-1533	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
19	RX BLDG TERM. CAB. XU-56 2-CAC-CS-1534	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
20	RX BLDG TERM. CAB. XU-56 2-CAC-CS-1541	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
21	RX BLDG TERM CAB. XU-56 2-CAC-CS-1542	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
22	INST. AIR CV 2889 & 2890 1-CAC-CS-2889-1 & 2-CAC-CS-2889-2	32(5)	2877	32(5)	2877	5.9457	.1312	5.9472	5.9457	.1312	5.9472	
23	CV 2716 1-CAC-CS-2716-1 & 2-CAC-CS-2716-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
24	SPARE											

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GENERAL COMPUTATION SHEET

ELECTRICAL — united engineers

NAME OF COMPANY: CP&L BSEP — UNIT: 2

SUBJECT: IX LOCA- 208/120V SYSTEM DATA

CALC. NO.		BY	CHKD BY
PWL #		RP	KS
REV.	✓	4/16/84	8/16/84 RP
SHEET	42 OF 48	DATE	DATE
JO	7453-227		

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO 32AB DWG NO LL-9341 SH 25 REV. 8 DATED 8-19-82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS				CABLE IMPEDANCES IN "OHM"						REMARKS
		NORMAL		IX - LOCA		NORMAL			IX LOCA			
		LOAD IN VA	DIST FROM PNL. IN FT.	LOAD IN VA	DIST FROM PNL. IN FT.	R_N	X_N	Z_N	R_{IX}	X_{IX}	Z_{IX}	
1	RX BLDG TERM. CAB. XU-53 2H12 - P606, P622	106.8	SEE NOTE #1	0.0	—	—	—	—	—	—	—	
2	RX BLDG TERM. CAB. XU-53 2-CAC-CS-4178	133	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
3	RX BLDG TERM. CAB XU-53 2-CAC-1699	42	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
4	RX BLDG TERM. CAB. XU-53 2-CAC-CS-1537	21	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
5	RX BLDG TERM. CAB. XU-53 2-CAC-CS-1531	21	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
6	RX BLDG TERM. CAB XU-53 2-CAC-CS-1530	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
7	RX BLDG TERM. CAB XU-53 2-CAC-CS-2711	21(5)	209	21(5)	209	0.4318	0.0095	0.4319	0.4318	0.0095	0.4319	
8	RX BLDG TERM. CAB. XU-53 2-CAC-CS-2710	21(5)	209	21(5)	209	0.4318	0.0095	0.4319	0.4318	0.0095	0.4319	
9	RX BLDG TERM. CAB. XU-53 2-CAC-CS-2572	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
10	RX BLDG TERM. CAB XU-53 2-CAC-CS-2571	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
11	RX BLDG TERM. CAB XU-53 2-CAC-CS-2573	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
12	RX BLDG TERM. CAB. XU-53 2-CAC-CS-2683	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
13	2-HS-V5003 [1-CAC-CS-2696 & 2-CAC-CS-2696-2]	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
14	INERT. STM TEMP. TCV-2695 1-CAC-CS-2695-1 & 2-CAC-CS-2695-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
15	CAD N_2 FCV 2717 1-CAC-CS-2717-1 & 2-CAC-CS-2717-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
16	CV 2713 1-CAC-CS-2713-1 & 2-CAC-CS-2713-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	

GENERAL COMPUTATION SHEET

ELECTRICAL

united engineers

7453-227-3-EDOO-01, SEC-4

NAME OF COMPANY CP&L BSEP UNIT 2

SUBJECT 1X LOCA- 208/120V SYSTEM DATA

SHEET 43 OF 48

JO 7453-227

SYSTEM LOAD DATA

UNIT SUB STN 2E7 DISTRIBUTION PANEL NO. 32AB DWG NO. LL-9341 SH. 25 REV. 8 DATED 8-19-82

CKT. NO.	CIRCUIT DESCRIPTION	CIRCUIT LOADS NORMAL LOAD IN VA	CIRCUIT LOADS NORMAL DIST. FROM PNL. IN FT.	CIRCUIT LOADS 1X-LOCA LOAD IN VA	CIRCUIT LOADS 1X-LOCA DIST. FROM PNL. IN FT	CABLE IMPEDANCES N "OHM" NORMAL R_N	X_N	Z_N	CABLE IMPEDANCES 1X LOCA R_{1X}	X_{1X}	Z_{1X}	REMARKS
17	CV-2715 1-CAC-CS-2715-1 & 2-CAC-CS-2715-2	10	SEE NOTE #1	10	SEE NOTE #1	—	—	—	—	—	—	
18	CTL BLDG. SEISMIC MON. CAB. ENV-XR-823 RECEPTACLE	69	SEE NOTE #1	69	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD
19	POST ACC. MISC INSTR. CAB. 2-XU-75	150	SEE NOTE #1	150	SEE NOTE #1	—	—	—	—	—	—	ASSUMED LOAD.
20	SPARE											
21	SPARE											
22	DIV I ISOLATOR CAB. XU-77	500	!!! (NO DETAIL INFO ON LOAD AVAIL)	500	!!! (NO DETAIL INFO ON LOAD AVAIL)	.2294	.0051	.2295	.2294	.0051	.2295	ASSUMED LOAD BASED ON PNL. SCH. 9341 SH. 25
23	VAC. BKR CONT. ISO VLV V16 2-CAC-CS-4222	5	SEE NOTE #1	5	SEE NOTE #1	—	—	—	—	—	—	
24	SPARE											

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7453.227-3-ED00-01

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	NIS
FINAL	X		DATE 4/18/84	DATE 4/22/84
VOID				
SHEET 44 OF 48			DATE	DATE
JO 7453.227				

NAME OF COMPANY CP&L, BSEP UNIT/S 2

SUBJECT 1X LOCA - 208/120 VOLT SYSTEM DATA

Review Notes

1. The following criteria were used in preparation of the load tabulations and in determining the circuit impedances:
   a. load distance was not determined for circuits having no operating relays and solenoids (120 volts AC).
   b. Within individual circuits, the relays and/or solenoids which are expected to experience the maximum Voltage Drop have been tabulated outside the parenthesis in the load column. The remaining loads are summed up and tabulated within the parenthesis. Therefore, total load for the circuit is a summation of loads outside and within the parenthesis.
   c. Circuits loads such as indicating lights, recorders, resistance heaters, cabinet fans, low voltage power transformer, instrument power, supplies, etc. have not been analyzed for load distance from panel board.
   d. No load distance analysis was made on circuits in which the relays and/or solenoids are deenergized under 1X LOCA Condition.
   e. Manually initiated test circuits were not analyzed for load and load distances.

2. Power factor is assumed to be .85 lagging for all AC inductive loads.

3. Cable impedances were calculated based on cable length and size available in the CASP "A" Report with resistance and reactances data from the Industrial Power Systems Handbook by Donald Beenan. (See Reference list and Sheet 48 of 48).

4. Transformer impedance is based on information derived from manufacturer. Refer to Tele-notes T-1015, T-1066 where manufacturer's test data and foreign print records are not available.

5. Loads for which precise information was not available at all in any drawing, were assumed and are so noted in the System Load Data and/or circuit evaluation Tables.

6. The following assumptions were used to assess individual circuit component loading:
   a. For low voltage control transformers without size or load data, 80% of the fuse size was assumed to be the load on the transformer (conservative estimate).
   b. Solenoids or Relays for which exact manufacturers information was not available, load was assumed to be similar to devices for which load characteristic is available.
   c. Panel schedule load listing (Dwg. 9527-LL-9341) is assumed for circuits on which no component information or detail drawing is available.
   d. For power supplies, convertors, the loading is assumed to be the maximum rated Power Consumptions (conservative approach).
   e. No fire is assumed concurrent with a LOCA.
   f. Radiation alarms and proper isolation of appropriate Systems due to high radiation following a LOCA are assumed for all areas.

7. All assumed loads should be verified at a later date when information is available. These assumed loads are conservative enough to provide reasonable voltage profiles at their terminals.

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

7453-227-3-EDOO-01, SEC. 5

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

CALC SET NO		REV	COMP BY	CHK'D
PRELIM		0	RA	
FINAL	✓		DATE 11/6/84	DATE 4/24
VOID				
SHEET 45 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L BSEP UNIT/S 2

SUBJECT 208/120 V SYSTEM DATA
FEEDER CABLE IMPEDANCE DATA
REF. DWG 9527-F-9334, REV. 7, DATED 9/31/82

			R	X	Z
GE7 - HQ6	1-4/C #2	21'	.0043	.0007	.00
DΦ9 - GE7	1-4/C #2	109'	.0225	.0037	.022
H14 - HGΦ	1-3/C 250MCM	462'	.1265	.0149	.030
H14 - HGΦ/1	1-1/C 250MCM	462			
H14 - HG3	1-3/C 250MCM	425'	.0244	.0137	.027
H14 - HG3/1	1-1/C 250MCM	425'	—	—	—
HΦB - HGΦ	1-3/C 250MCM	45'	.0026	.0014	.003
HΦB - HGΦ/1	1-1/C 250MCM	45'	—	—	—
HΦB - HG3	1-3/C-250MCM	40'	.0023	.0013	.002
HΦB - HG3/1	1-1/C-250MCM	40'	—	—	—
H11 - HGΦ	1-3/C-250MCM	181'	.0104	.0058	.011
H11 - HGΦ/1	1-1/C-250MCM	181'	—	—	—
H11 - HG3	1-3/C-250MCM	213'	.0122	.0069	.014
H11 - HG3/1	1-1/C-250	213'	—	—	—
GE8 - HQ7	1-4/C #2	21'	.0043	.0007	.0044
D49 - GE8	1-4/C #6	111'	.0573	.0043	.057
GE2 - HQ5	1-4/C #2	30'	.0062	.0010	.0063
E47 - GE2	1-4/C #6	45'	.0232	.0018	.023

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

7453-227-3-ED00-01 SEC-5

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	NAB
FINAL	✓		DATE 4/16/84	DATE 4/26/84
VOID				
SHEET 46 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L BSEP UNIT/S 2

SUBJECT 208/120 V SYSTEM DATA
FEEDER CABLE IMPEDANCE DATA
REF. DWG. 9527-F-9331
REV. 7 DATED 9/13/82

CABLE	CABLE SIZE	LENGTH (FT)	R	X	Z
H12 - HGΦ	1-3/c · 250 MCM	185'	.0106	.0060	.0122
H12 - HGΦ/1	1-1/c · 250MCM	185'	—	—	—
HΦ9 - HGΦ	1-3/c · 250 MCM	153'	.0088	.0049	.0101
HΦ9 - HGΦ/1	1-1/c · 250 MCM	153'	—	—	—
HΦ6 - HGΦ	1-3/c · 500MCM	30'	.0009	.0009	.0013
HΦ6 - HGΦ/1	1-1/c · 250 MCM	30'	—	—	—
HGΦ - LG3	1-3/c #1/0	50'	.0066	.0017	.0068
HG3 - LG3	1-3/c #1/0	80'	.0105	.0027	.0108
HΦ7 - HG3	1-3/c .500MCM	35'	.0011	.0010	.0015
HΦ7 - HG3/1	1-1/c - 250MCM	35'	—	—	—
H1Φ - HG3	1-3/c - 250MCM	372'	.0213	.0120	.0245
H1Φ - HG3/1	1-1/c · 250MCM	372'	—	—	—
FJ7 - HW9	1-4/c #2/0	25'	.0026	.0008	.0028
C7B - FJ7	1 4/c #6	145'	.0750	.0057	.0751
H13 - HG3	1-3/c #250MCM	495'	.0284	.0159	.0325
H13 - HG3/1	1-1/c 250MCM	495'	—	—	—
GE1 - HQ4	1-4/c #2	30'	.0062	.0010	.0063
E14 - GE1	1-4/c #6	70'	.0362	.0027	.0363

FORM 5007 REV 7/79

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

7453-227-3-EDC0-01, SEC. 5

CALC SET NO		REV	COMP BY	CHK'D
PRELIM		0	RA	
FINAL	✓		DATE 4/16/84	DATE 4/26/
VOID				
SHEET 47 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L BSEP UNIT/S 2

SUBJECT 208/120 V SYSTEM DATA
FEEDER CABLE IMPEDANCE DATA.
REF. DWG 9527-F-9331, REV-7, DATED 9/13/82

			R	X	Z
FJ6-HW8	1-4/c #2/0	50'	.0052	.0017	.005
C77-FJ6	1-4/c #6	45'	.0232	.0018	.023
HGØ-HYØ	1-3/c-250MCM	23'	.0013	.0007	.001
HGØ-HYØ/1	1-1/c-250MCM	23'	—	—	—
HGØ-HXØ	1-3/c-250MCM	125'	.0072	.0040	.008
HGØ-HXØ/1	1-1/c-250MCM	125'	—	—	—
HG3-HXØ	1-3/c-250MCM	90'	.0052	.0029	.006
HG3-HXØ/1	1-1/c-250MCM	90'	—	—	—
HG3-HY1	1-3/c-250MCM	30'	.0017	.0010	.002
HG3-HY1/1	1-1/c-250MCM	30'	—	—	—
GF4-HG0	1-3/c-500MCM	35'	.0011	.0010	.001
GF6-HG3	1-3/c-500MCM	23'	.0070	.0007	.001

GENERAL COMPUTATION SHEET

(DISCIPLINE) ELECTRICAL

united engineers & constructors inc

7453-227-3-ED00-01, SEC-5

CALC SET NO		REV	COMP BY	CHK'D BY
PRELIM		0	RA	
FINAL	✓		DATE 4/16/84	DATE 5/24/84
VOID				
SHEET 48 OF 48			DATE	DATE
JO 7453-227				

NAME OF COMPANY CP&L BSEP UNIT/S 2

SUBJECT 208/120 V SYSTEM DATA FEEDER CABLE IMPEDANCE DATA

TABLE 1.20 Approximate Resistance, Reactance, and Impedance of 600-volt Cables in Magnetic Ducts per 100 Ft

Cable size	Three single-conductor cables per duct, ohms per 100 ft			Three-conductor cable including interlocked armor cable, ohms per 100 ft		
	R*	X	Z	R*	X	Z
No. 14 Awg..	0.3135	0.00765	0.3135	0.3135	0.00468	0.31352
No. 12 Awg..	0.1972	0.00710	0.1972	0.1972	0.00456	0.19720
No. 10 Awg..	0.1240	0.00697	0.1240	0.1240	0.00448	0.12410
No. 8 Awg...	0.0779	0.00638	0.0782	0.0779	0.00427	0.07460
No. 6 Awg...	0.0498	0.00598	0.0500	0.0493	0.00391	0.04899
No. 4 Awg...	0.0318	0.00551	0.0322	0.0312	0.00362	0.03140
No. 2 Awg...	0.0203	0.00513	0.0209	0.0197	0.00344	0.02000
No. 1 Awg...	0.0163	0.00500	0.0171	0.0157	0.00342	0.01606
No. 1/0 Awg..	0.0131	0.00495	0.0140	0.0125	0.00340	0.01296
No. 2/0 Awg..	0.0106	0.00490	0.0117	0.0100	0.00336	0.01054
No. 3/0 Awg..	0.00860	0.00486	0.00986	0.00800	0.00333	0.00866
No. 4/0 Awg	0.00700	0.00482	0.00850	0.00640	0.00327	0.00721
250 MCM....	0.00608	0.00480	0.00778	0.00547	0.00322	0.00632
300 MCM....	0.00520	0.00474	0.00704	0.00460	0.00316	0.00557
350 MCM....	0.00461	0.00469	0.00658	0.00400	0.00310	0.00510
400 MCM....	0.00419	0.00462	0.00623	0.00354	0.00304	0.00469
500 MCM....	0.00359	0.00450	0.00575	0.00292	0.00295	0.00412
750 MCM....	0.00280	0.00438	0.00520	0.00208	0.00284	0.00346

* Based on 75 C.

RESISTANCE AT 90 °C = RESISTANCE AT 75°C x $\frac{234.5+90}{234.5+75}$ =

Rx 1.048