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SUBJECT: Forwards response to NRC request for addl info re License Amend Request (LAR) 98-01 for implementation of 230 kV sys improvements.

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May 19, 1998

PG&E Letter DCL-98-076

U.S. Nuclear Regulatory Commission
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Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Response to NRC Request for Additional Information Regarding License Amendment Request (LAR) 98-01, Implementation of 230 kV System Improvements

Dear Commissioners and Staff:

In a letter dated March 16, 1998, the NRC staff identified additional technical information required in order for them to complete their evaluation associated with improvements to the Diablo Canyon Power Plant, Units 1 and 2, offsite power system. PG&E's response to the request for additional information is enclosed. This additional information does not affect the results of the safety evaluation performed for LAR 98-01.

Sincerely,

Gregory M. Rueger

A001

Subscribed and sworn to before me
this 19th day of May 1998
County of San Luis Obispo
State of California

Notary Public

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Enclosures

Request for Additional Information Regarding Offsite Electrical System Improvements

Question 1:

The Diablo Canyon licensing basis requires the offsite system to have sufficient capacity and capability to supply the necessary voltage to safety system loads following the occurrence of two transmission network contingencies [1 and 2]. Confirm this.

[1]The first transmission network contingency is defined as the loss of the worst case (most heavily loaded) transmission line, switchyard bus, capacitor bank, or generating unit connected to (or associated with) the transmission network, assuming the worst case summer and/or winter expected loading or operating configuration of the transmission network. Five exceptions to this contingency are explicitly defined on page 8.2-3 of Section 8.2.2 of Revision 11 of the FSAR.

[2]The second contingency is defined as the trip of one of the two Diablo Canyon units following a loss of coolant accident and trip of the second unit 30 seconds following trip of the accident unit or, if more limiting, assuming one unit operating at 100 percent power with a loss of coolant accident trip.

PG&E Response to Question 1:

The above statement is correct, subject to the following clarifications to the two transmission network contingencies stated in the question. Diablo Canyon Power Plant's (DCPP) offsite system is designed to supply the maximum demand of the engineered safety feature loads for the accident unit, with an orderly shutdown of the other unit. A dual unit trip is not a design or licensing basis requirement. These clarifications were discussed with the NRC in a phone call on April 9, 1998.

The two contingencies should be defined as follows:

1. The first transmission network contingency is defined as the loss of the worst case (most heavily loaded) transmission line, switchyard bus, capacitor bank, or generating unit connected to (or associated with) the transmission network, assuming the worst case summer and/or winter expected loading or operating configuration of the transmission network.

2. The second contingency is defined as the trip of one of the two DCPP units following a loss-of-coolant accident (LOCA). A trip of the other unit

is not postulated. This contingency is assumed to occur while the transmission network has already experienced the first contingency.

The resulting change in 230 kV system voltage due to the occurrence of the first contingency would cause the startup transformer load tap changer to move such that the pretransfer 12 kV bus voltage will be automatically adjusted to maintain a preset voltage of 107.5 percent of 12 kV. This assumption precludes the simultaneous occurrence of contingencies 1 and 2.

Question 2:

Revision 11 of the Diablo Canyon Final Safety Analysis Report Update (FSAR) notes that procedurally controlled compensatory measures may be required to meet the licensing basis described above (as part of question 1) for certain line outages (i.e., Morro Bay-Diablo Canyon, Diablo Canyon-Mesa, or Morro Bay-Mesa). After implementation of the 230 kV system improvements, it is the staff's understanding that these compensatory measures will no longer be needed to meet the Diablo Canyon licensing basis. Confirm this.

PG&E Response to Question 2:

With automatic voltage control of the 12 kV bus voltage using the load tap changer (two startup transformers in service), and automatic switching of shunt capacitors at DCPP switchyard and Mesa substation, no compensatory measures are required. The expected minimum voltages for a full load transfer of all DCPP loads based on load flow results are above the minimum voltages specified in Table III of PG&E Procedure O-23, "Operating Instruction for Reliable Transmission Service for DCPP." Compensatory measures are still required for other conditions. They are identified in Tables I through V of Procedure O-23.

The amount of shunt capacitors presently installed, i.e., 50 MVAR at DCPP and 50 MVAR at Mesa substation, is adequate through the year 2002, based on system load growth projections. An additional 25 MVAR installation is planned at DCPP and Mesa substation during the year 2002, which will provide adequate voltage support through the year 2008. Annual review of the system load growth will ensure the adequacy of the installed banks. The need for additional capacitor banks at DCPP and Mesa beyond the year 2008 will be based on future studies.

Compensatory measures and the voltages required to maintain operability are reviewed annually. If compensatory measures are needed, they will be identified in Table III of Procedure O-23. Compensatory actions are limited to those that can be done expeditiously in the control room , such as reduced bus transfer and blocking the start of noncritical loads after a unit trip.

Question 3:

For operation prior to the installation of capacitor banks, provide results of analysis that sufficient capacity and capability will be available from the transmission network to supply the necessary voltage to safety system loads following any one transmission contingency[1] assuming the second contingency defined below[2]

[1]The first transmission network contingency is defined as the loss of the worst case (most heavily loaded) transmission line, switchyard bus, capacitor bank, or generating unit connected to (or associated with) the transmission network, assuming the worst case summer and/or winter expected loading or operating configuration of the transmission network. Five exceptions to this contingency are explicitly defined on page 8.2-3 of Section 8.2.2 of Revision 11 of the FSAR.

[2]The second contingency is defined as the trip of one of the two Diablo Canyon units following a loss of coolant accident and trip of the second unit 30 seconds following trip of the accident unit or, if more limiting, assuming one unit operating at 100 percent power with a loss of coolant accident trip.

PG&E Response to Question 3:

The results of the analyses, based on the clarification of the second contingency discussed in the response to Question 1, are included in Attachment 1, and are summarized under cases run for Table I of Procedure O-23. These analyses are based on peak winter 1997 load, which is the limiting load prior to installation of the capacitor banks.

Question 4:

For operation after the installation of capacitor banks, provide results of analyses that demonstrate that sufficient capacity and capability will be available from the transmission network to supply the necessary voltage to safety system loads following any one transmission contingency[1] assuming the second contingency defined below[2]

[1]The first transmission network contingency is defined as the loss of the worst case (most heavily loaded) transmission line, switchyard bus, capacitor bank, or generating unit connected to (or associated with) the transmission network, assuming the worst case summer and/or winter expected loading or operating configuration of the transmission network. Five exceptions to this contingency are explicitly defined on page 8.2-3 of Section 8.2.2 of Revision 11 of the FSAR.

[2]The second contingency is defined as the trip of one of the two Diablo Canyon units following a loss of coolant accident and trip of the second unit 30 seconds following trip of the accident unit or, if more limiting, assuming one unit operating at 100 percent power with a loss of coolant accident trip.

PG&E Response to Question 4:

The results of the 230 kV grid flow studies demonstrate 230 kV system capability and capacity. These results are included in Attachment 2. The results of the transient stability analyses following a LOCA trip, based on the clarification of the second contingency discussed in the response to Question 1, are included in Attachment 1, and are summarized under cases run for Tables III, IV, and V or Procedure O-23. These analyses are based on the projected 1998 peak summer load of 500 MW for Los Padres area..

Question 5:

Describe the contractual requirements of the independent system operator and PG&E/plant procedural requirements which assure compliance with the licensing basis requirements (described as part of question 1 above) for the Diablo Canyon offsite system.

PG&E Response to Question 5:

The contractual requirements (Appendix E of Transmission Control Agreement, and a copy of letter from the Independent System Operator (ISO) committing to the use of PG&E procedure O-23) and procedural requirements (Procedure O-23) are included as Attachments 3, 4, and 5, respectively.

Question 6:

Based on information presented in the January 14, 1998, amendment request, the staff understands that following the bounding transmission network contingency (i.e., loss of the worst case transmission line), stability analysis demonstrates that dependence on the load tap changer to maintain voltage is not required to assure the continued immediate availability of offsite power following a loss of coolant accident. In addition, operation of the load tap changer to boost voltage is not required to assure reset of first or second levels of undervoltage protection. Confirm this.

PG&E Response to Question 6:

Based on the expected voltages identified in PG&E Procedure O-23, Table III, Column 3, for the first transmission network contingency, which includes the loss of a transmission line, switchyard bus, capacitor bank, generation unit, or line outages due to a fire on a common right of way, the load tap changer (LTC) is not relied upon to boost voltage after a LOCA, with one exception. For the Table III cases, the voltages required for operability are evaluated at lower than the expected voltages, and as such, in some cases the LTC may make minor adjustments, but it would not be needed to reset the first or second levels of undervoltage protection. This conclusion is based on an analysis of the voltage margin available between the evaluated voltage and the expected voltage and the amount of voltage boost using the LTC in the evaluated cases.

The one exception is the worst case transmission line contingency involving the loss of the Morro Bay-DCPP line. Under this scenario, it is assumed that the LTC installed on the 230/12 kV startup transformers will automatically maintain the 12 kV bus voltage at the preset voltage level of 107.5 percent of 12 kV. Following a LOCA, the 230/12 kV startup transformer for the accident unit will be immediately available and will provide offsite power to the safety system loads. Two cases were run to examine the dependence of the LTC on the reset of the second levels of undervoltage protection. Case 605A (Attachment 1-III-1) illustrates the dependence of the LTC boost at the evaluated pretransfer voltage of 227 kV. Case 3F2A (Attachment 1-III-7) was run at the expected voltage of 231 kV, instead of 237 kV, considering the operational overlap of the capacitor on-off setting . The results demonstrate that dependence on the LTC to boost voltage is required to assure reset of the second level undervoltage relay. Dependence on the LTC to boost voltage is not required to reset the first level undervoltage relay.

Results of Load Flow and Transient Stability Studies for Bus Transfer to 230 kV Source Following a Loss-of-Coolant Accident (LOCA) Trip

Methodology of Analysis: PC based software "Electrical Transient Analyzer Program (ETAP)," Nuclear Version 7.3N2, was used to accurately model the steady state and transient characteristics of the plant loads. Predisturbance tap setting of the startup transformer (SUT) 11 load tap changer (LTC) is determined from the initial load flow. The loading sequences following a LOCA trip are based on the plant design parameters. LTC movements are simulated by changing the transformer tap ratios at discrete time intervals based on the LTC design. Each LTC step movement provides a voltage change of 2.1 percent.

Success Criteria for 230 kV Operability: 12 kV and 4 kV buses transfer successfully without activating first level undervoltage relay (FLUR) and second level undervoltage relay (SLUR) resets within 16.5 seconds. SLUR reset voltage is 93 percent of 4.16 kV. If the SLUR resets within 8.5 seconds, then there is no EDG start. If the SLUR does not reset within 16.5 seconds, then the 4 kV loads are shed and loaded on to the EDG. Plots for 12 kV Startup Bus (Bus 120) and 4 kV Vital Bus F (Bus 185) are included as an attachment for each case.

The minimum 230 kV voltages at the DCPP switchyard required for operability for each transmission line contingency in Tables I through V of PG&E Procedure O-23 were determined by running steady state and transient load flow cases. The results of analyses for the following bounding cases for Tables I, III, IV, and V are attached. The cases for Table II, which involve manual setting of the LTCs are not included.

I. TABLE I of Procedure O-23 (No Morro Bay Generation, No Capacitors at DCPP/Mesa).

1. Unit 1 LOCA with full transfer, all lines in service, pretransfer 230 kV voltage at 214 kV; Case 600X, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Vital Bus F recovers to 93.5 percent of 4.16 kV in less than 8.5 seconds. SUT 1-1 LTC movement (one tap position) after the bus transfer is required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-I-1).

2. Unit 1 LOCA with full transfer, all lines in service, pretransfer 230 kV voltage at 221 kV; Case 600X, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Vital Bus F recovers to 93.1 percent of 4.16 kV in less than 8.5 seconds. SUT 1-1 LTC movement after the bus transfer is not required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-I-2).

3. Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 222 kV; Case 605X, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully with Compensatory Action 1 (block starting of standby condensate/condensate booster pump). 4.16 kV Vital Bus F recovers to 93.6 percent in less than 16 seconds. SUT 1-1 LTC boost (one tap position) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-I-3).

4. Unit 1 LOCA with full transfer, Morro Bay - Gates # 1 or #2 line out of service, pretransfer 230 kV voltage at 218 kV; Case 606, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully with Compensatory Action 1 (block starting of standby condensate/condensate booster pump). 4.16 kV Vital Bus F recovers to 94.1 percent in less than 8.5 seconds. SUT 1-1 LTC movement to boost voltage after the bus transfer is not required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-I-4).

5. Unit 1 LOCA with full transfer, Morro Bay-Gates #1 and #2 lines out of service, pretransfer 230 kV Voltage at 221 kV; Case 607, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully with Compensatory Action 1 (Block starting of standby condensate/condensate booster pump). 4.16 kV Vital Bus F recovers to 94.3 percent in less than 8.5 seconds. SUT 1-1 LTC movement after the bus transfer is not required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-I-5).

6. Unit 1 LOCA with full transfer, Morro Bay-Mesa and DCPP-Mesa line out of service, pretransfer 230 kV Voltage at 214 kV; Case 608, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully with Compensatory Action 1 (block starting of standby condensate/condensate booster pump). 4.16 kV Vital Bus F recovers to 94.6 percent in less than 8.5 seconds. SUT 1-1 LTC movement after the bus transfer is not required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-I-6).

II. TABLE III of Procedure O-23 (No Morro Bay Generation, Capacitors at DCPP and Mesa).

1. Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 227 kV; Case 605A, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 93.3 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-1).

2. Unit 1 LOCA with full transfer, Morro Bay-Mesa line out of service, pretransfer 230 kV voltage at 223 kV; Case 3F3, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 93.9 percent in less than 16 seconds. SUT 1-1 LTC boost (one tap position) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-2).

3. Unit 1 LOCA with full transfer, DCPP-Mesa line out of service, pretransfer 230 kV voltage at 221 kV; Case 3F4, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 93.2 percent in less than 8.5 seconds. SUT 1-1 LTC movement after the bus transfer is not required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-3).

4. Unit 1 LOCA with full transfer, Morro Bay-Gates #1 and #2 line out of service, pretransfer 230 kV voltage at 224 kV; Case 3F7, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 94.5 percent in less than 16 seconds. SUT 1-1 LTC boost (one tap position) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-4).

5. Unit 1 LOCA with full transfer, Morro Bay-Midway #1 and #2 line out of service, pretransfer 230 kV voltage at 214 kV; Case 3F8, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 95 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-5).

6. Unit 1 LOCA with full transfer, Morro Bay-Mesa and Diablo-Mesa line out of service, pretransfer 230 kV voltage at 214 kV; Case 3F9, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 94.2 percent in less than 16 seconds. SUT 1-1 LTC boost (one tap position) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-6).

7. Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 231 kV; Case 3F2A, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 93.1 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-III-7).

III. TABLE IV of O-23 (No Morro Bay Generation, Capacitors at DCPP Only).

1 Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 222 kV; Case 4F2B, Calc 359-DC.

   Results:

   12 kV and 4 kV buses transfer successfully with Compensatory Action 1 (block starting of standby condensate/condensate booster pump). 4.16 kV Vital Bus F recovers to 93.6 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-IV-1).

2 Unit 1 LOCA with full transfer, DCPP-Mesa line out of service, pretransfer 230 kV voltage at 226 kV; Case 4F4A, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 93.5 percent in less than 8.5 seconds. SUT 1-1 LTC movement to boost voltage after the bus transfer is not required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-IV-2).

3 Unit 1 LOCA with full transfer, Morro Bay-Gates #1 or #2 line out of service, pretransfer 230 kV voltage at 220 kV; Case 4F5, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 94.6 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-IV-3).

4. Unit 1 LOCA with full transfer, Morro Bay-Midway #1 or #2 line out of service, pretransfer 230 kV voltage at 220 kV; Case 4F6, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 93.4 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-IV-4).

5. Unit 1 LOCA with full transfer, Morro Bay-Mesa and Diablo-Mesa line out of service, pretransfer voltage at 214 kV, Case 4F9, Calc 359-DC

Results: Bounded by Case 3F9 (Attachment 1-III-6)

IV TABLE V of O-23 (No Morro Bay Generation, Capacitors at Mesa Only).

1. Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 220 kV, Case 5F2A, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully without any compensatory actions. 4.16 kV Bus F recovers to 94 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-V-1).

2. Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 217 kV; Case 5F2B, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully with Compensatory Action 1 (block starting of standby condensate/condensate booster pump). 4.16 kV Vital Bus F recovers to 93 percent in less than 16 seconds. SUT 1-1 LTC boost (two tap positions) after the bus transfer is required to reset the SLUR. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-V-2).

3. Unit 1 LOCA with partial transfer, DCPP-Mesa line out of service, pretransfer 230 kV Voltage at 218 kV; Case 5P4, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully with Compensatory Actions 1 and 2 (block starting of standby condensate/condensate booster pump and block transfer of one 12kV bus). 4.16 kV Vital Bus F recovers to 95.7 percent in less than 8.5 seconds. SUT 1-1 LTC movement after the bus transfer is not required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-V-3).

4. Unit 1 LOCA with partial transfer, Morro Bay-Midway #1 or #2 line out of service, pretransfer 230 kV voltage at 216 kV; Case 5P6, Calc 359-DC.

Results:

12 kV and 4 kV buses transfer successfully with Compensatory Actions 1 and 2 (block starting of standby condensate/condensate booster pump and block transfer of one 12kV bus). 4.16 kV Vital

Bus F recovers to 94.5 percent in less than 8.5 seconds. SUT 1-1 LTC movement after the bus transfer is not required to meet the SLUR reset criteria. Voltage plots for 12 kV and 4 kV buses are attached (Attachment 1-V-4).

5. Unit 1 LOCA with full transfer, Diablo-Mesa line out of service, pretransfer 230 kV voltage at 226 kV; Case 5F4, Calc 359-DC.

   Results: Bounded by Case 4F4A (Attachment 1-IV-2)

6. Unit 1 LOCA with full transfer, Morro Bay-Midway #1 or #2 line out of service, pretransfer voltage at 220 kV, Case 5F6, Calc 359-DC

   Results: Bounded by Case 4F6 (Attachment 1-IV-4)

Unit 1 LOCA with full transfer, all lines in service, pretransfer 230 kV voltage at 214 kV; Case 600X, Calc 359-DC

TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract:
Engineer: Duke Engineering & Services

ETAP 7.3N2

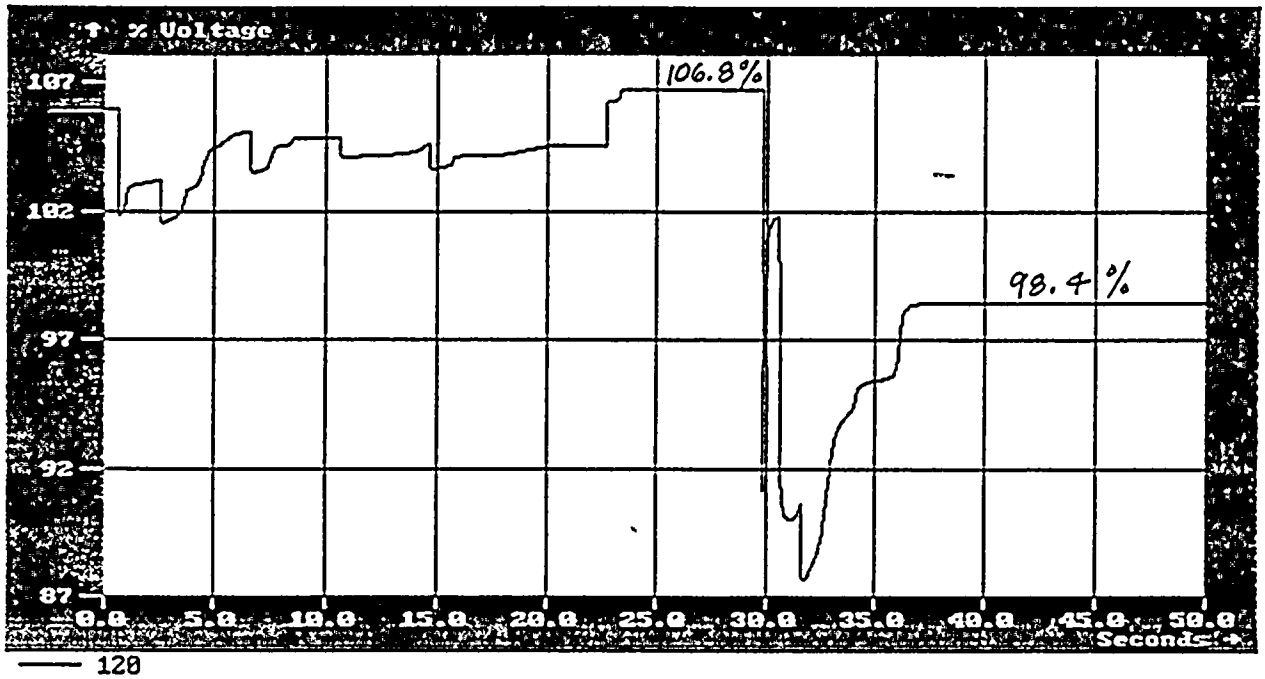
Study Case: 600X

Page: 1
Date: 05-13-1998
SN: 31992-PG&E
File: 023-1F1

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 214KV GRID VOLTS
MORRO BAY OFFLINE, ALL LINES IN, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-1F1 Plot Filename: 023-1F1

Bus # 120: 12KVSU1



TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract:
Engineer: Duke Engineering & Services

ETAP 7.3N2

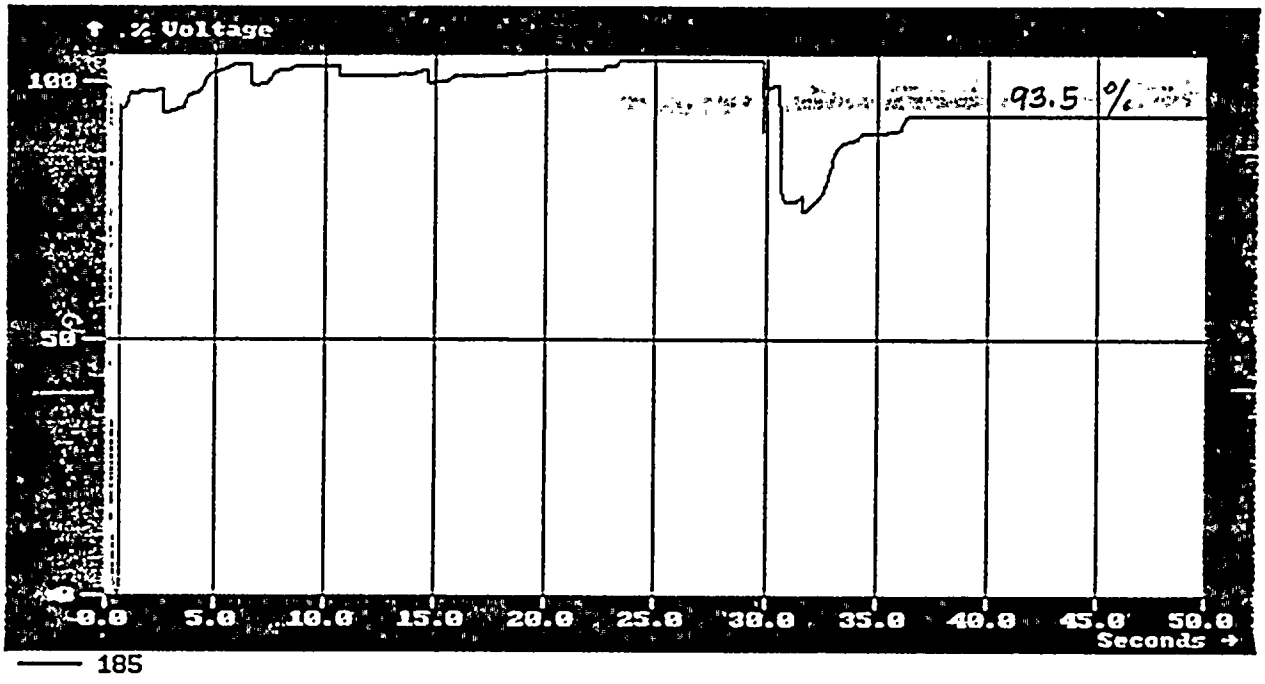
Study Case: 600X

Page: 1
Date: 05-13-1998
SN: 31992-PG&E
File: 023-1F1

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 214KV GRID VOLTS
MORRO BAY OFFLINE, ALL LINES IN, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-1F1 Plot Filename: 023-1F1

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, all lines in service, pretransfer 230 kV voltage at 221 kV; Case 600X, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: BASE600X
Engineer: Duke Engineering & Services

ETAP 7.3N2

Study Case: 600X

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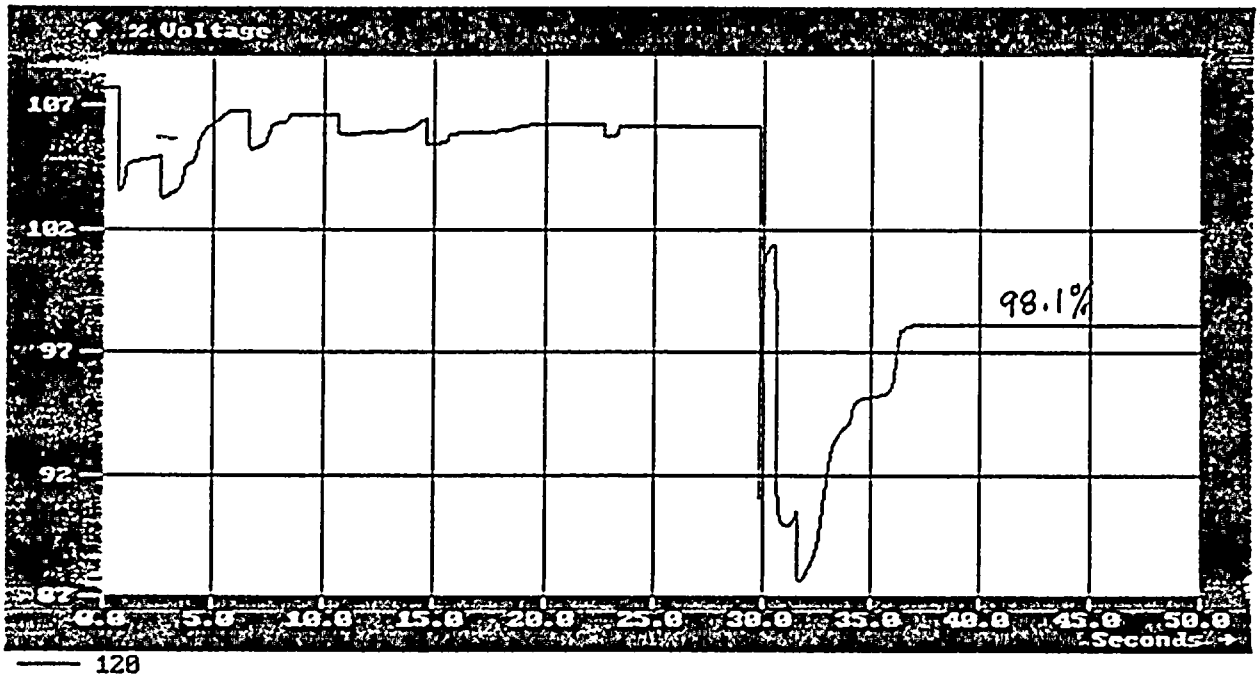
UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 221KV GRID VOLTS
MORRO BAY OFFLINE, ALL LINES IN, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-1F1X Plot Filename: 023-1F1X

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: BASE600X
Engineer: Duke Engineering & Services

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Study Case: 600X

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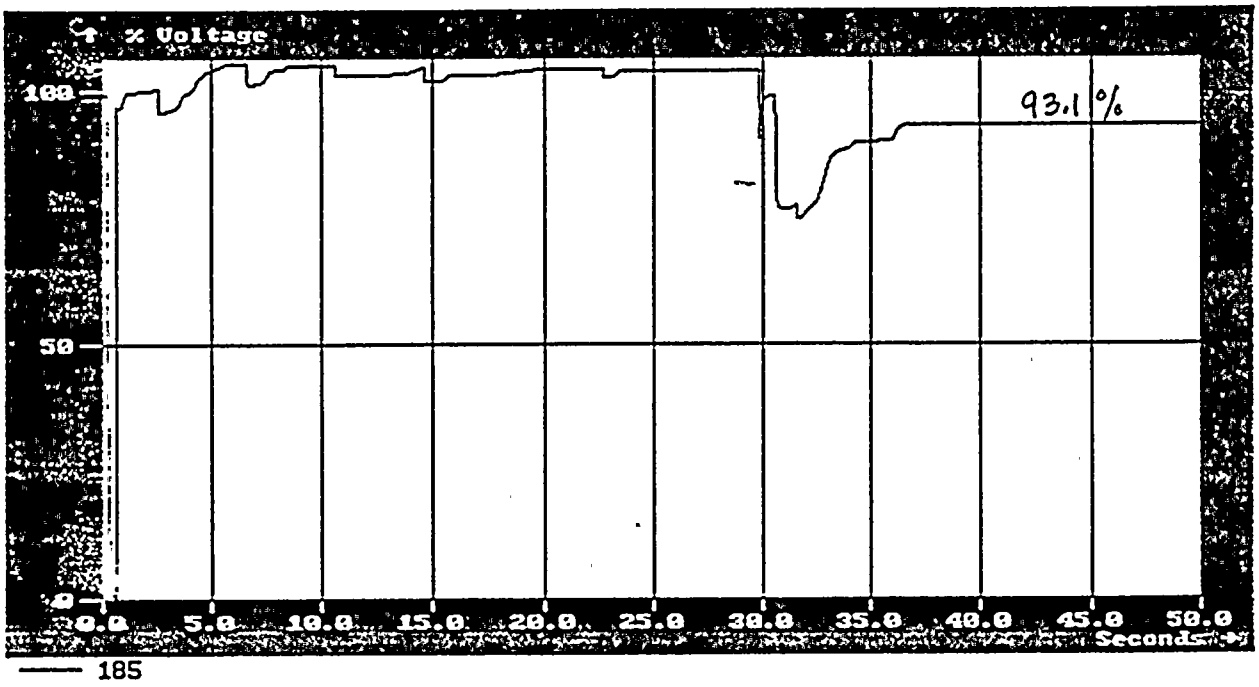
Date: 05-13-1998
SN: 31992-PG&E
File: 023-1F1X

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 221KV GRID VOLTS
MORRO BAY OFFLINE, ALL LINES IN, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-1F1X Plot Filename: 023-1F1X

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 222 kV; Case 605X, Calc 359-DC

TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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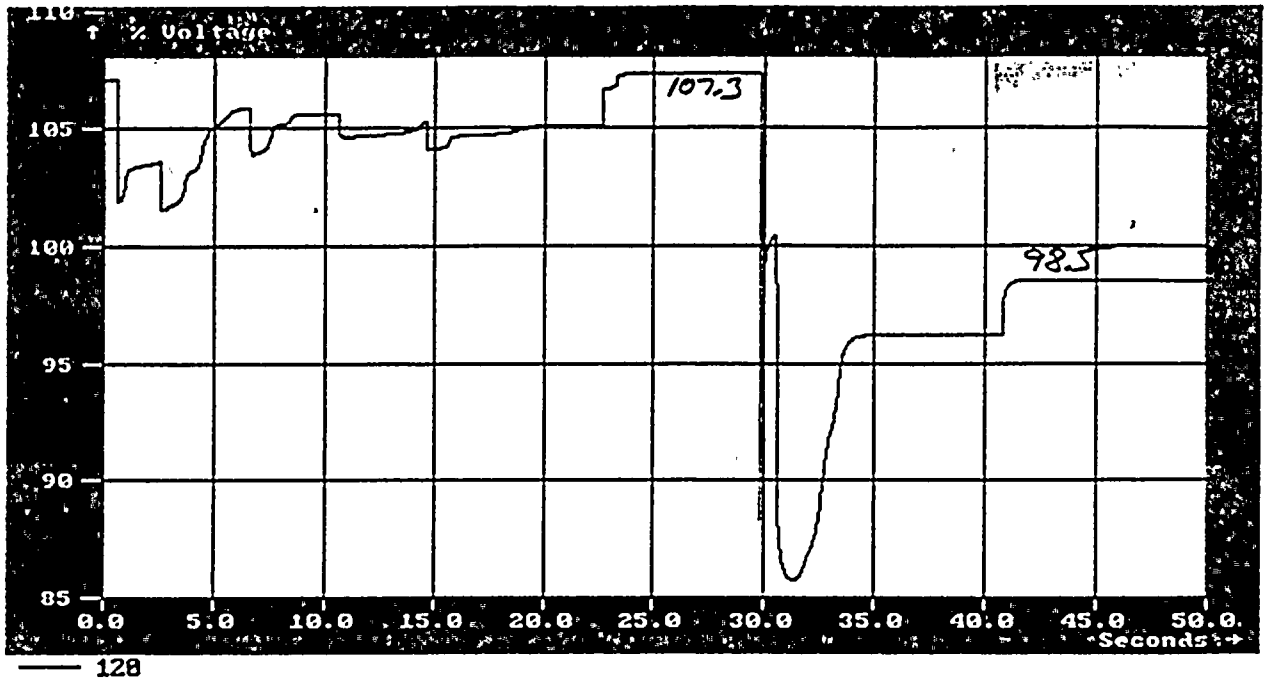
Date: 07-25-1997
SN: 31992-PG&E
File: 023-2F2X

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 222kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-2F2X Plot Filename: 2F2-7

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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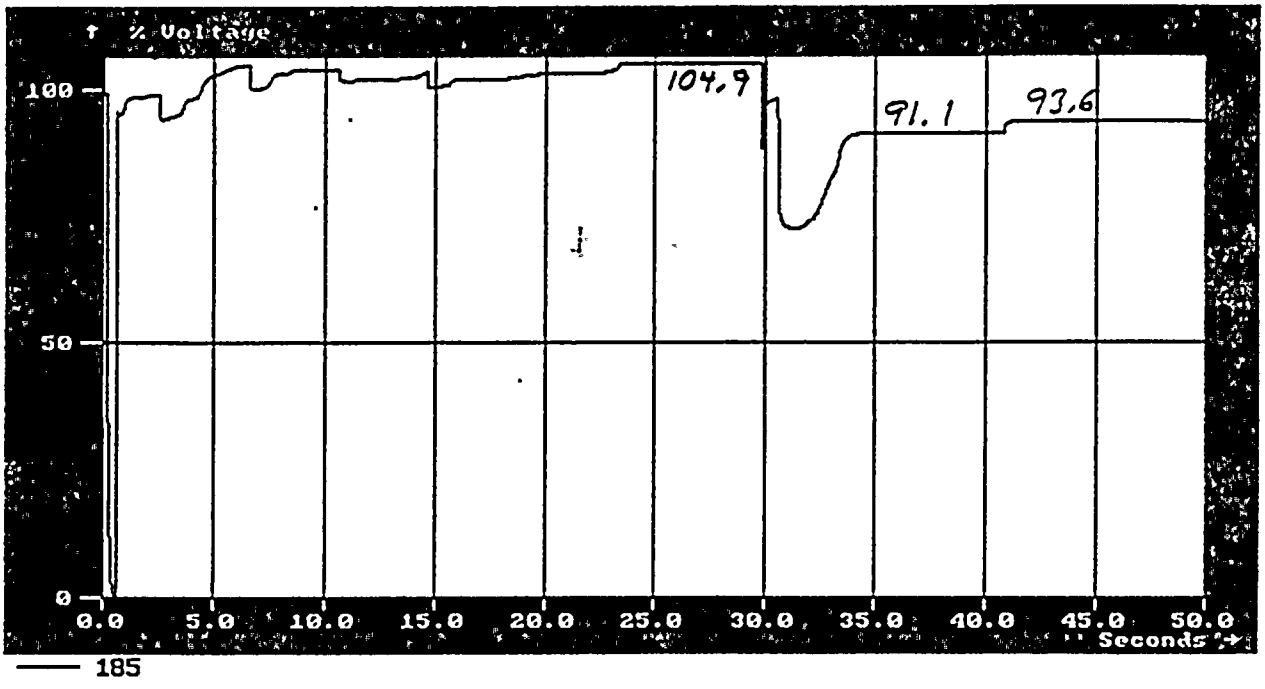
Study Case: 605X

Page: 1
Date: 07-25-1997
SN: 31992-PG&E
File: 023-2F2X

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 222kV GRID VOLTS (0-72 2)
MORRO BAY OFFLINE, MB-OCPP LINE OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-2F2X Plot Filename: 2F2-7

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay - Gates # 1 or #2 line out of service, pretransfer 230 kV voltage at 218 kV; Case 606, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

ETAP 7.3N2
Study Case: 606

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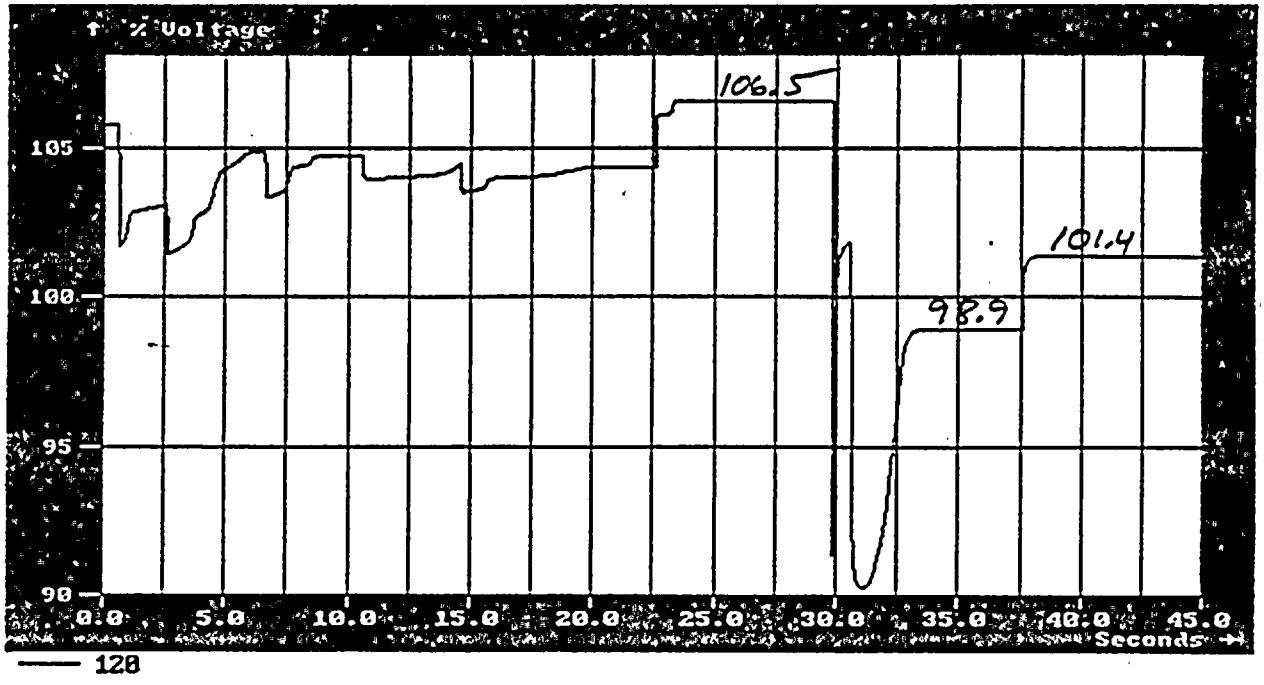
Date: 07-26-1997
SN: 31992-PG&E
File: 023-5F2

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 218kV GRID VOLTS
MORRO BAY OFFLINE, MB-GATES 1-LINE OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-5F2 Plot Filename: 5F2

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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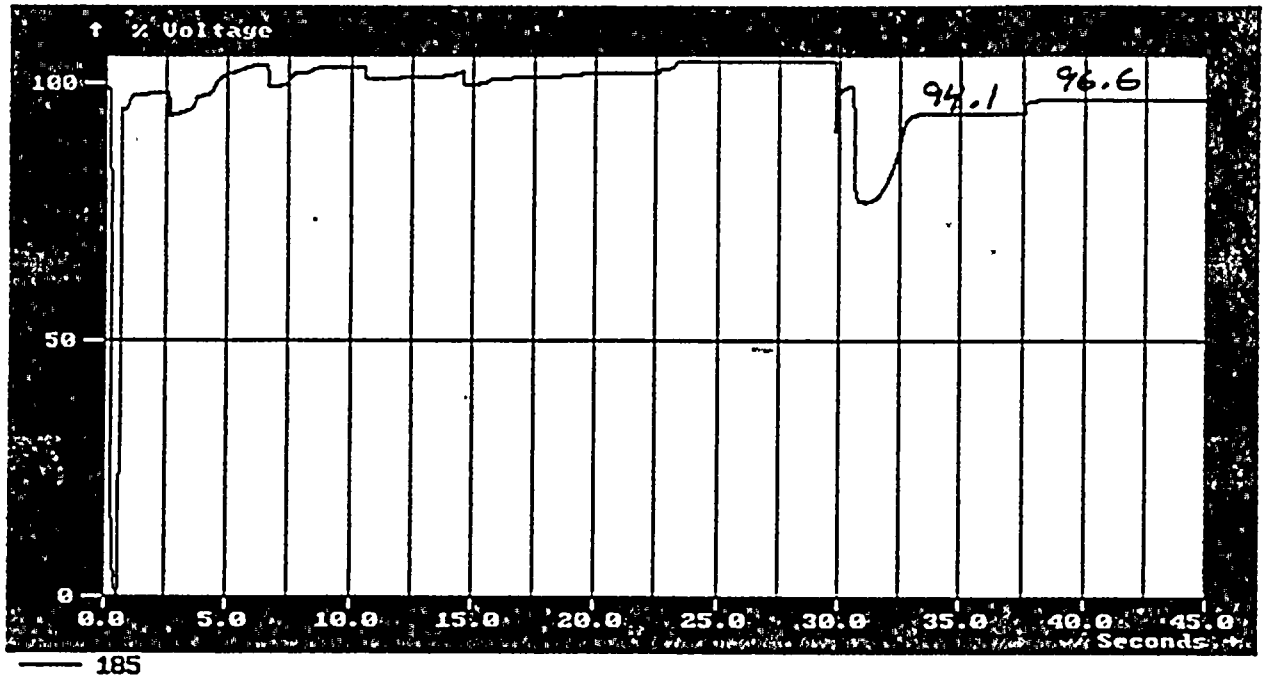
Study Case: 606

Page: 1
Date: 07-26-1997
SN: 31992-PG&E
File: 023-5F2

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 218kV GRID VOLTS
MORRO BAY OFFLINE, MB-GATES 1-LINE OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-5F2 Plot Filename: 5F2

Bus # 185: 4KVBUSF

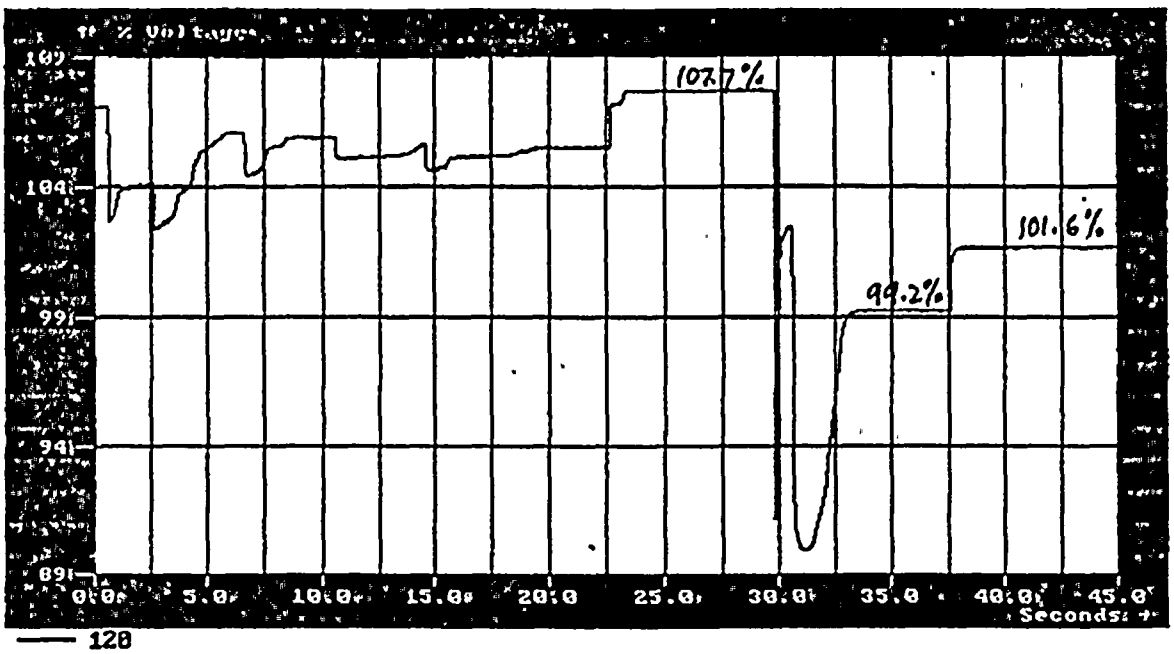


Unit 1 LOCA with full transfer, Morro Bay-Gates #1 and #2 lines out of service, pretransfer 230 kV voltage at 221 kV; Case 607, Calc 359-DC

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 221kV GRID VOLTS
MORRO BAY OFFLINE, MB-GATES 1 AND 2 LINES OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-7F2 Plot Filename: 7F2

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

ETAP 7.3N2

Study Case: 607

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Date: 07-26-1997
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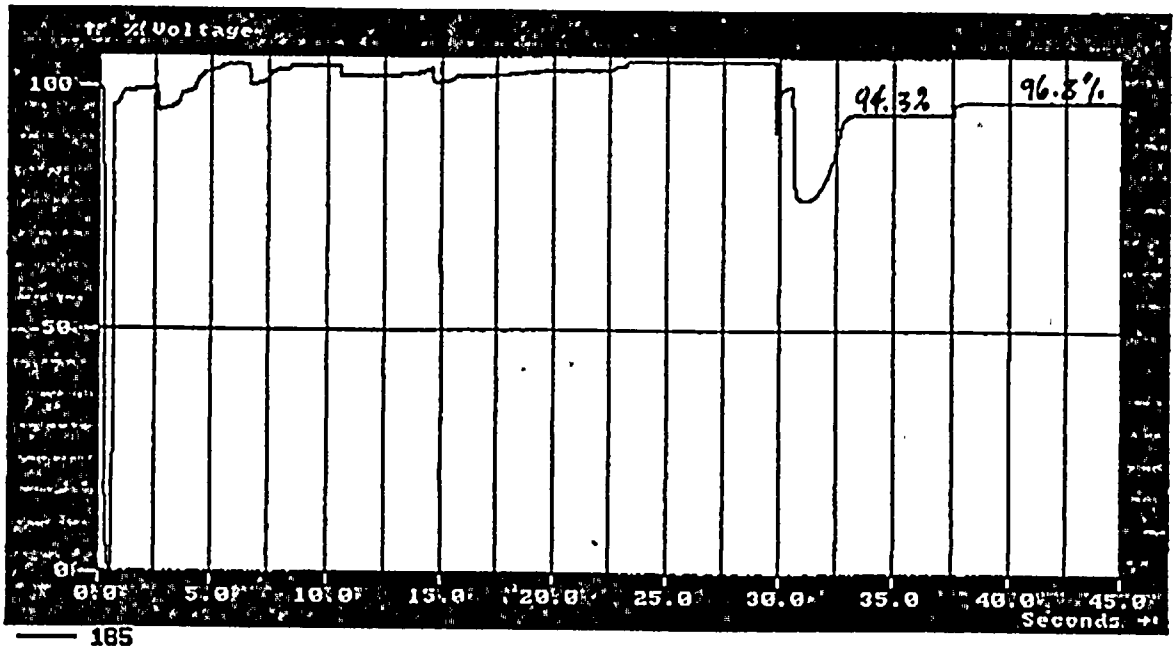
File: 023-7F2

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 221kV GRID VOLTS
MORRO BAY OFFLINE, MB-GATES 1 AND 2 LINES OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-7F2 Plot Filename: 7F2

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-Mesa and DCPP-Mesa lines out of service, pretransfer 230 kV voltage at 214 kV; Case 608, Calc 359-DC

TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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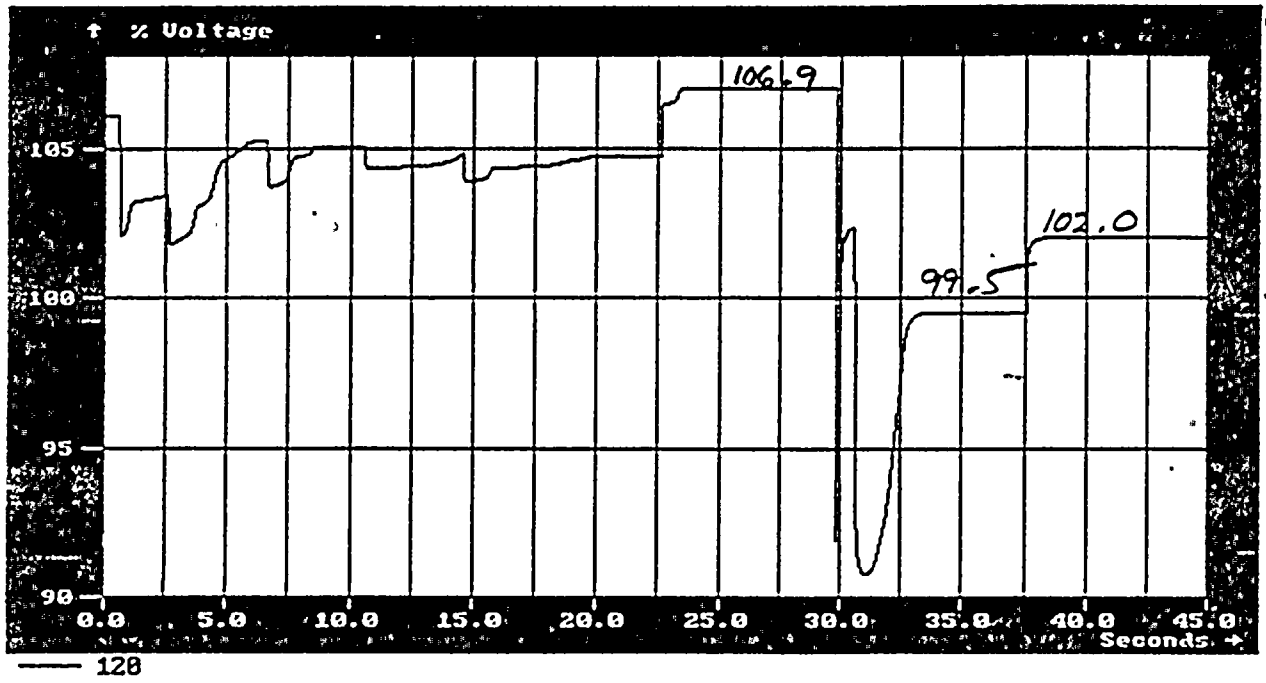
File: 023-9F2

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 214kV GRID VOLTS
MORRO BAY OFFLINE, MB-MESA & DCPP-MESA LINES OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-9F2 Plot Filename: 9F2

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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Study Case: 608

Page: 1
Date: 07-26-1997
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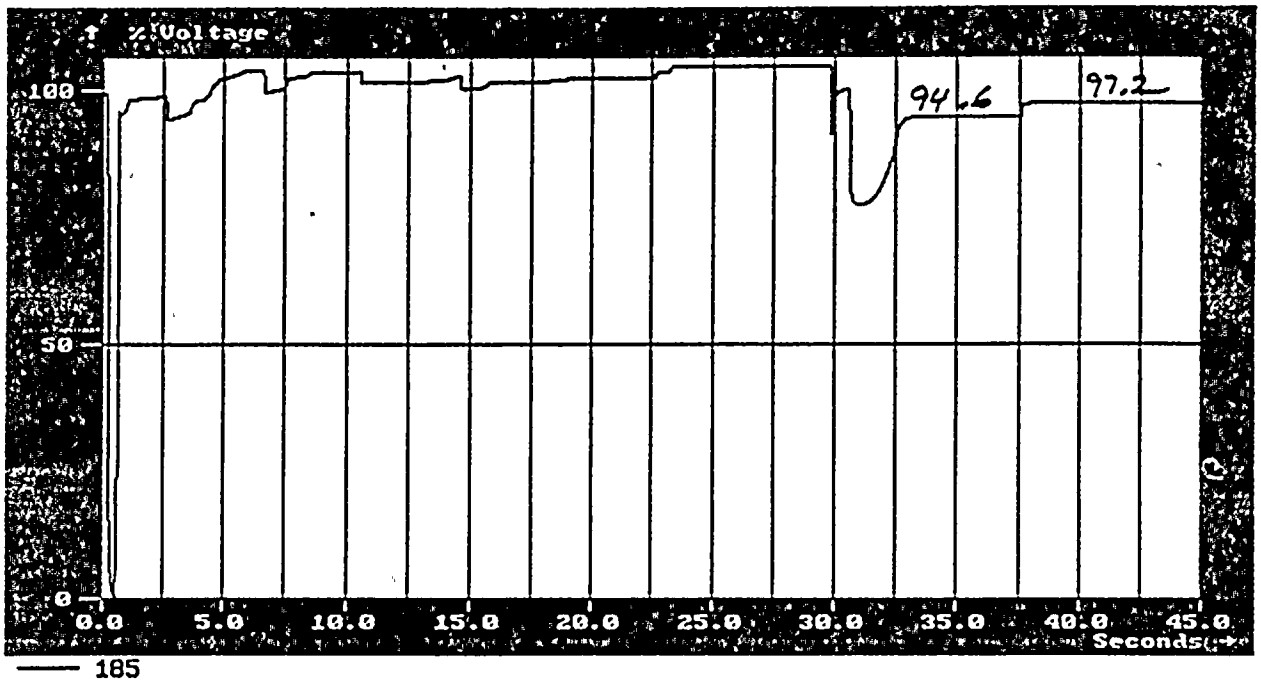
File: 023-9F2

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 214kV GRID VOLTS
MORRO BAY OFFLINE, MB-MESA & DCPP-MESA LINES OUT, XFR COND TRAINS #11 & #13

Data Filename: 023-9F2 Plot Filename: 9F2

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 227 kV; Case 605A, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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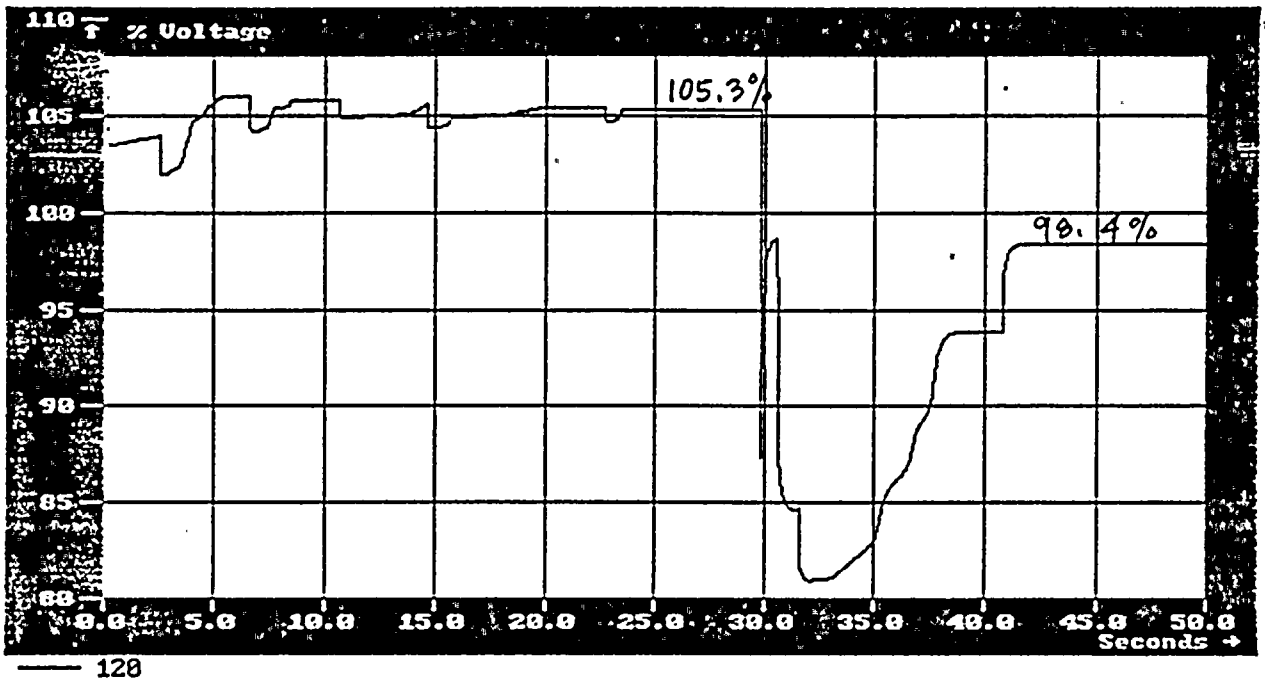
File: 023-2F2B

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 227kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-2F2B Plot Filename: 2F2B

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: 023-2F2
Engineer: Duke Engineering & Services

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Study Case: 605A

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Date: 05-08-1998
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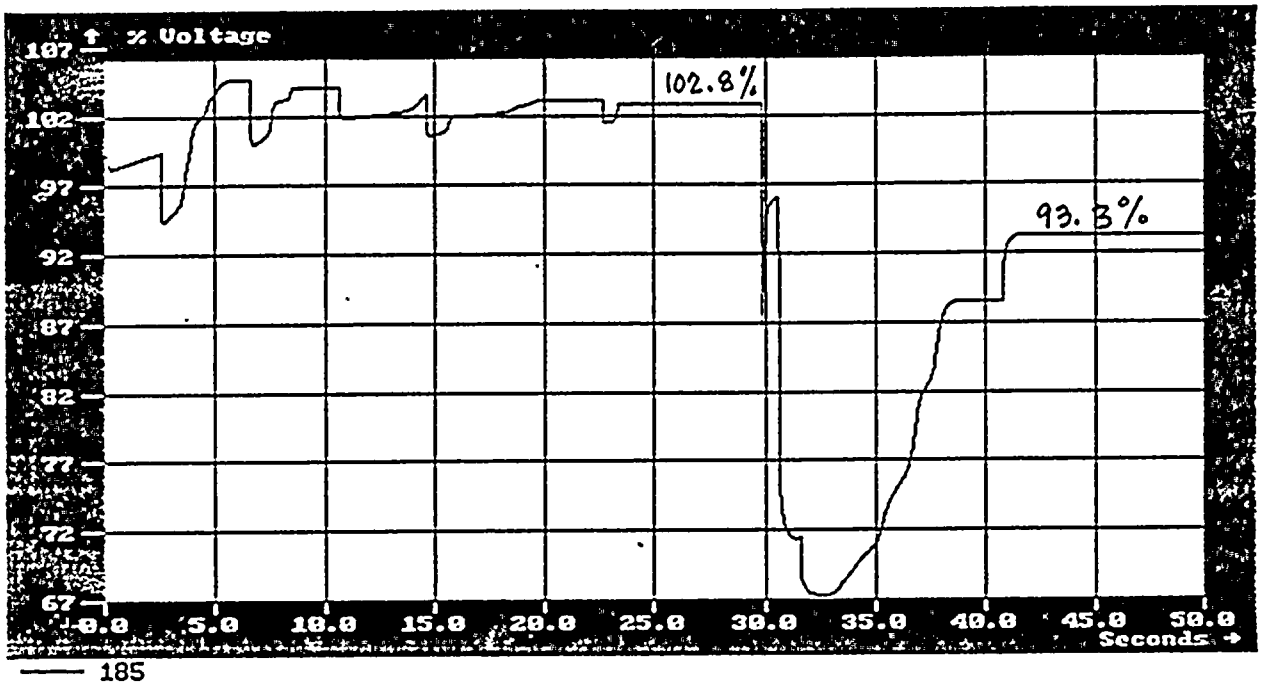
File: 023-2F2B

IT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 227kV GRID VOLTS (0.72 Z)
ORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-2F2B Plot Filename: 2F2B

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-Mesa line out of service, pretransfer 230 kV voltage at 223 kV; Case 3F3, Calc 359-DC

TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

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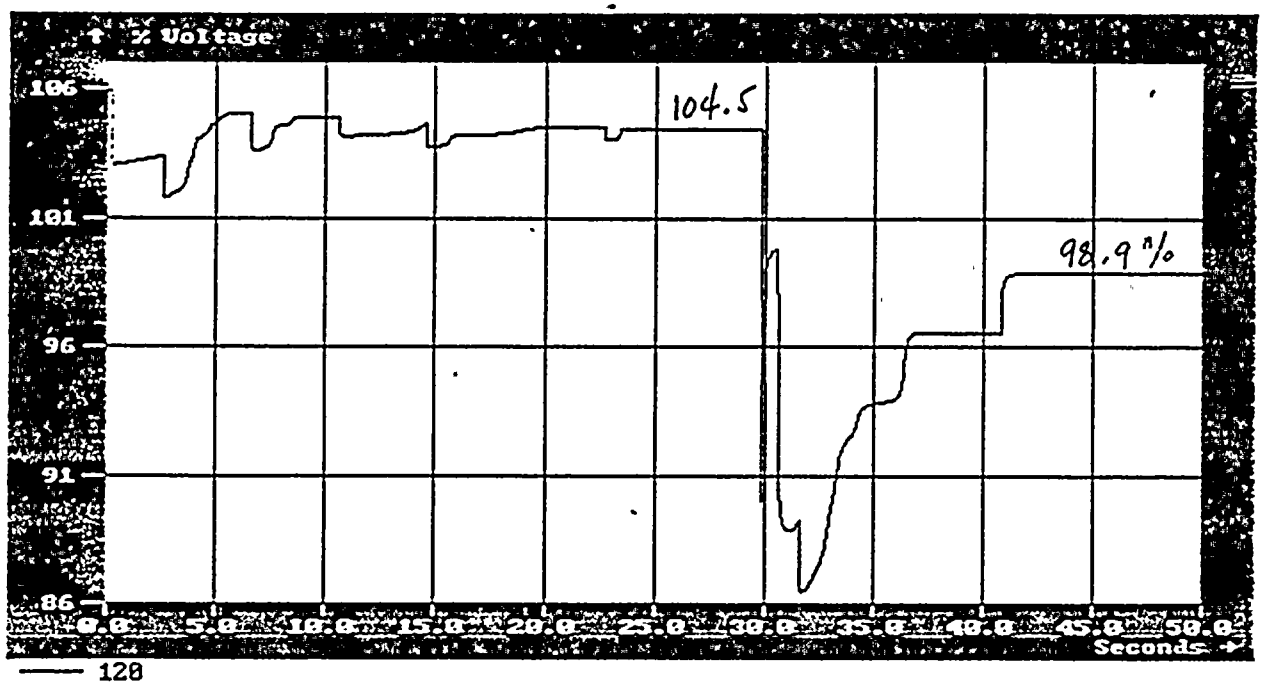
UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 223kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F3 Plot Filename: 023-3F3

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

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Study Case: TB3-3F3

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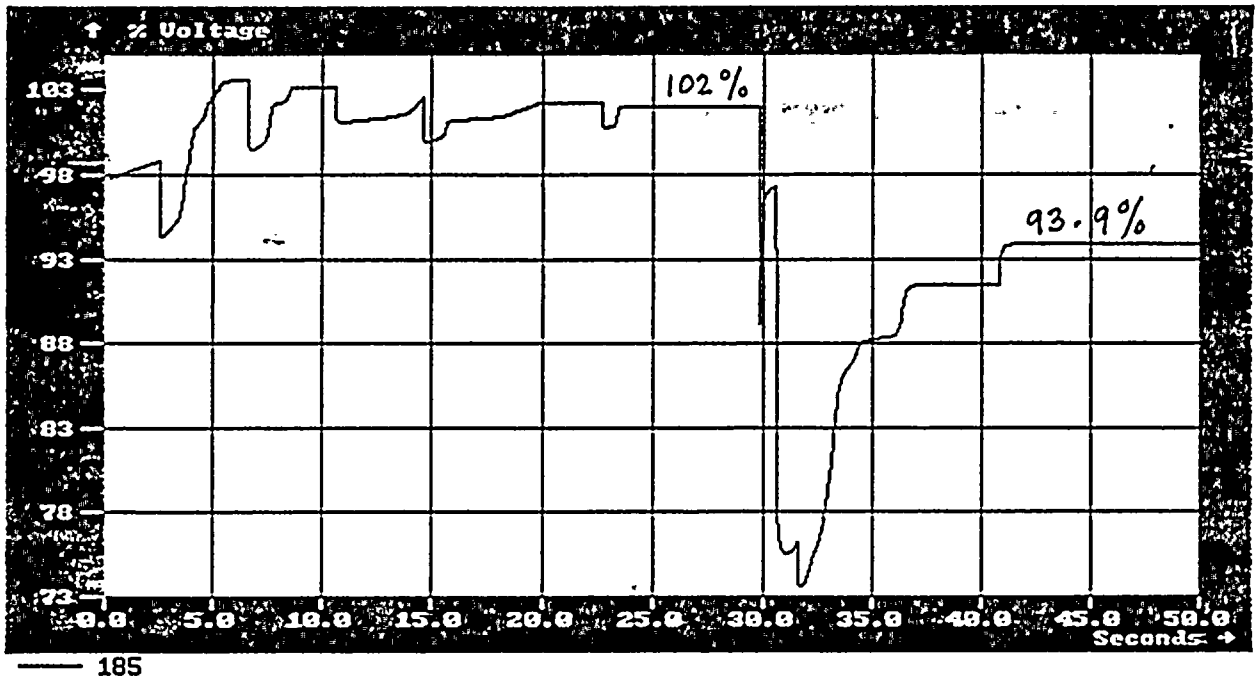
File: 023-3F3

NIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 223kV GRID VOLTS
ORRO BAY OFFLINE, MORRO BAY-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F3 Plot Filename: 023-3F3

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, DCPP-Mesa line out of service, pretransfer 230 kV voltage at 221 kV; Case 3F4, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

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Study Case: TB3-3F4

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Date: 05-14-1998
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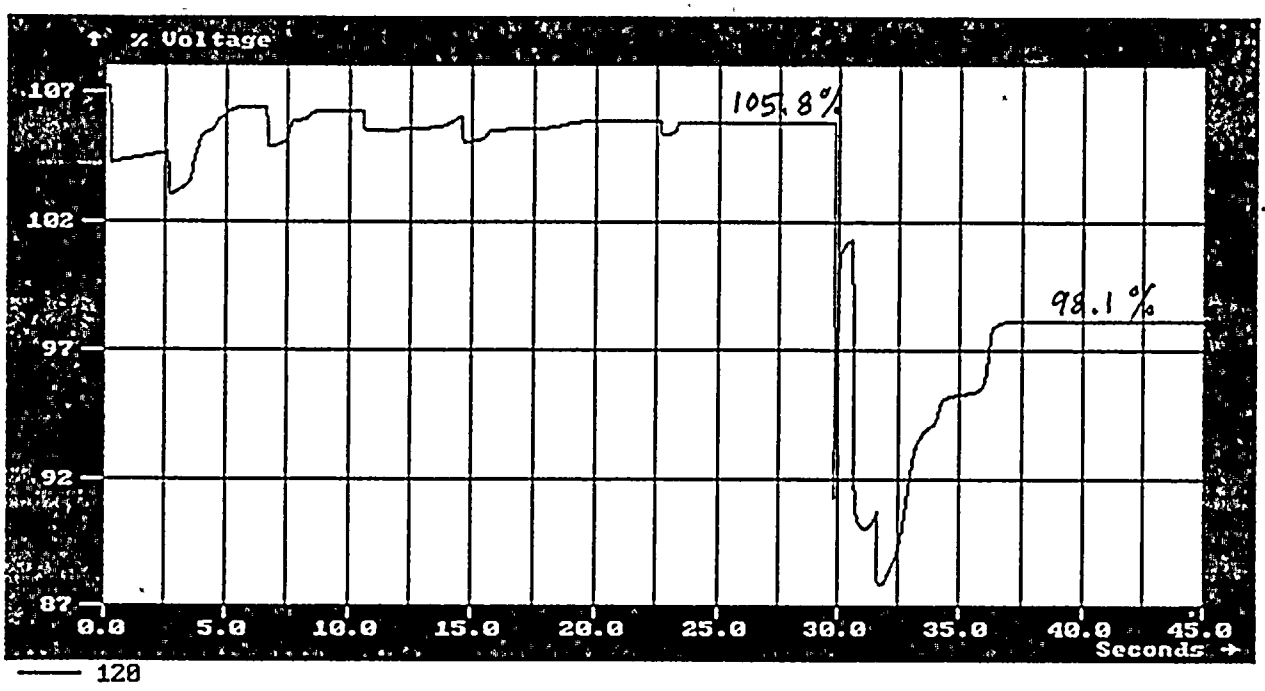
File: 023-3F4

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 221kV GRID VOLTS
MORRO BAY OFFLINE, DCPP-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F4 Plot Filename: 023-3F4

Bus # 120: 12KVSU1



TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

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Study Case: TB3-3F4

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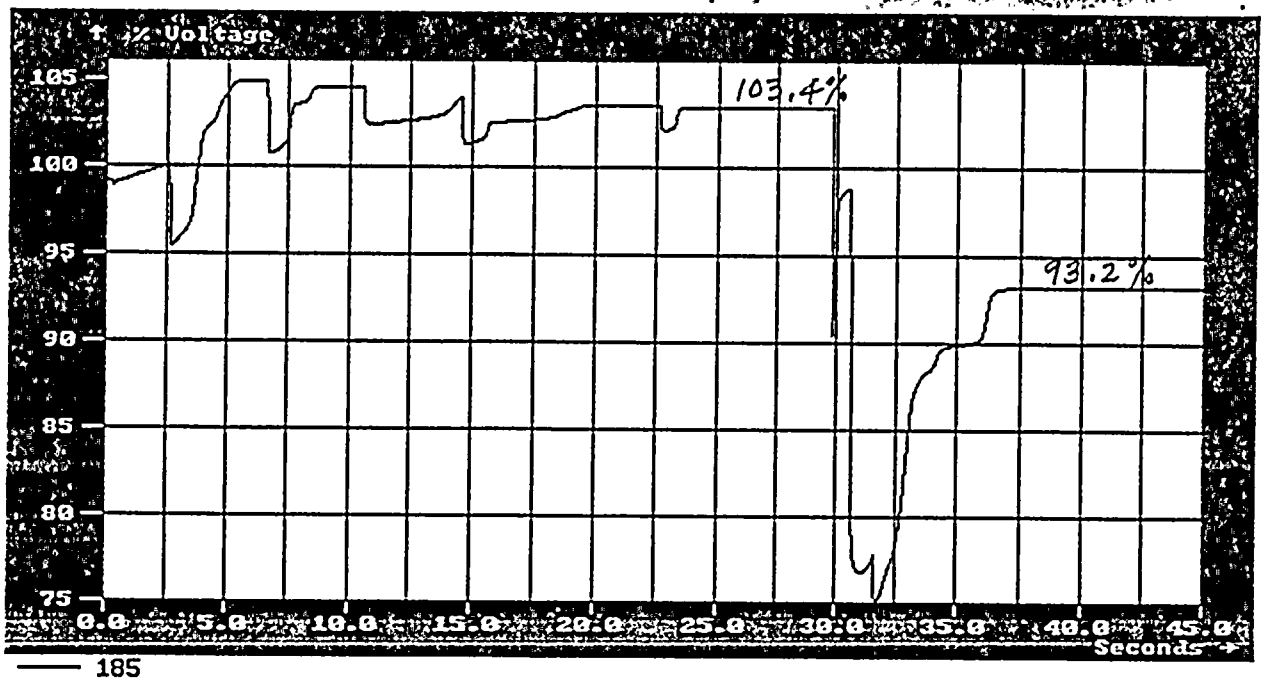
UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 221kV GRID VOLTS
MORRO BAY OFFLINE, DCPP-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F4 Plot Filename: 023-3F4

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-Gates #1 and #2 line out of service, pretransfer 230 kV voltage at 224 kV; Case 3F7, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Dase605A
Engineer: Duke Engineering & Services

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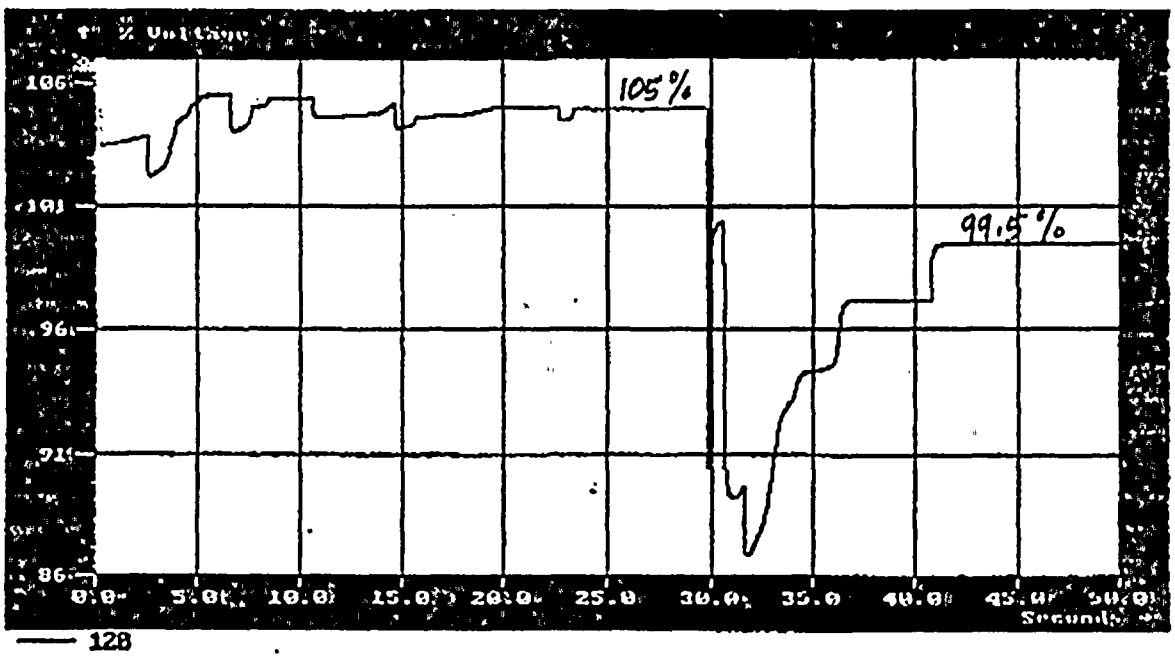
UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 224kV GRID VOLTS
MORRO BAY OFFLINE. MORRO BAY-GATES #1 AND #2 LINE OUT. XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F7 Plot Filename: 023-3F7

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base60SA
Engineer: Duke Engineering & Services

ETAP 7.3N2

Study Case: TB3-3F7

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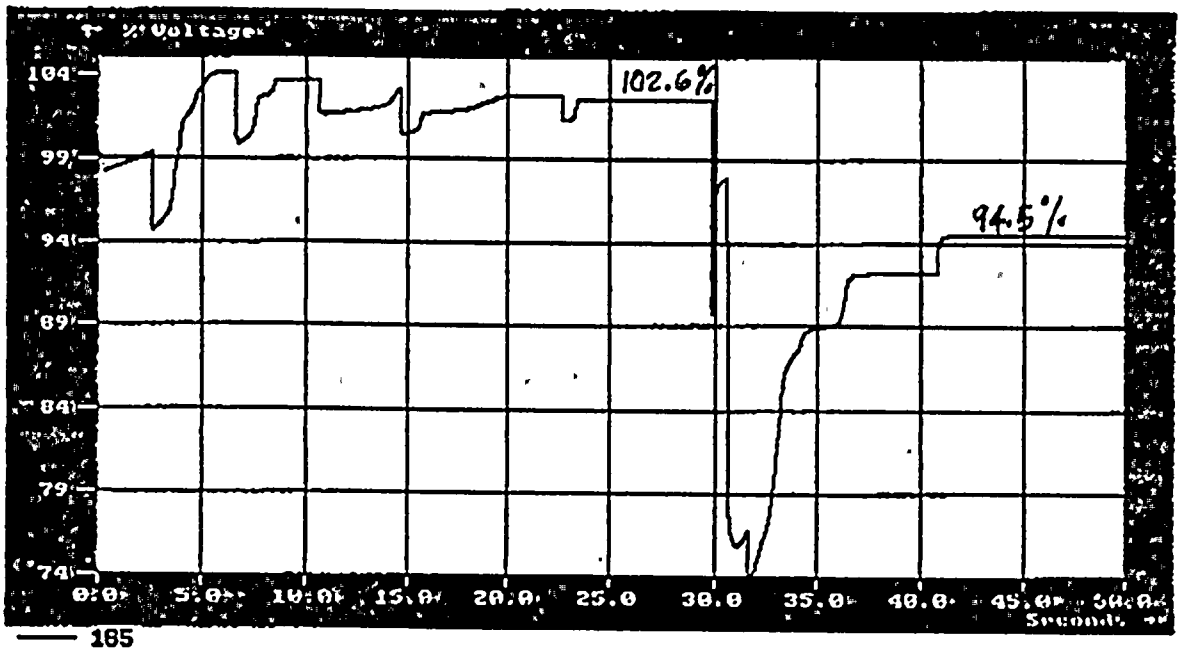
UNIT.1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 224kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-GATES #1 AND #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F7 Plot Filename: 023-3F7

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-Midway # 1 and #2 lines out of service, pretransfer 230 kV voltage 214 kV, Case 3F8, Calc 359-DC

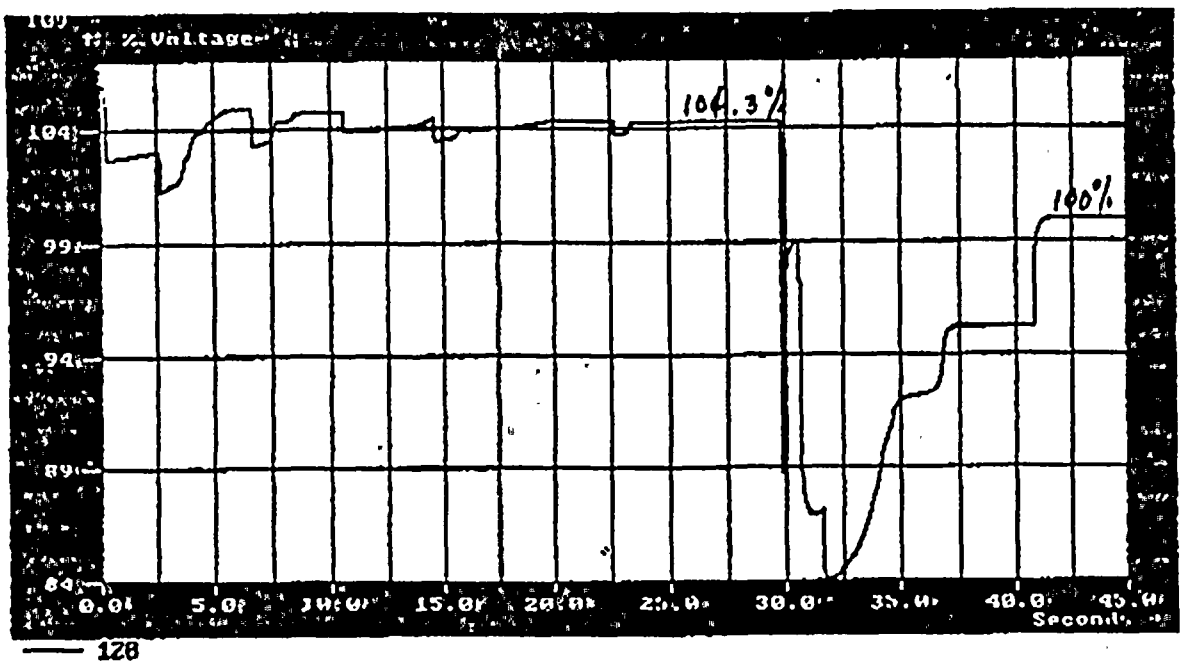
SYSTEM ANALYSIS

Project: DIABLO CANYON			Page: 1
Location: Pacific Gas & Electric	ETAP 7.3N2		Date: 05-15-1998
Contract: Base605A			SN: 31992-PG&E
Engineer: Duke Engineering & Services	Study Case: TB3-3F8		File: 023-3F8

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 21ekV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-MIDWAY #1 AND #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F8 Plot Filename: 023-3F8

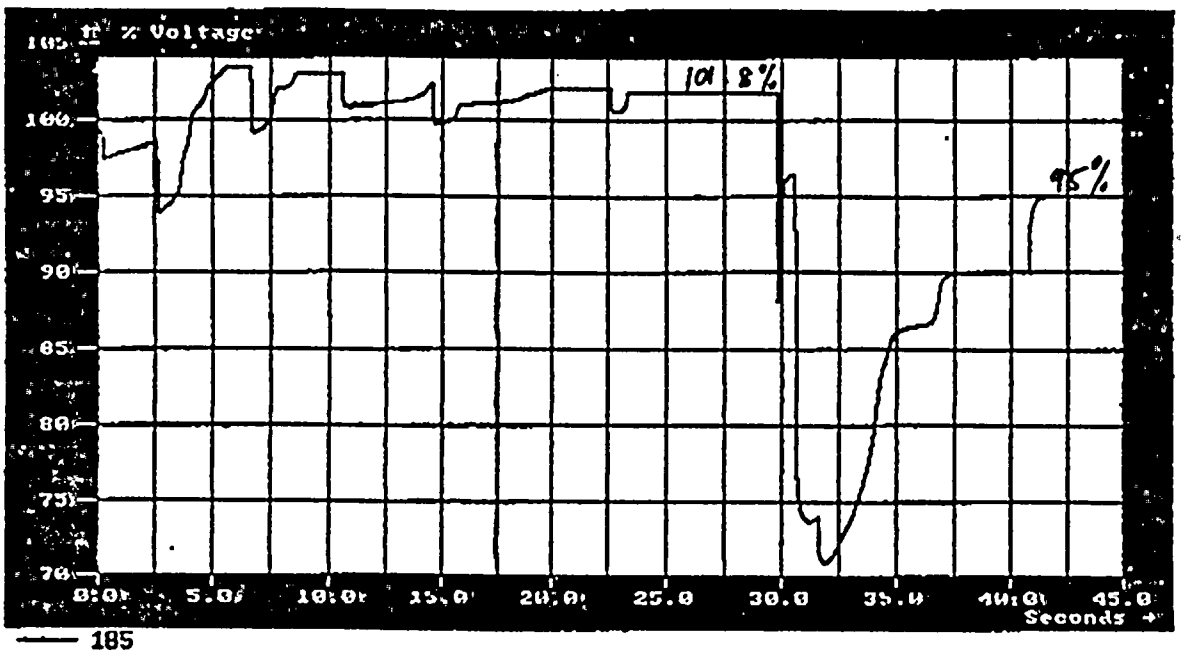
Bus # 120: 12KVSU1



UNIT 1 LOCA W/FULL XFR. UNIT 2 COLD SHUTDOWN, 214kV GRID VOLTS
MORRO BAY OFFLINE. MORRO BAY-MIDWAY #1 AND #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F8 Plot Filename: 023-3F8

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-Mesa and Diablo-Mesa lines out of service, pretransfer 230 kV voltage at 214 kV; Case 3F9, Calc 359-DC

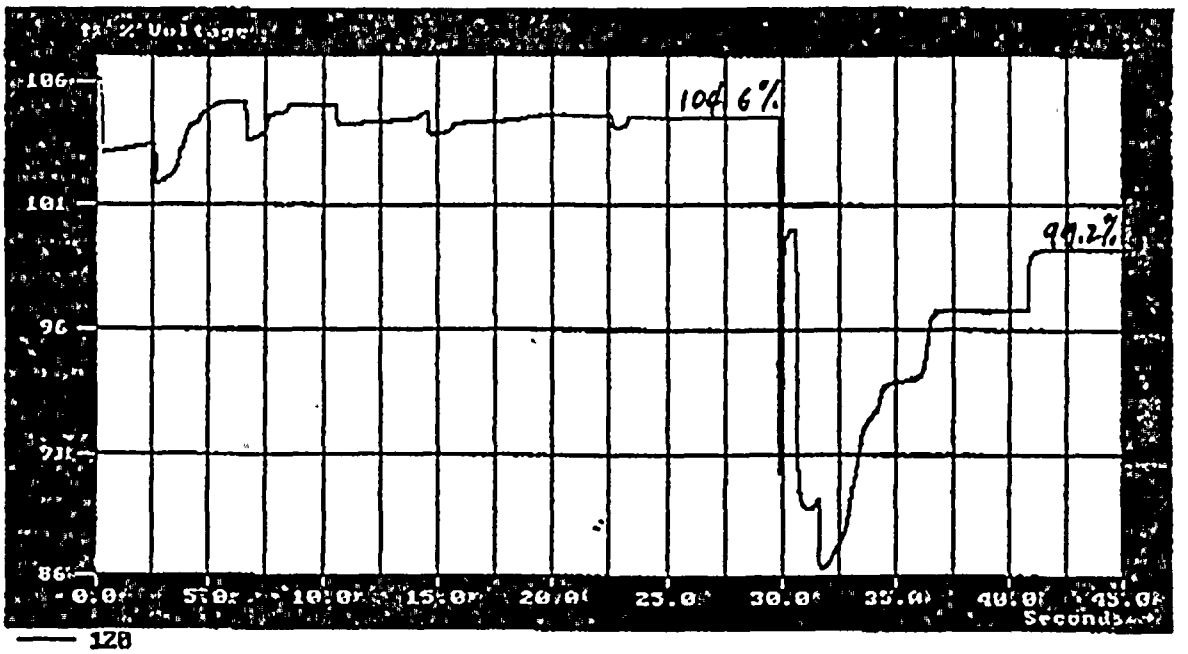
TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON | ETAP 7.3N2 | Page: 1
Location: Pacific Gas & Electric | Date: 05-18-1998
Contract: Base605A | SN: 31992-PG&E
Engineer: Duke Engineering & Services | Study Case: TS3-3F9 | File: 023-3F9

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 214kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-MESA & DCPP-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F9 Plot Filename: 023-3F9

Bus # 120: 12KVSU1



TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

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Study Case: TB3-3F9

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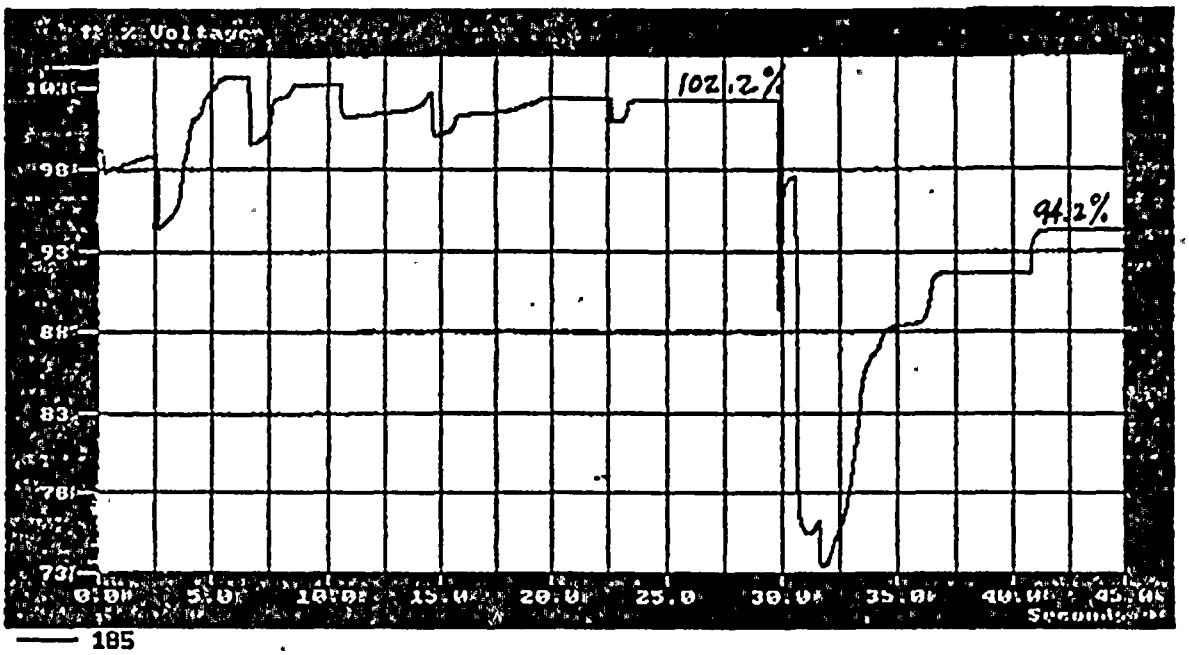
File: 023-3F9

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 214kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-MESA & DCPP-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F9 Plot Filename: 023-3F9

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 231 kV, Case 3F2A, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

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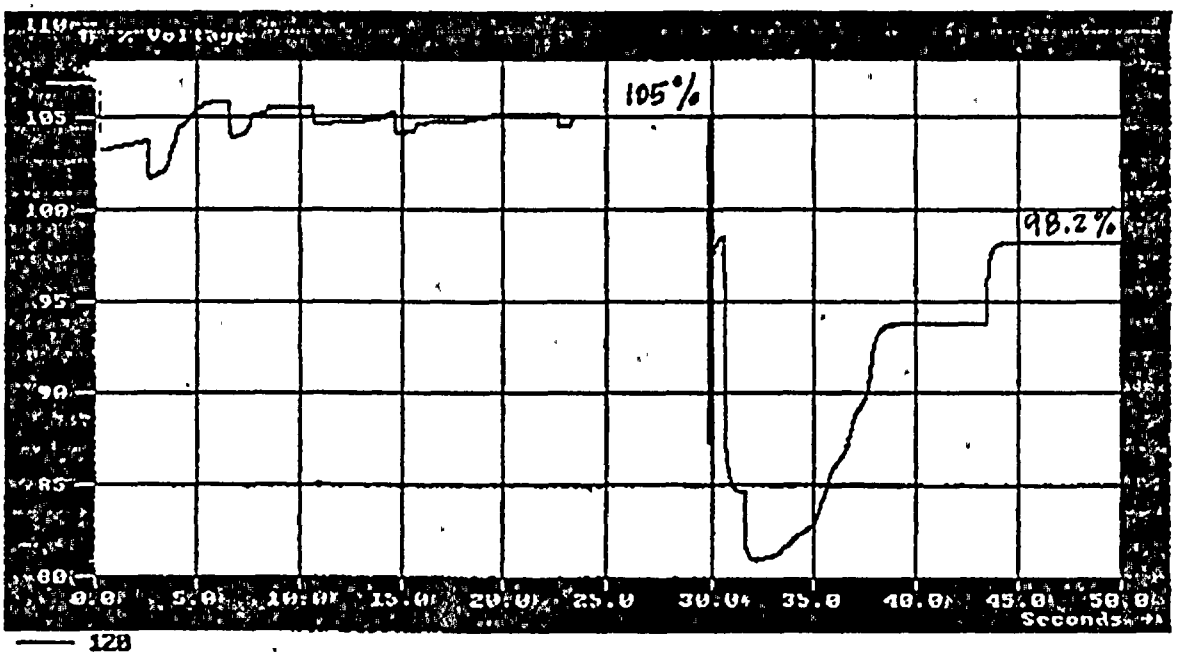
File: 023-3F2A

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 231kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F2A Plot Filename: 023-3F2A

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.1N2

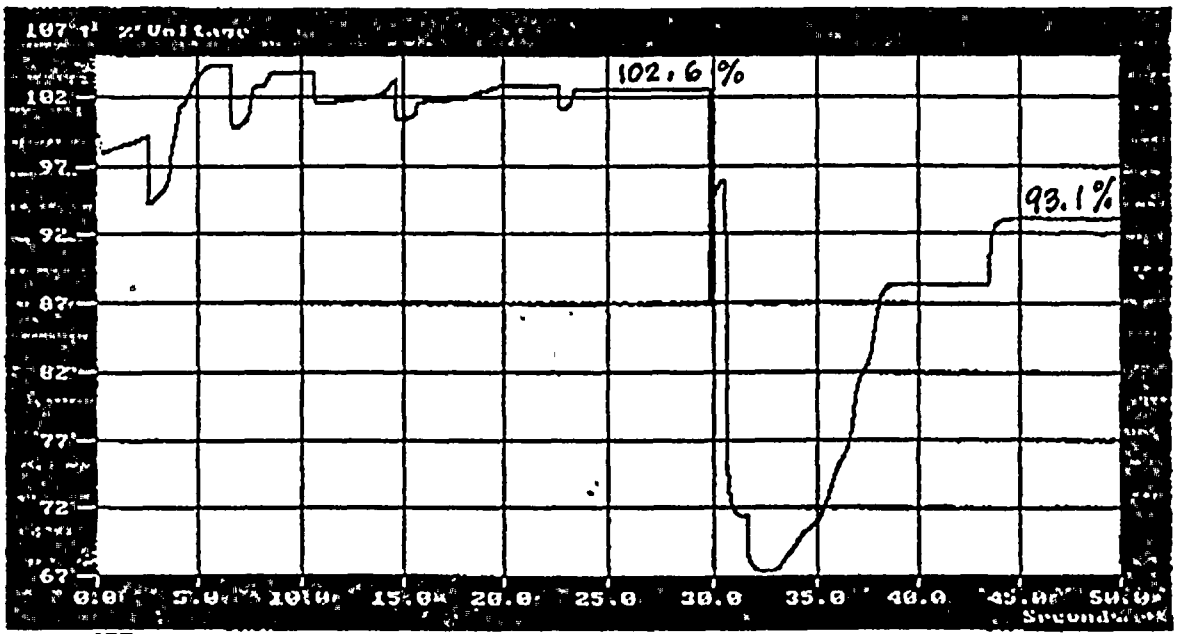
Study Case: TB3-3F2A

Page: 1
Date: 05-19-1998
SN: 31992-PG&E
File: 023-3F2A

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 231kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-3F2A Plot Filename: 023-3F2A

Bus 4 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 222 kV; Case 4F2B, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base 605
Engineer: Duke Engineering & Services

ETAP 7.3N2

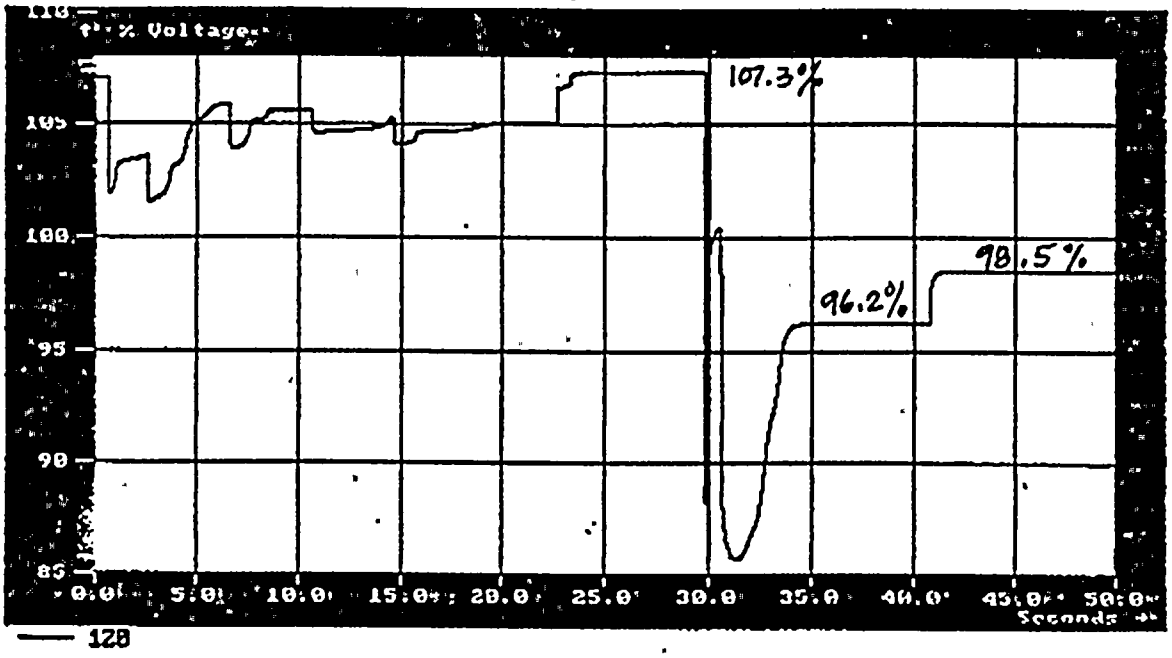
Study Case: TB4-4F2B

Page: 1
Date: 05-19-1998
SN: 31992-PG&E
File: 023-4F2B

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 222kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13, BLOCK START COND TRAIN #12

Data Filename: 023-4F2B Plot Filename: 4F2B

Bus # 120: 12KV5U1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base 605
Engineer: Duke Engineering & Services

ETAP 7.1N2

Study Case: TB4-4F2B

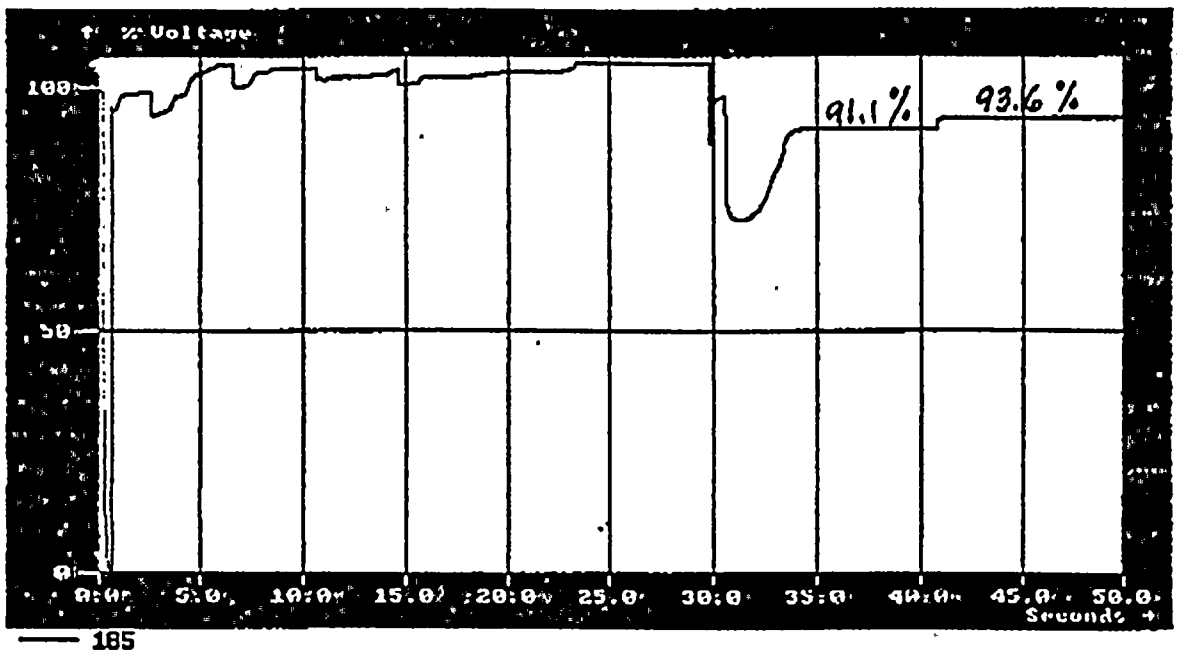
Page: 1
Date: 05-19-1998
SN: 31992-PG&E
File: 023-4F2B

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 222kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13, BLOCK START COND TRAIN #12

Data Filename: 023-4F2B

Plot Filename: 4F2B

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, DCPP-Mesa line out of service, pretransfer 230 kV voltage at 226 kV; Case 4F4A, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

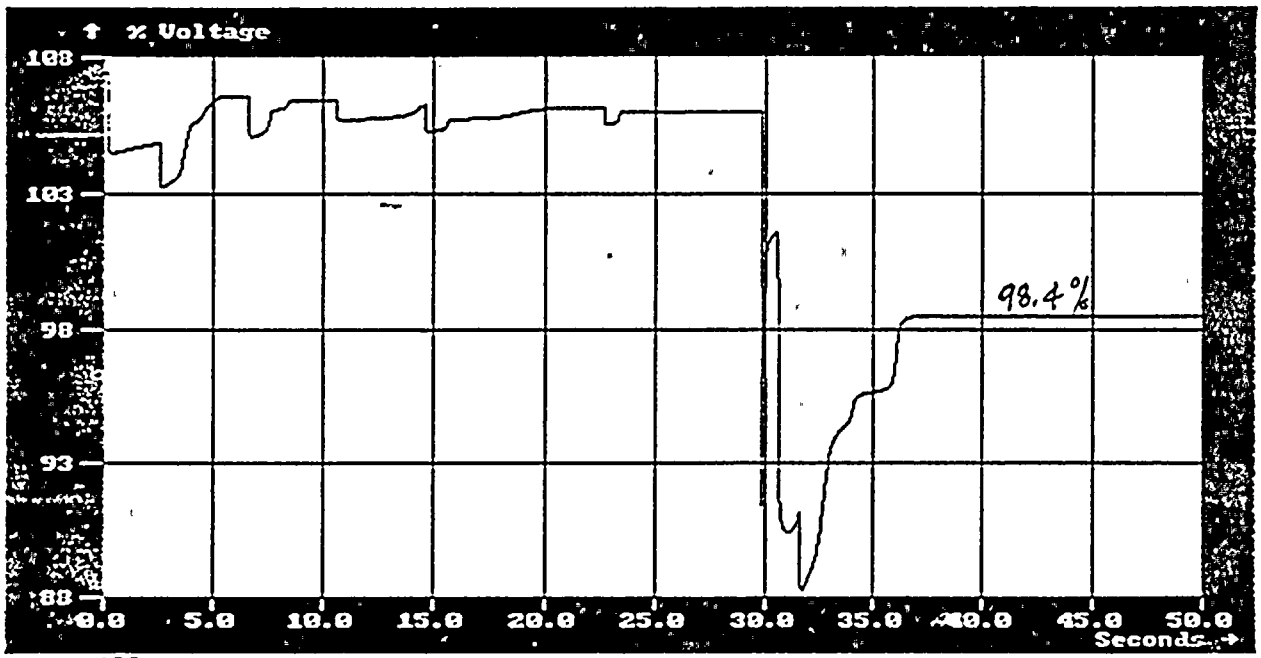
Study Case: TB4-4F4A

Page: 1
Date: 05-12-1998
SN: 31992-PG&E
File: 023-4F4A

IT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 226kV GRID VOLTS
RRO BAY OFFLINE, DCPP-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-4F4A Plot Filename: 4F4A

Bus # 120: 12KVSU1



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Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

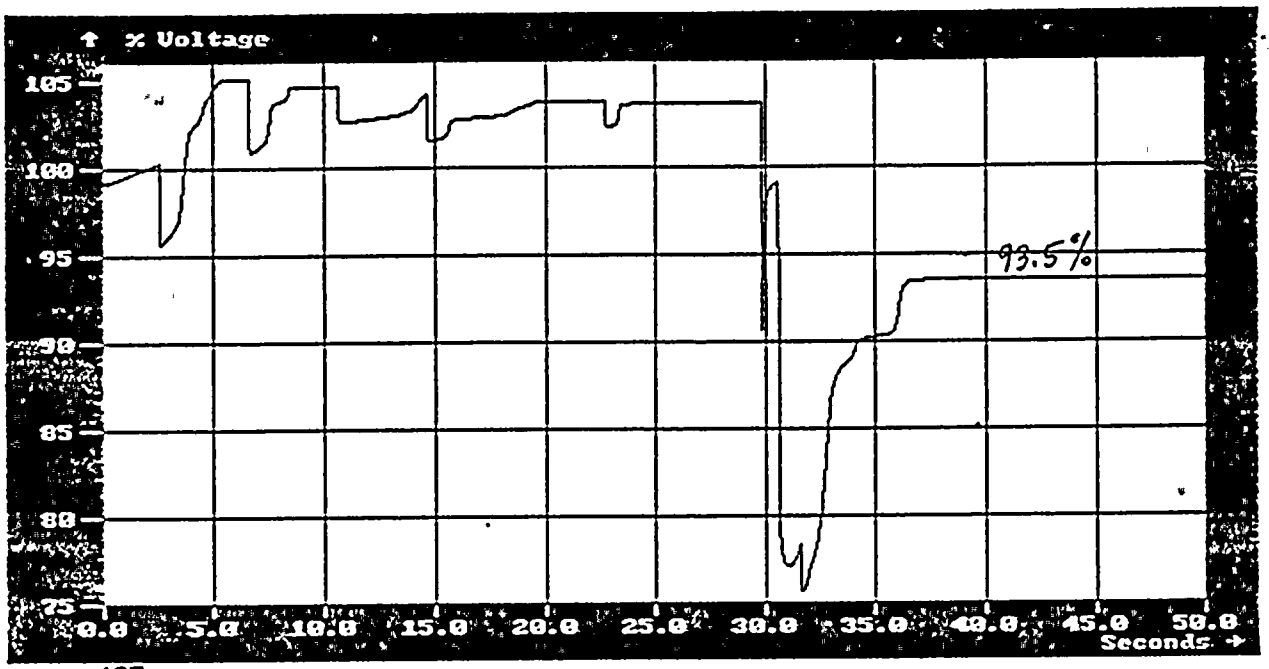
Study Case: TB4-4F4A

Page: 1
Date: 05-12-1998
SN: 31992-PG&E
File: 023-4F4A

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 226kV GRID VOLTS
MORRO BAY OFFLINE, DCPP-MESA LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-4F4A Plot Filename: 4F4A

Bus # 185: 4KVBUSF



185

Unit 1 LOCA with full transfer, Morro Bay-Gates #1 or #2 line out of service, pretransfer 230 kV voltage at 220 kV; Case 4F5, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

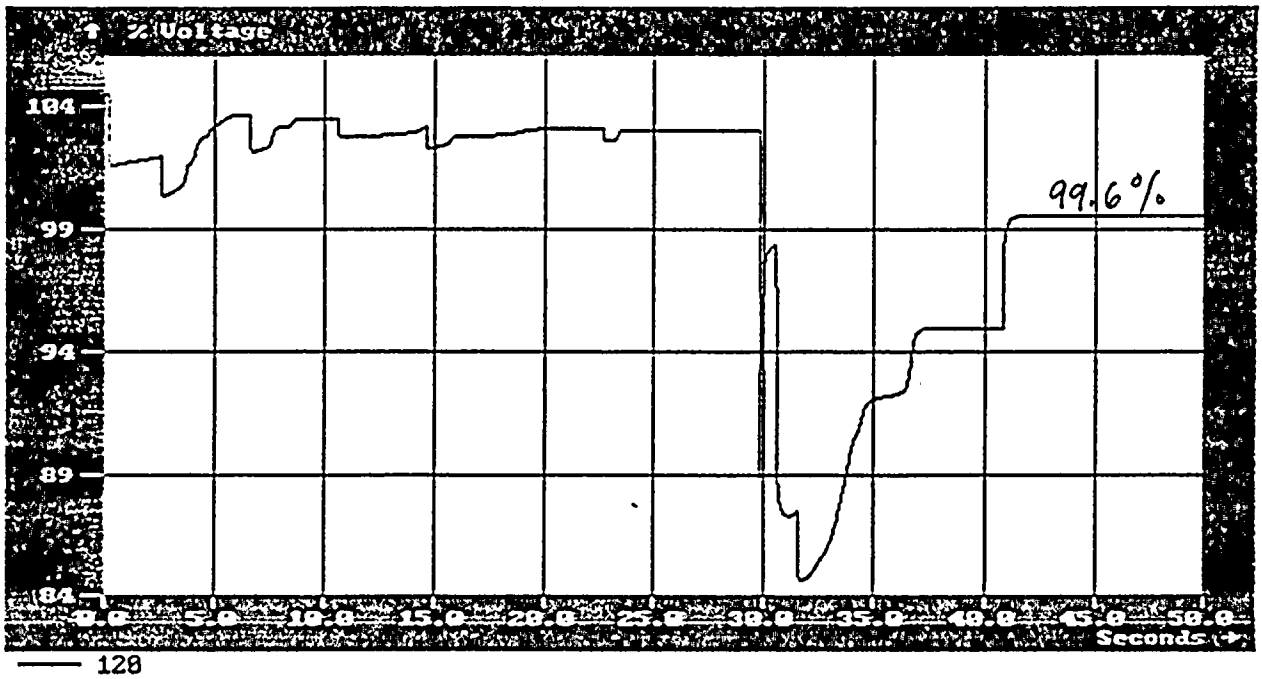
Study Case: TB4-4F5

Page: 1
Date: 05-12-1998
SN: 31992-PG&E
File: 023-4F5

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 220kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-GATES #1 OR #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-4F5 Plot Filename: 4F5

Bus # 120: 12KVSU1



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Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

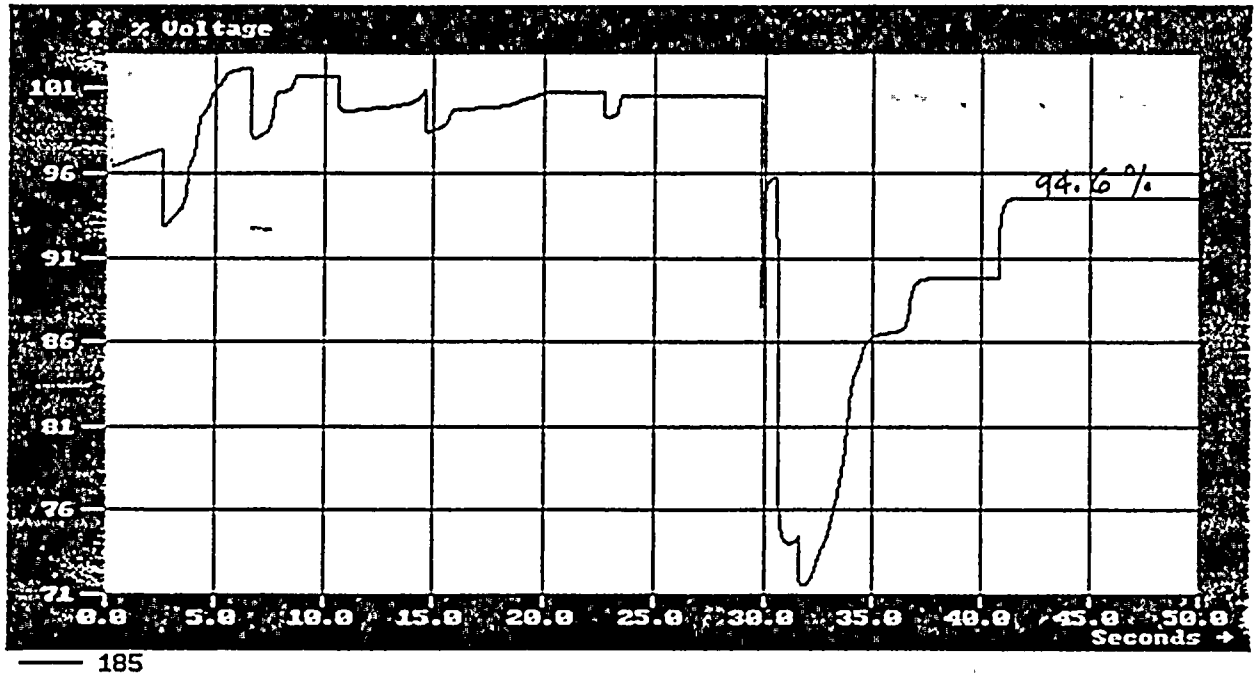
Study Case: TB4-4F5

Page: 1
Date: 05-12-1998
SN: 31992-PG&E
File: 023-4F5

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 220kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-GATES #1 OR #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-4F5 Plot Filename: 4P5

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-Midway #1 or #2 line out of service, pretransfer 230 kV voltage at 220 kV; Case 4F6, Calc 359-DC

TRANSIENT STABILITY PLOTS

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

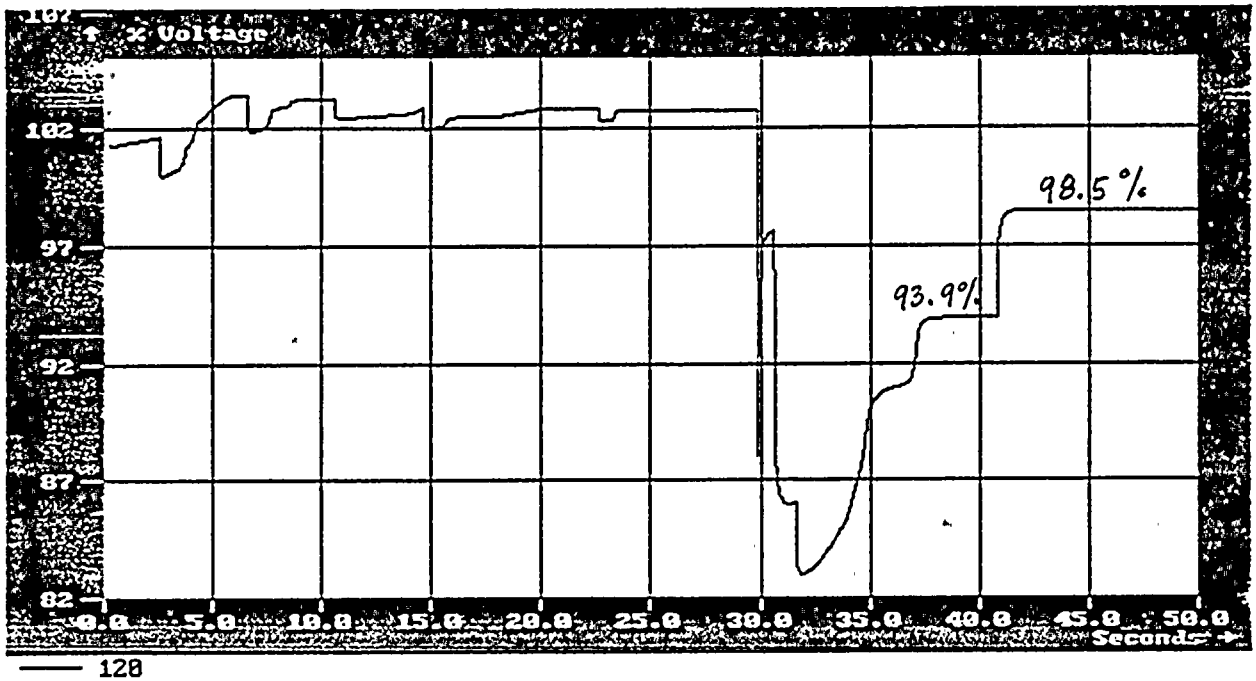
Study Case: TB4-4F6

Page: 1
Date: 05-12-1998
SN: 31992-PG&E
File: 023-4F6

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 220kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-MIDWAY #1 OR #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-4F6 Plot Filename: 4F6

Bus # 120: 12KVSU1



120

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

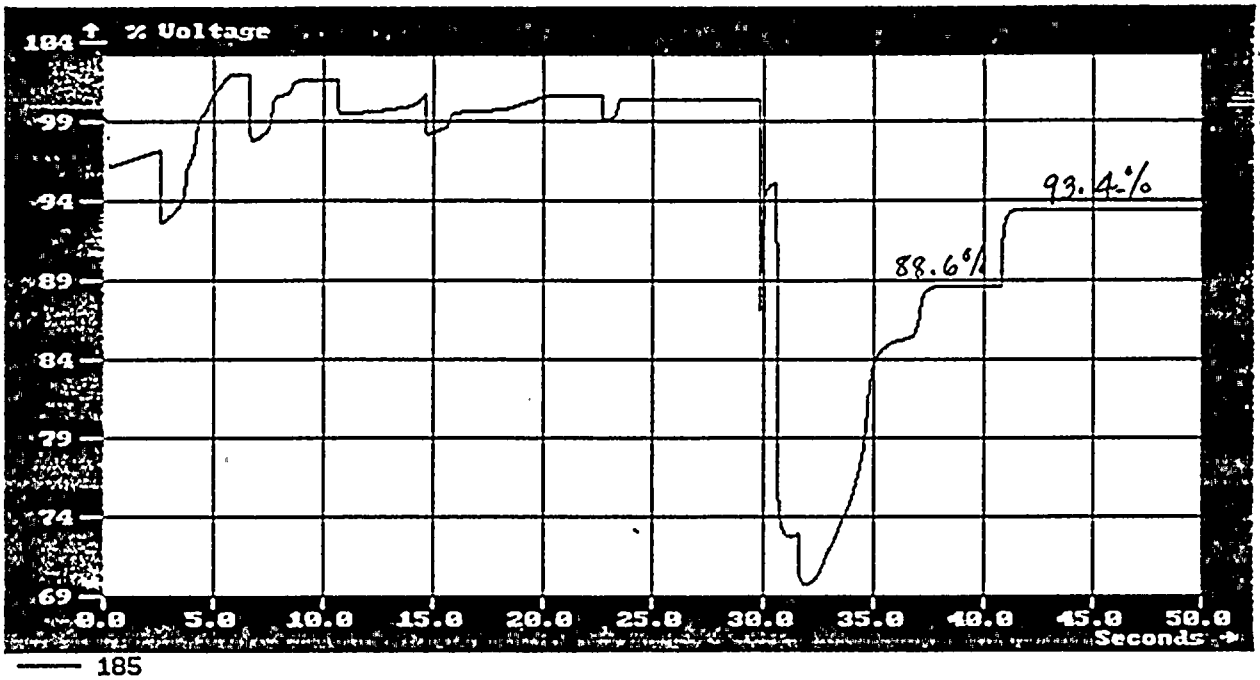
ETAP 7.3N2
Study Case: TB4-4F6

Page: 1
Date: 05-12-1998
SN: 31992-PG&E
File: 023-4F6

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 220kV GRID VOLTS
MORRO BAY OFFLINE, MORRO BAY-MIDWAY #1 OR #2 LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-4F6 Plot Filename: 4F6

Bus # 185: 4KVBUSF



185

Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 220 kV, Case 5F2A, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

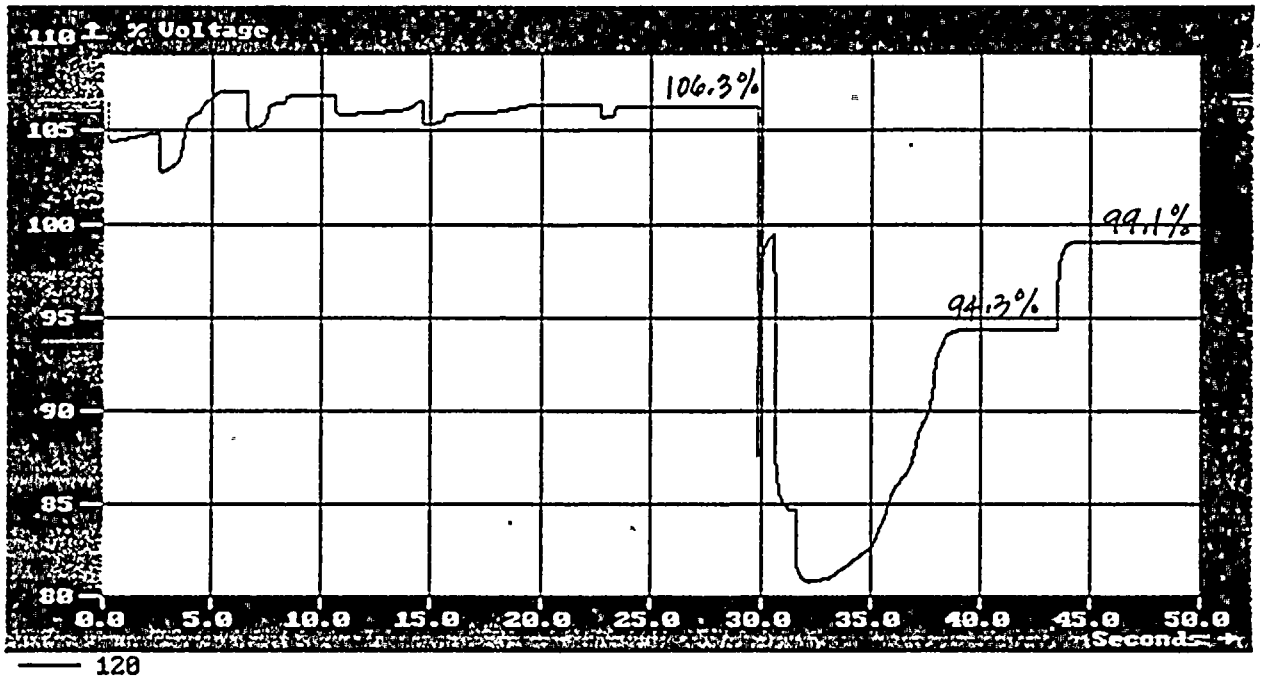
Study Case: TB5-5F2A

Page: 1
Date: 05-13-1998
SN: 31992-PG&E
File: 023-5F2A

NIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 220kV GRID VOLTS (0.72 Z)
ORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-5F2A Plot Filename: 5F2A

Bus # 120: 12KVSU1



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base605A
Engineer: Duke Engineering & Services

ETAP 7.3N2

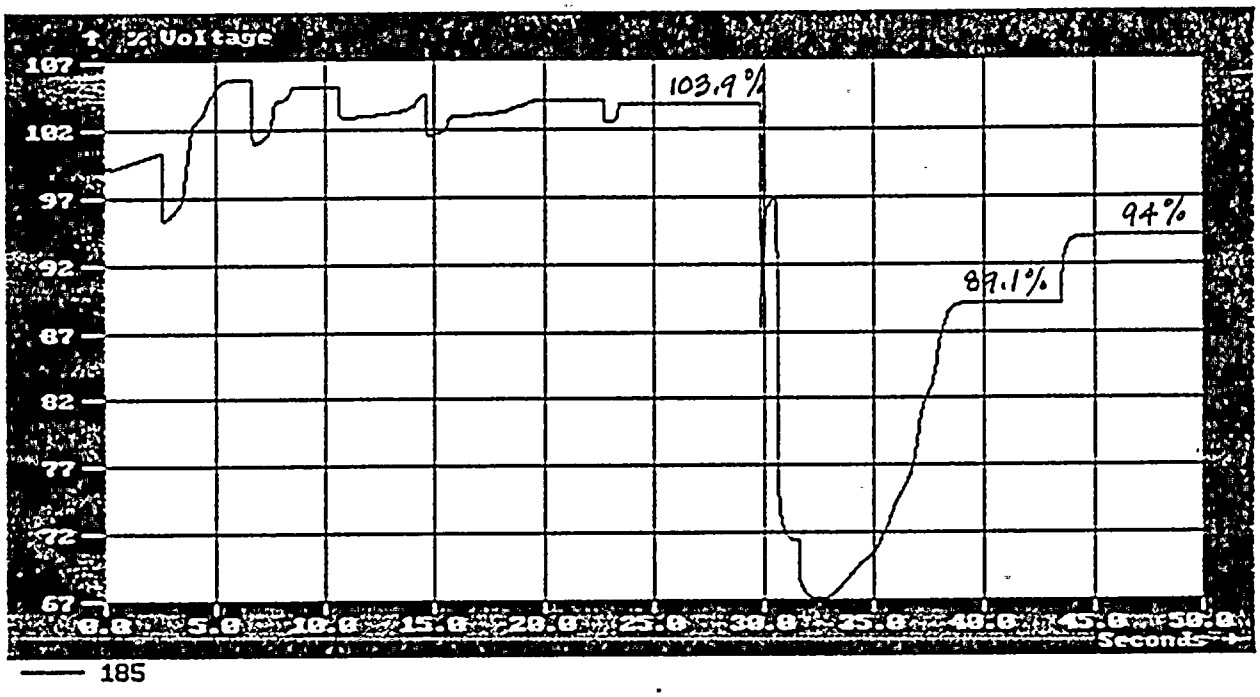
Study Case: TB5-5F2A

Page: 1
Date: 05-13-1998
SN: 31992-PG&E
File: 023-5F2A

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 220kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13 & START COND TRAIN #12

Data Filename: 023-5F2A Plot Filename: 5F2A

Bus # 185: 4KVBUSF



Unit 1 LOCA with full transfer, Morro Bay-DCPP line out of service, pretransfer 230 kV voltage at 217 kV; Case 5F2B, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: Base 605
Engineer: Duke Engineering & Services

ETAP 7.3N2

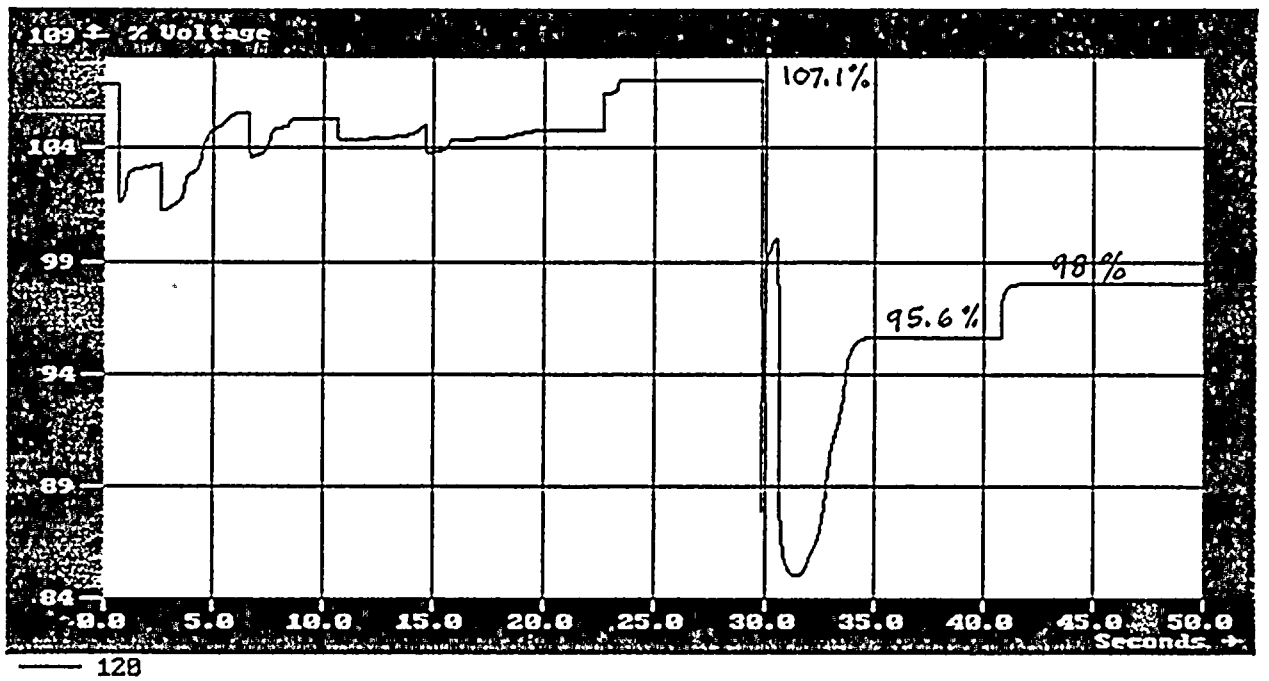
Study Case: TB5-5F2B

Page: 1
Date: 05-13-1998
SN: 31992-PG&E
File: 023-5F2B

UNIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 217kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13, BLOCK START COND TRAIN #12

Data Filename: 023-5F2B Plot Filename: 5F2B

Bus # 120: 12KVSU1



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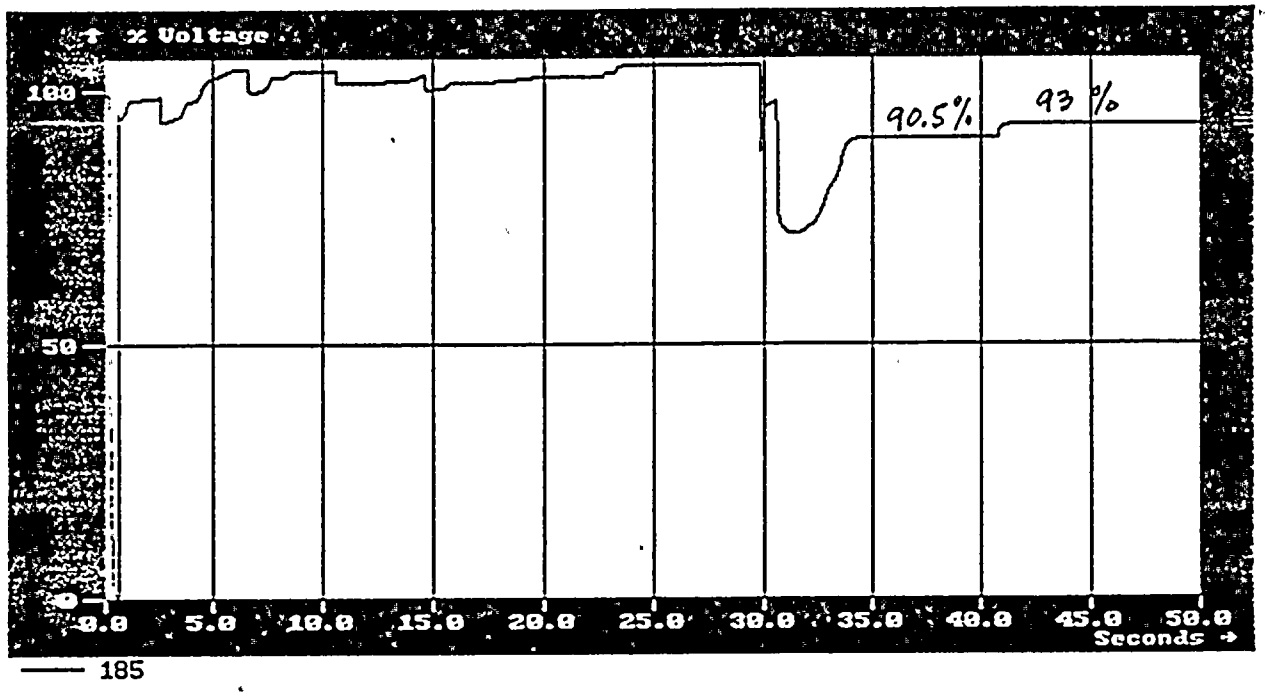
Project: DIABLO CANYON | ETAP 7.3N2 | Page: 1
Location: Pacific Gas & Electric | Date: 05-13-1998
Contract: Base 605 | SN: 31992-PG&E
Engineer: Duke Engineering & Services | Study Case: TB5-5F2B | File: 023-5F2B

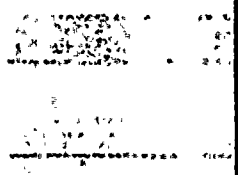
NIT 1 LOCA W/FULL XFR, UNIT 2 COLD SHUTDOWN, 217kV GRID VOLTS (0.72 Z)
MORRO BAY OFFLINE, MB-DCPP LINE OUT, XFR COND TRAINS #11 & #13, BLOCK START COND TRAIN #12

Data Filename: 023-5F2B Plot Filename: 5F2B

Bus # 185: 4KVBUSF



Unit 1 LOCA with partial transfer, DCPP-Mesa line out of service, pretransfer 230 kV voltage at 218 kV; Case 5P4, Calc 359-DC



Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: BASE610
Engineer: Duke Engineering & Services

ETAP 7.3N2

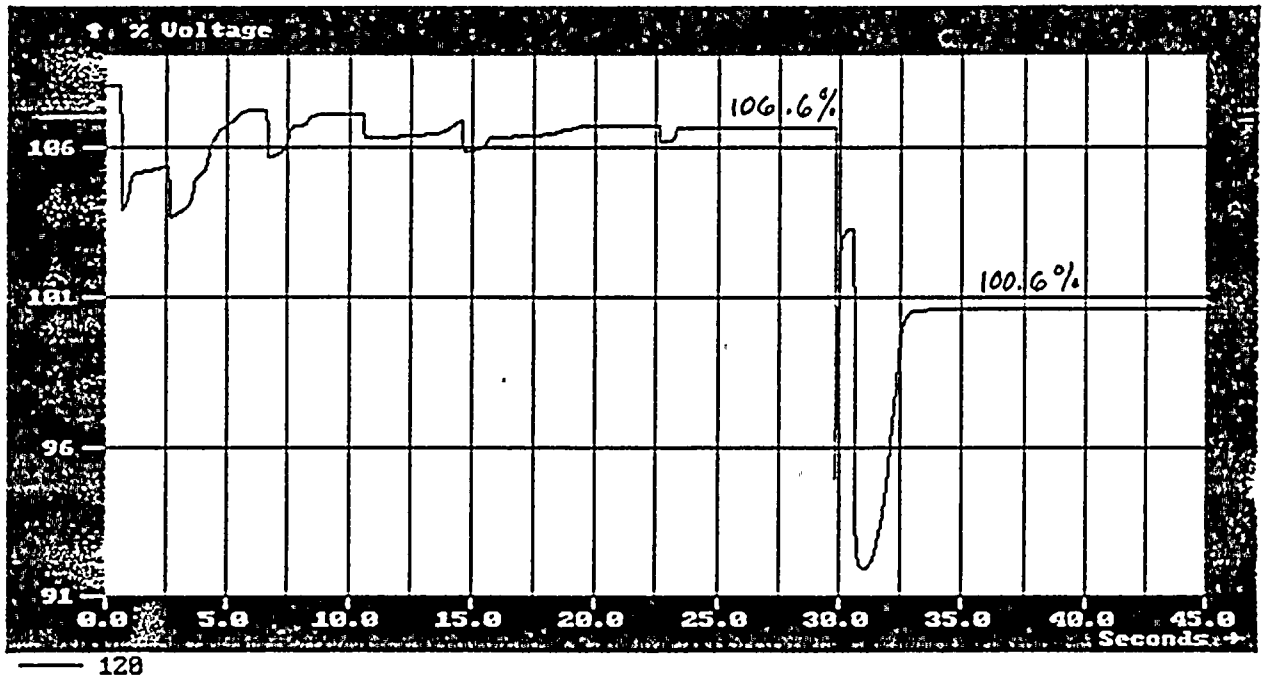
Study Case: 023-5P4

Page: 1
Date: 05-14-1998
SN: 31992-PG&E
File: 023-5P4

NIT 1 LOCA W/PARTIAL XFR, UNIT 2 COLD SHUTDOWN, 218kV GRID VOLTS, WITH COMP ACTION 1 & 2
MORRO BAY OFFLINE, DIABLO-MESA LINE OUT, XFR COND TRAINS #11 & #13, BLOCK START COND TRAIN #12 & BLOCK ONE 12KV BUS

Data Filename: 023-5P4 Plot Filename: 5P4

Bus # 120: 12KVSU1

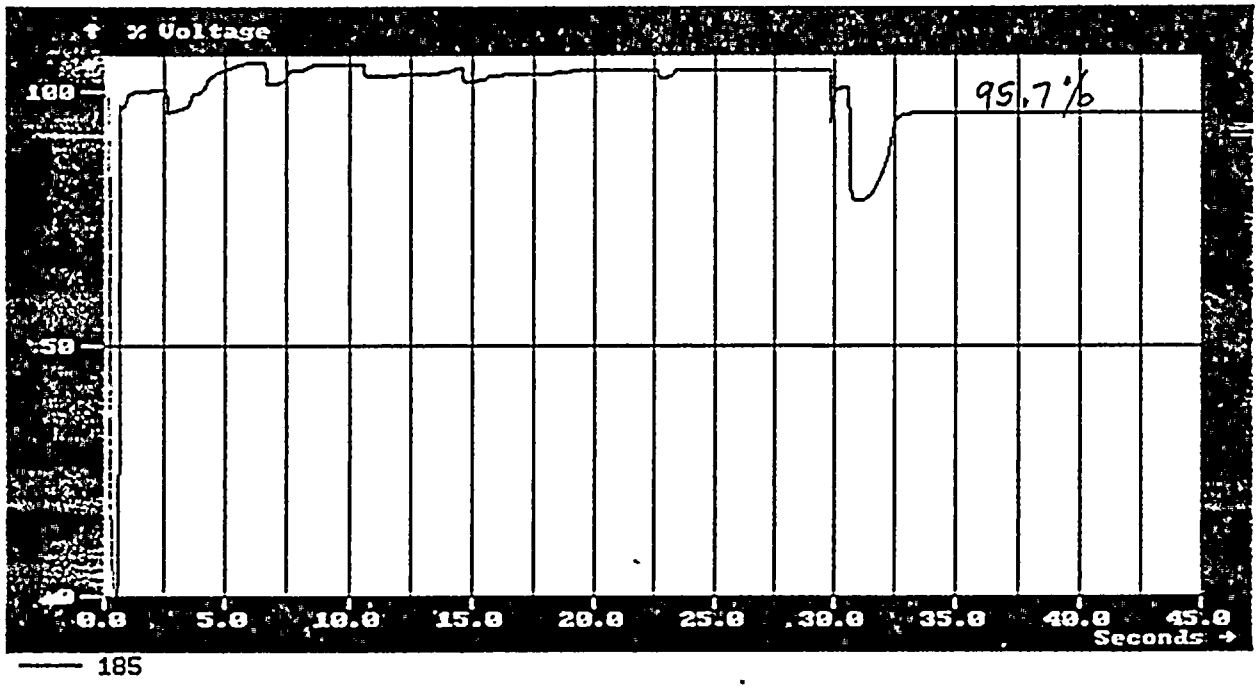


Project: DIABLO CANYON | ETAP 7.3N2 | Page: 1
Location: Pacific Gas & Electric | Date: 05-14-1998
Contract: BASE610 | SN: 31992-PG&E
Engineer: Duke Engineering & Services | Study Case: 023-5P4 | File: 023-5P4

UNIT 1 LOCA W/PARTIAL XFR, UNIT 2 COLD SHUTDOWN, 218kV GRID VOLTS, WITH COMP ACTION 1 & 2
MORRO BAY OFFLINE, DIABLO-MESA LINE OUT, XFR COND TRAINS #11 & #13, BLOCK START COND TRAIN #12 & BLOCK ONE 12KV BUS

Data Filename: 023-5P4 Plot Filename: 5P4

Bus # 185: 4KVBUSF



Unit 1 LOCA with partial transfer, Morro Bay-Midway #1 or #2 line out of service, pretransfer 230 kV voltage at 216 kV; Case 5P6, Calc 359-DC

Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: BASE610
Engineer: Duke Engineering & Services

ETAP 7.3N2

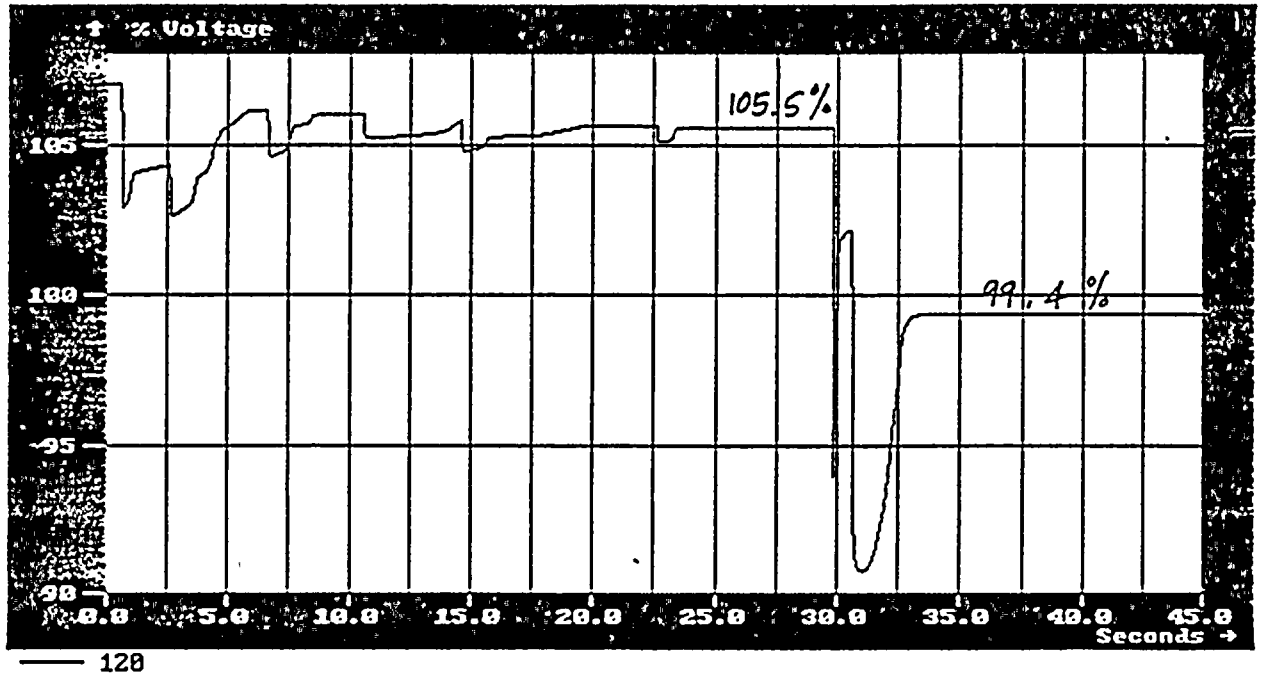
Study Case: 023-5P6

Page: 1
Date: 05-14-1998
SN: 31992-PG&E
File: 023-5P6

UNIT 1 LOCA W/PARTIAL XFR, UNIT 2 COLD SHUTDOWN, 216kV GRID VOLTS, WITH COMP ACTION 1 & 2
MORRO BAY OFFLINE, MORRO BAY-MIDWAY #1 OR #2 LINE OUT, XFR COND TRAINS #11 & #13, BLOCK CND TRAIN #12 & 1 - 12KV BUS

Data Filename: 023-5P6 Plot Filename: 5P6

Bus # 120: 12KVSU1



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Project: DIABLO CANYON
Location: Pacific Gas & Electric
Contract: BASE610
Engineer: Duke Engineering & Services

ETAP 7.3N2

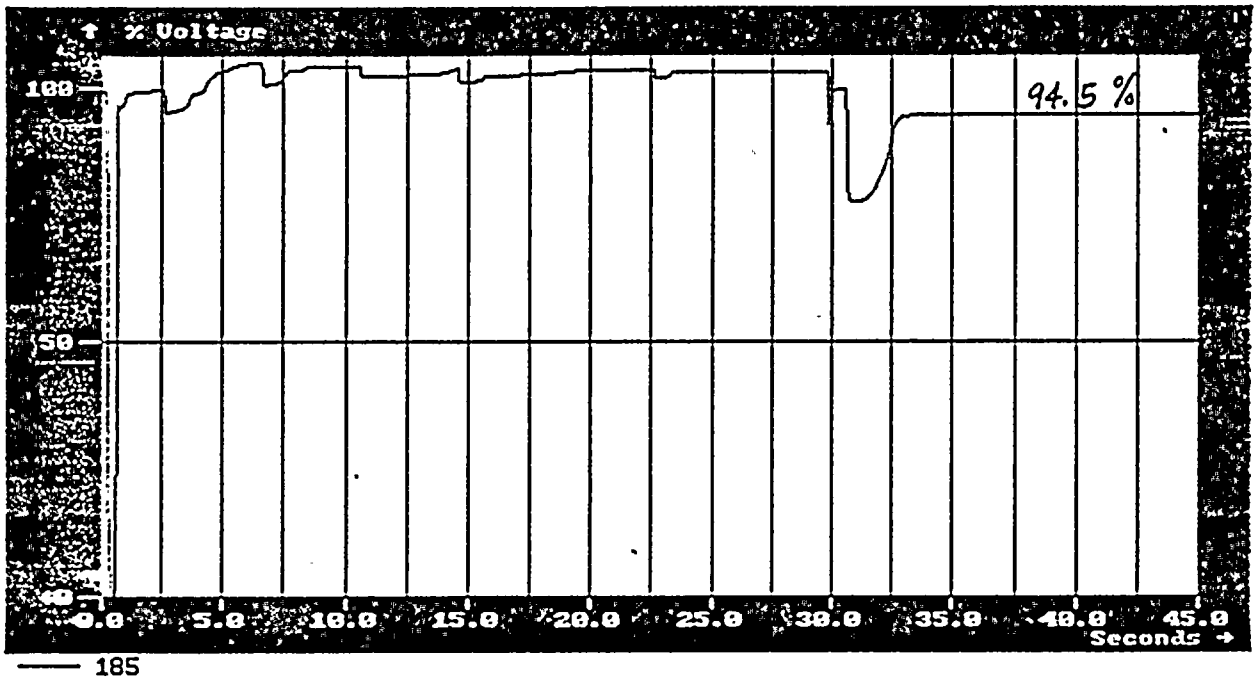
Study Case: 023-5P6

Page: 1
Date: 05-14-1998
SN: 31992-PG&E
File: 023-5P6

UNIT 1 LOCA W/PARTIAL XFR, UNIT 2 COLD SHUTDOWN, 216kV GRID VOLTS, WITH COMP ACTION 1 & 2
MORRO BAY OFFLINE, MORRO BAY-MIDWAY #1 OR #2 LINE OUT, XFR COND TRAINS #11 & #13, BLOCK CND TRAIN #12 & 1 - 12KV BUS

Data Filename: 023-5P6 Plot Filename: 5P6

Bus # 185: 4KVBUSF



230 kV Grid Load Flows for Procedure O-23 Case Study with or without Shunt Capacitors in Operation at Diablo Canyon and Mesa

O-23 Case Study with Diablo Canyon and Mesa Shunt Capacitor - TABLE III

Cap Settings used in the study
Diablo on - 231 kV
Mesa on - 228 kV

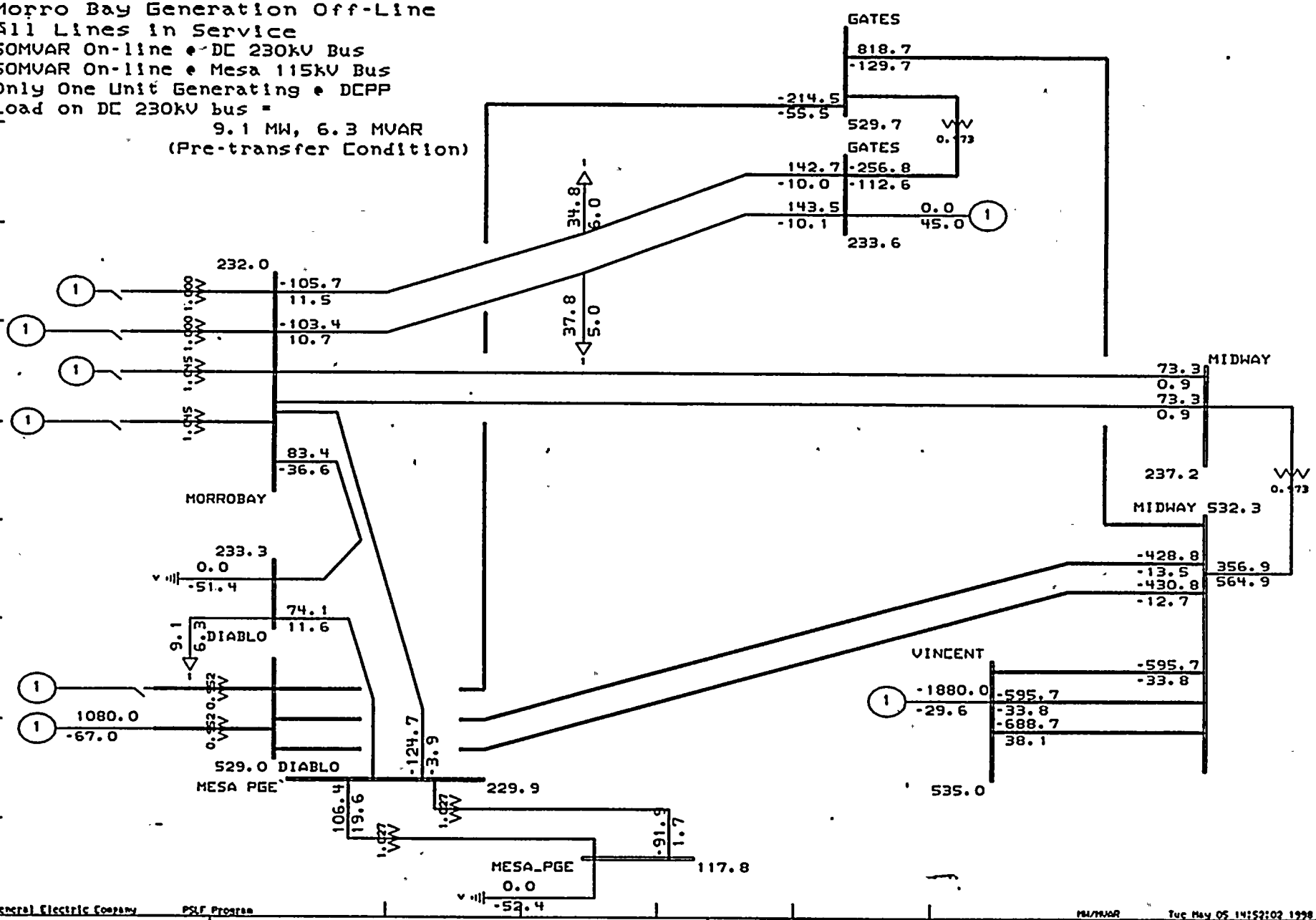
Diablo off - 238 kV
Mesa Off - 236 kV

Key base Case Assumptions
Shunt Caps at Mesa 115 kV bus and Diablo 230 kV bus on-line
Diablo Canyon single unit trip
Los Padres Area Load = 500 MW, 114 MVAR (excluding DCPP load)
Morro Bay Generation = 0 MW
PG&E Control Area Load = 21;613 MW, 5031 MVAR (load + losses)
North Tie = Swing Bus (below 4,800 MW)
South Tie = -1,880

Steady-State Voltages Diablo 230 kV Bus Load

Line Outages	Pre-transfer			Full transfer			Reduced transfer		
	9.3 MW, 6.1 MVAR			56.5 MW, 40.3 MVAR			40.8 MW, 29.5 MVAR		
	Morro Bay	Diablo	Mesa	Morro Bay	Diablo	Mesa	Morro Bay	Diablo	Mesa
All line in service	231.95	233.25	229.88	228.14	227.34	224.42	229.44	229.36	226.34
Morro Bay - Diablo 230 kV	231.00	237.40	230.69	225.64	217.29	217.07	227.55	224.29	221.83
Morro Bay - Mesa 230 kV	229.32	227.76	218.67	225.00	220.91	211.60	226.47	223.20	213.92
Diablo - Mesa 230 kV	230.42	232.85	223.62	226.59	226.76	218.31	227.86	228.77	220.05
Morro Bay - Gates 230 kV	230.50	231.70	228.10	225.00	223.90	220.40	226.70	226.30	222.60
Morro Bay - Midway 230 kV	228.06	229.08	225.17	222.53	221.24	217.48	224.38	223.84	220.00
Morro Bay - Gates 1 & 2 (line down on Morro Bay side)	225.32	226.04	221.50	215.01	213.38	209.28	218.66	217.78	213.46
Morro Bay - Midway 1 & 2, 230 kV lines	218.28	218.17	213.75	207.47	205.54	201.30	211.33	210.21	205.74
Morro Bay - Mesa & Diablo - Mesa 230 kV lines	222.90	225.20	-	217.30	217.40	-	219.60	220.30	-

Los Padres Total Area Load = 512.0 (121.9)
Morro Bay Generation Off-Line
All Lines in Service
50MVAR On-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
9.1 MW, 6.3 MVAR
(Pre-transfer Condition)



General Electric Company PSLF Program MW/MVAR Tue May 05 14:52:02 1998

GENERAL ELECTRIC COMPANY

SYSTEM OPERATION
MASTER NETWORK BASECASE

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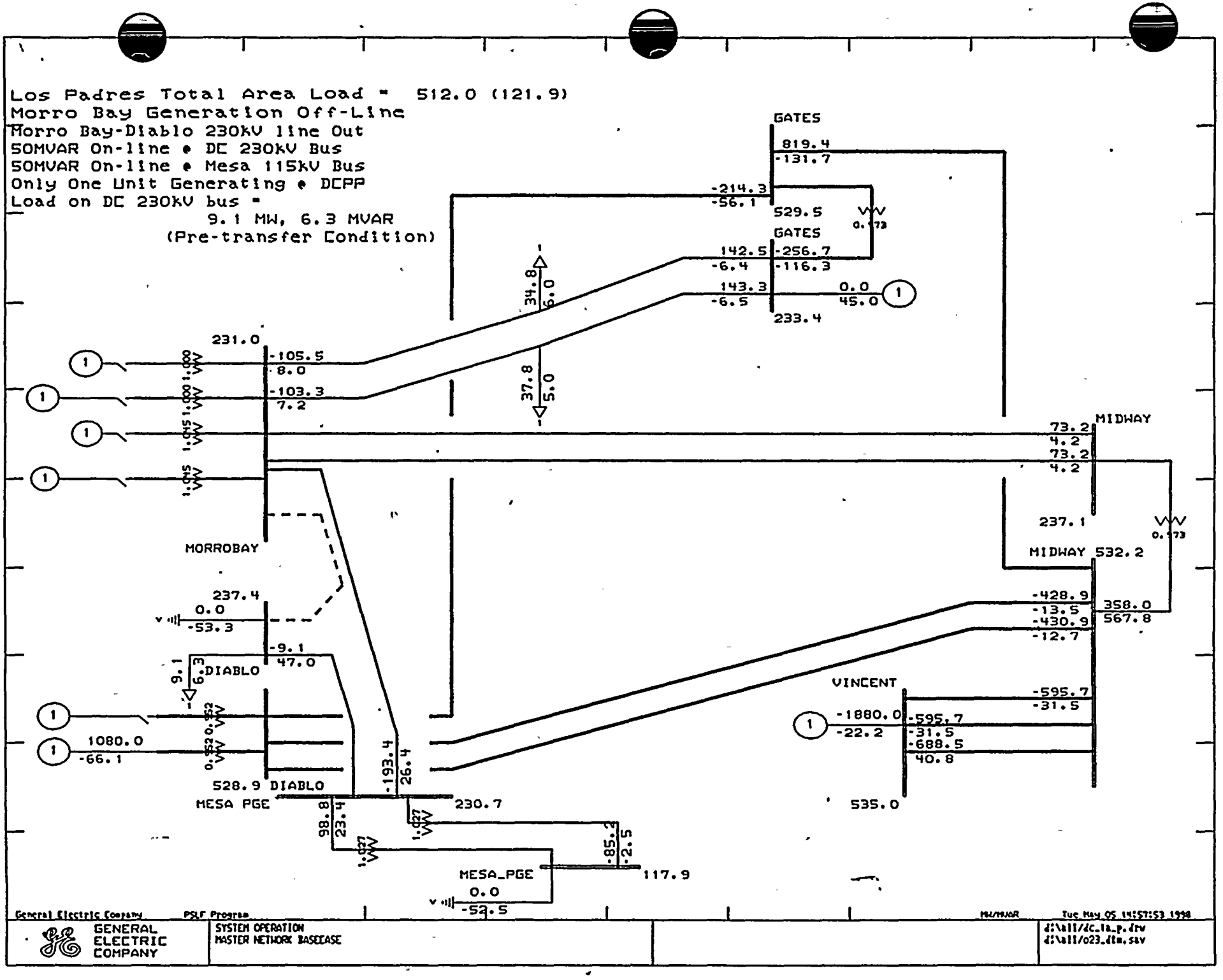
Los Padres Total Area Load = 512.0 (121.9)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR On-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
9.1 MW, 6.3 MVAR
(Pre-transfer Condition)
GATES
819.4
-131.7
-214.3
-56.1
529.5
0.173
GATES
142.5
-256.7
-6.4
-116.3
143.3
-6.5
0.0
45.0
233.4
34.8
6.0
37.8
5.0
231.0
-105.5
8.0
-103.3
7.2
MIDWAY
73.2
4.2
73.2
4.2
237.1
0.173
MIDWAY 532.2
MORROBAY
237.4
0.0
-53.3
-9.1
47.0
9.1
6.3
DIABLO
-428.9
-13.5
358.0
-430.9
567.8
-12.7
VINCENT
-595.7
-31.5
-1880.0
-22.2
-595.7
-31.5
-688.5
40.8
535.0
1080.0
-66.1
528.9 DIABLO
-193.4
26.4
MESA PGE
230.7
98.8
23.4
-85.2
2.5
117.9
MESA_PGE
0.0
-52.5
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 14:57:53 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
MASTER NETWORK BASECASE
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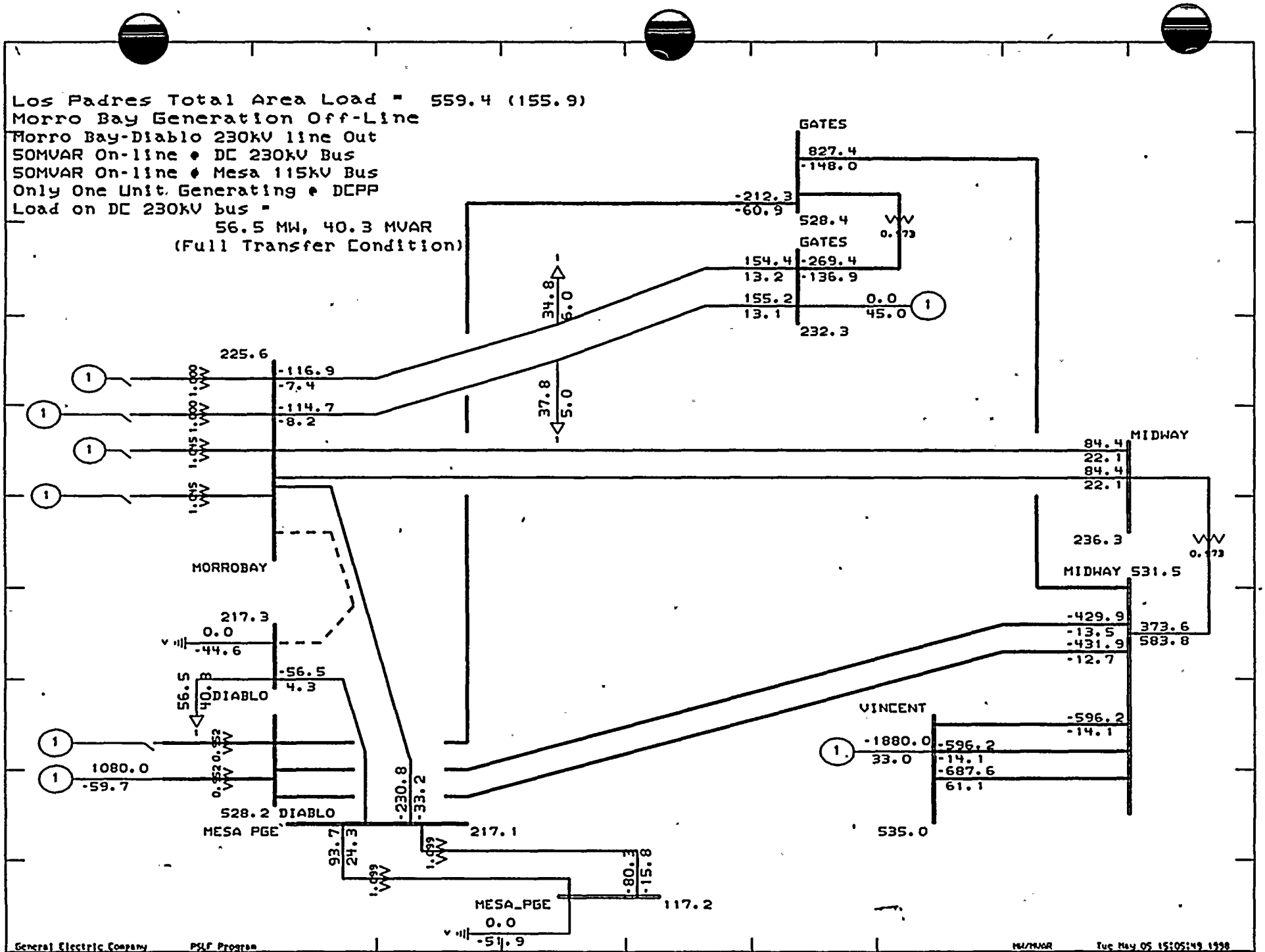
Los Padres Total Area Load = 559.4 (155.9)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR On-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
56.5 MW, 40.3 MVAR
(Full Transfer Condition)
GATES
827.4
-148.0
-212.3
-60.9
528.4
GATES
154.4
13.2
-269.4
-136.9
155.2
13.1
0.0
45.0
232.3
34.8
6.0
37.8
5.0
225.6
-116.9
-7.4
-114.7
-8.2
MIDWAY
84.4
22.1
84.4
22.1
236.3
MIDWAY 531.5
MORROBAY
217.3
0.0
-44.6
-56.5
4.3
56.5
40.8
DIABLO
-429.9
-13.5
373.6
-431.9
583.8
-12.7
VINCENT
-596.2
-14.1
-1880.0
33.0
-596.2
-14.1
-687.6
61.1
535.0
1080.0
-59.7
528.2 DIABLO
MESA PGE
-230.8
-33.2
217.1
93.7
24.3
-80.3
-15.8
117.2
MESA_PGE
0.0
-51.9
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 15:05:49 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
MASTER NETWORK BASECASE
d:\all/dc_ib_f.drw
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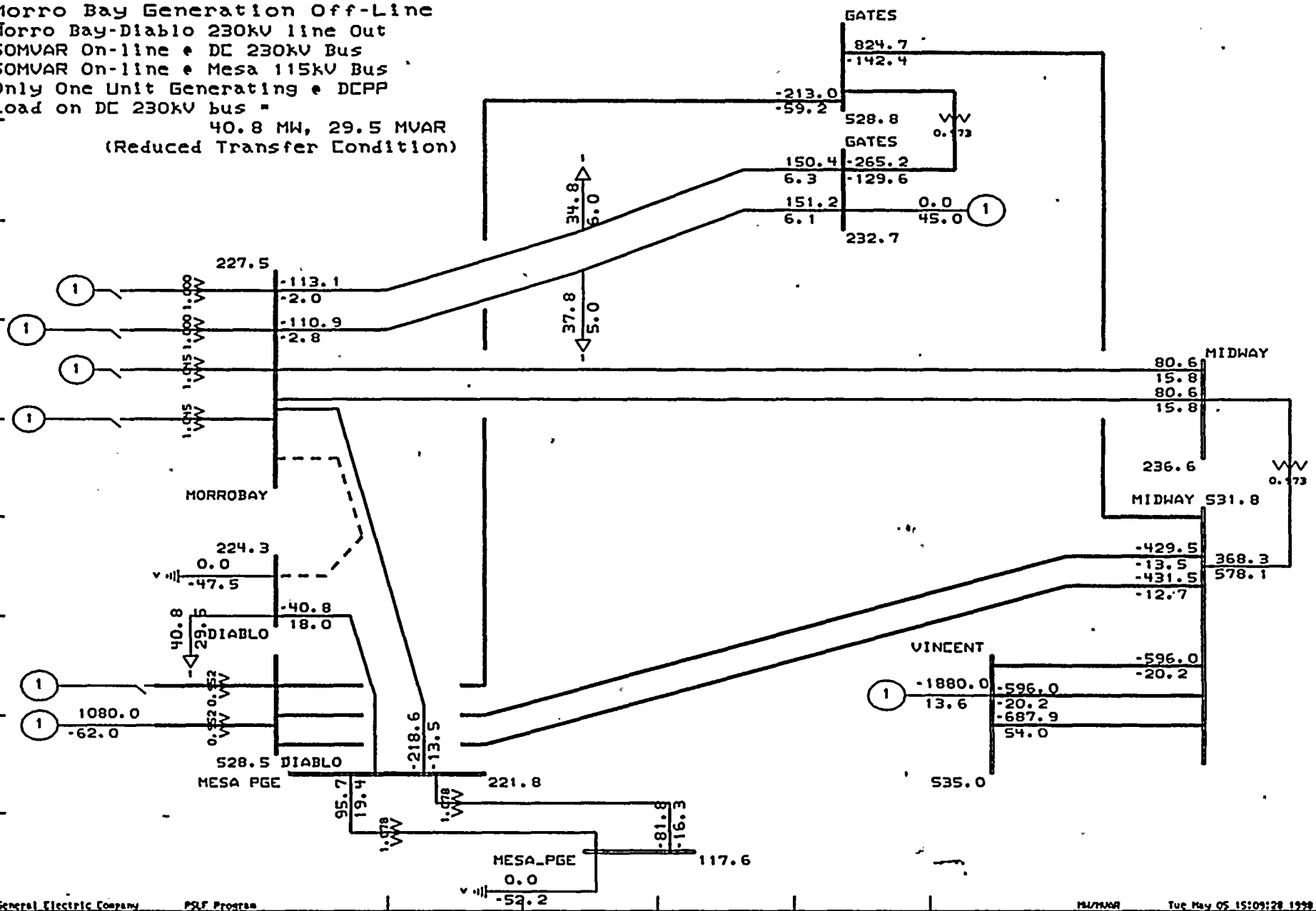
Los Padres Total Area Load = 543.7 (145.1)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR On-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
40.8 MW, 29.5 MVAR
(Reduced Transfer Condition)



General Electric Company PSLF Program MW/MVAR Tue May 05 15:09:28 1998

GENERAL ELECTRIC COMPANY	SYSTEM OPERATION MASTER NETWORK BASECASE		d:\all/dc_18_r.drw d:\all/023_dtm.sav

O-23 Case Study with Diablo Canyon and Mesa Shunt Capacitor - TABLE IV

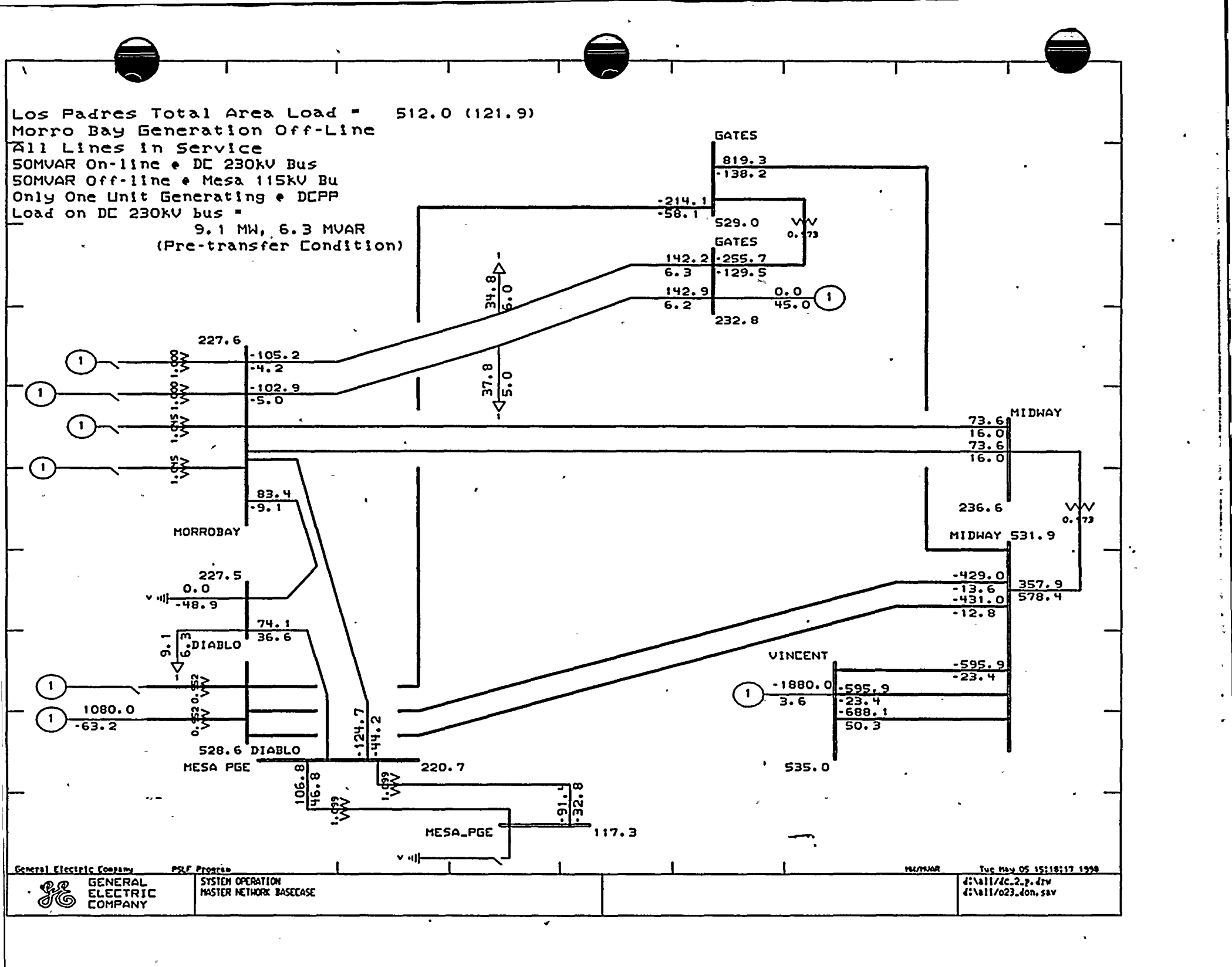
Cap Settings used in the study
Diablo on - 231 kV
Mesa on - 228 kV

Diablo off - 238 kV
Mesa Off - 236 kV

Key base Case Assumptions
Shunt Caps at Mesa 115 kV bus off-line and at Diablo 230 kV bus on-line
Diablo Canyon single unit trip
Los Padres Area Load = 500 MW, 114 MVAR (excluding DCPP load)
Morro Bay Generation = 0 MW
PG&E Control Area Load = 21,613 MW, 5031 MVAR (load + losses)
North Tie = Swing Bus (below 4,800 MW)
South Tie = -1,880

Steady-State Voltages **Diablo 230 kV Bus Load**

Line Outages	Pre-transfer			Full transfer			Reduced transfer		
	9.3 MW, 6.1 MVAR			56.5 MW, 40.3 MVAR			40.8 MW, 29.5 MVAR		
	Morro Bay	Diablo	Mesa	Morro Bay	Diablo	Mesa	Morro Bay	Diablo	Mesa
All line in service	227.64	227.49	220.72	223.77	221.69	215.94	225.07	223.63	217.56
Morro Bay - Diablo 230 kV	226.50	224.86	218.61	220.99	206.72	207.2	222.94	213.09	211.25
Morro Bay - Mesa 230 kV	224.92	221.20	206.96	220.43	214.18	199.90	221.94	216.53	202.28
Diablo - Mesa 230 kV	226.13	228.50	213.37	222.31	222.37	209.28	223.57	224.40	210.64
Morro Bay - Gates 230 kV	224.70	224.50	217.70	219.20	217.00	211.10	221.10	219.50	213.30
Morro Bay - Midway 230 kV	222.44	222.16	215.31	216.81	214.48	208.58	218.07	217.05	210.84
Morro Bay - Gates 1 & 2 (line down on Morro Bay side)	215.95	215.46	208.33	204.52	201.64	195.28	208.59	206.53	199.94
Morro Bay - Midway 1 & 2, 230 kV lines	209.33	208.68	201.44	197.13	193.94	187.40	201.57	199.26	192.53
Morro Bay - Mesa & Diablo - Mesa 230 kV lines	226.7	229.1	-	222.5	222.5	-	223.9	224.7	-


Los Padres Total Area Load = 512.0 (121.9)
Morro Bay Generation Off-Line
All Lines in Service
50MVAR On-line @ DC 230kV Bus
50MVAR Off-line @ Mesa 115kV Bu
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
9.1 MW, 6.3 MVAR
(Pre-transfer Condition)
GATES
819.3
-138.2
-214.1
-58.1
529.0
GATES
142.2
6.3
-255.7
-129.5
142.9
6.2
0.0
45.0
232.8
34.8
6.0
37.8
5.0
227.6
-105.2
-4.2
-102.9
-5.0
MORROBAY
83.4
-9.1
227.5
0.0
-48.9
74.1
36.6
DIABLO
9.1
6.3
1080.0
-63.2
528.6 DIABLO
MESA PGE
-124.7
-44.2
220.7
106.8
46.8
-91.4
-32.8
MESA_PGE
117.3
MIDWAY
73.6
16.0
73.6
16.0
236.6
MIDWAY 531.9
-429.0
-13.6
357.9
-431.0
578.4
-12.8
VINCENT
-595.9
-23.4
-1880.0
3.6
-595.9
-23.4
-688.1
50.3
535.0
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 15:18:17 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
MASTER NETWORK BASECASE
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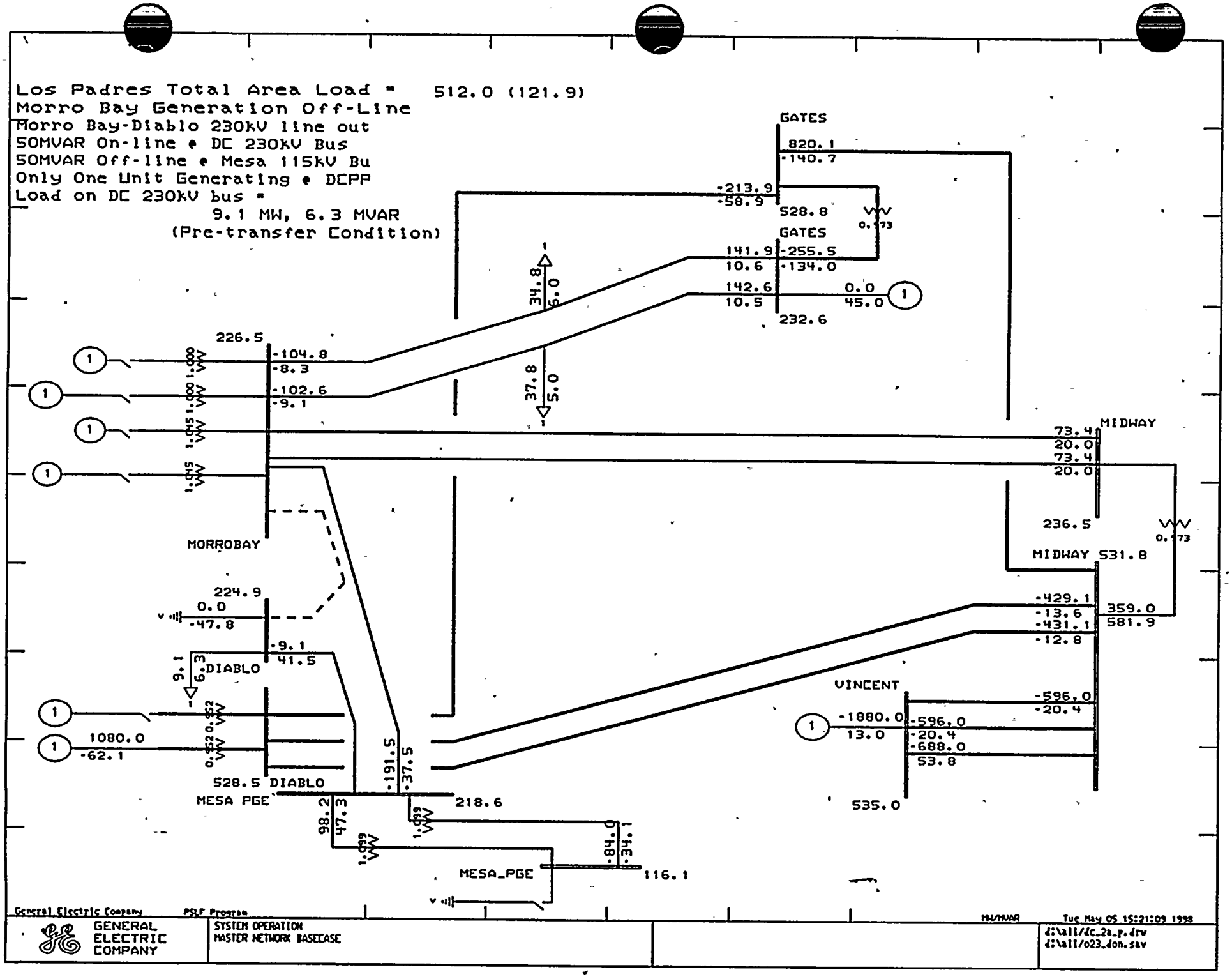
Los Padres Total Area Load = 512.0 (121.9)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line out
50MVAR On-line @ DC 230kV Bus
50MVAR Off-line @ Mesa 115kV Bu
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
9.1 MW, 6.3 MVAR
(Pre-transfer Condition)
GATES
820.1
-140.7
-213.9
-58.9
528.8
GATES
141.9
-255.5
10.6
-134.0
142.6
10.5
0.0
45.0
232.6
34.8
6.0
37.8
5.0
226.5
-104.8
-8.3
-102.6
-9.1
MORROBAY
MIDWAY
73.4
20.0
73.4
20.0
236.5
MIDWAY 531.8
224.9
0.0
-47.8
-9.1
41.5
9.1
6.3
DIABLO
-429.1
-13.6
359.0
581.9
-431.1
-12.8
VINCENT
-596.0
-20.4
-1880.0
13.0
-596.0
-20.4
-688.0
53.8
1080.0
-62.1
528.5 DIABLO
MESA PGE
-191.5
-37.5
218.6
98.2
47.3
-84.0
-34.1
MESA_PGE
116.1
535.0
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 15:21:09 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
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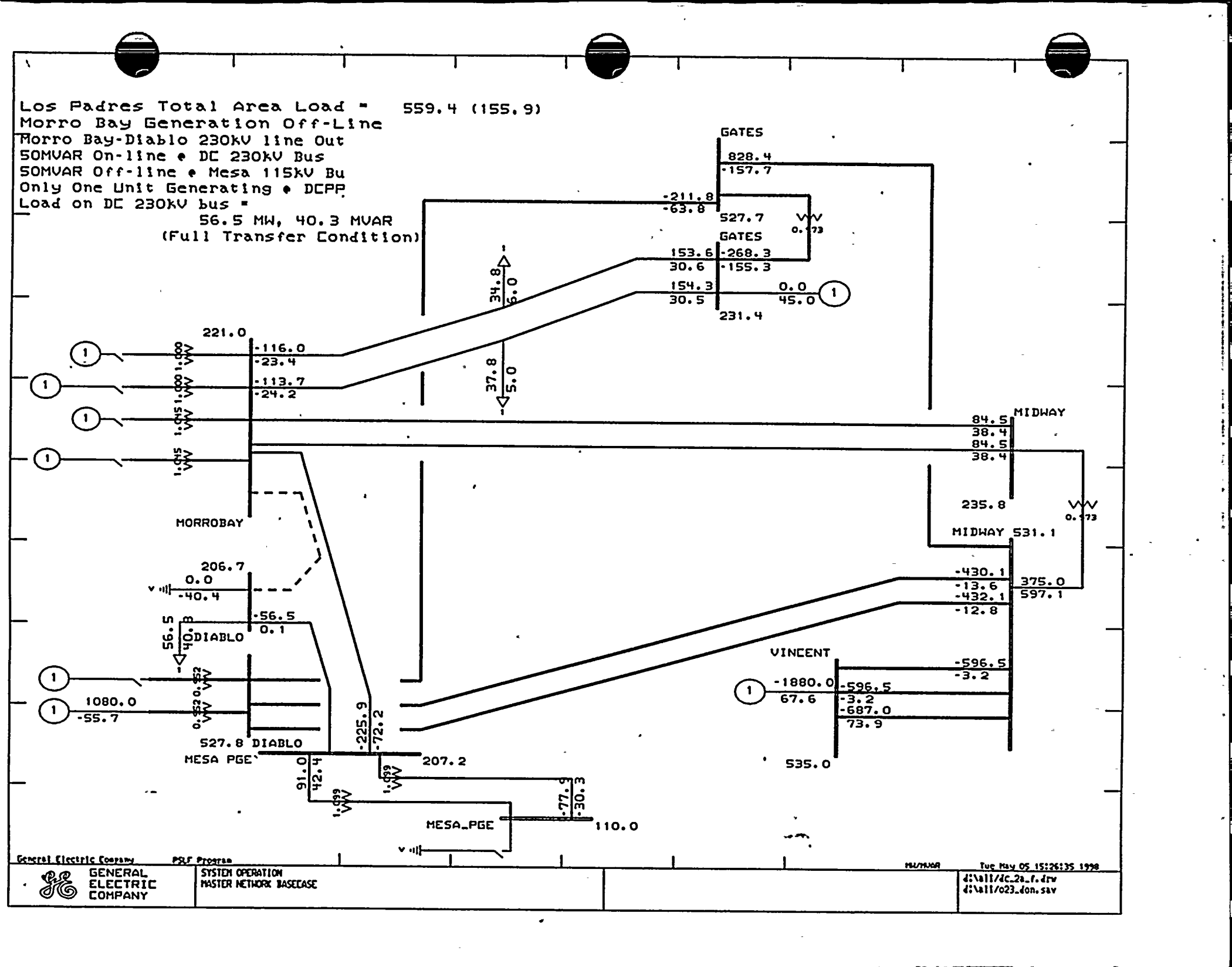
Los Padres Total Area Load = 559.4 (155.9)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR On-line @ DC 230kV Bus
50MVAR Off-line @ Mesa 115kV Bu
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
56.5 MW, 40.3 MVAR
(Full Transfer Condition)
GATES
828.4
-157.7
-211.8
-63.8
527.7
GATES
153.6
30.6
-268.3
-155.3
154.3
30.5
0.0
45.0
231.4
34.8
6.0
37.8
5.0
221.0
-116.0
-23.4
-113.7
-24.2
MORROBAY
MIDWAY
84.5
38.4
84.5
38.4
235.8
MIDWAY 531.1
206.7
0.0
-40.4
-56.5
0.1
56.5
40.3
DIABLO
-430.1
-13.6
-432.1
-12.8
375.0
597.1
VINCENT
-596.5
-3.2
-1880.0
67.6
-596.5
-3.2
-687.0
73.9
535.0
1080.0
-55.7
527.8 DIABLO
-225.9
-72.2
MESA PGE
207.2
91.0
42.4
-77.9
-30.3
MESA_PGE
110.0
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 15:26:35 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
MASTER NETWORK BASECASE
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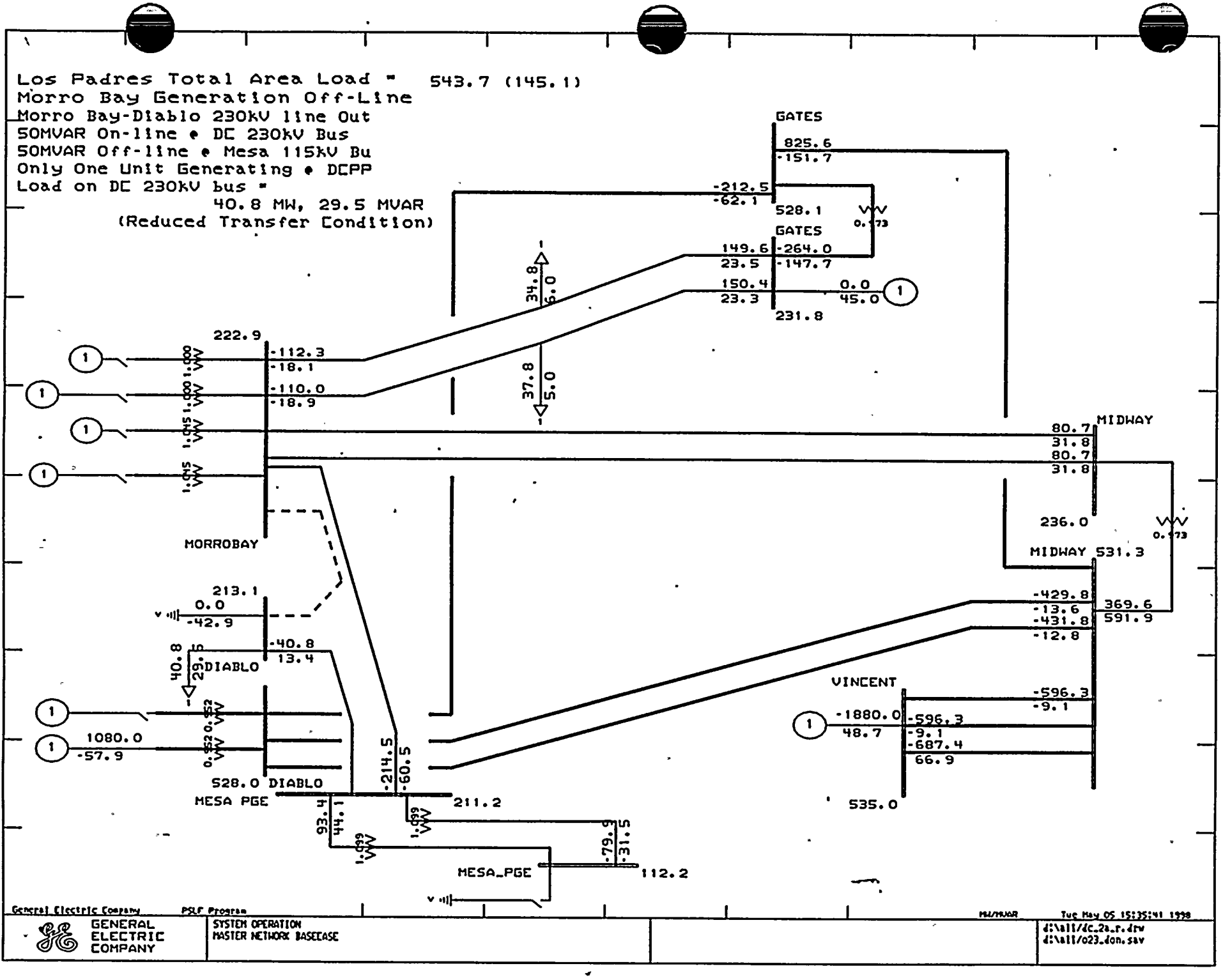

Los Padres Total Area Load = 543.7 (145.1)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR On-line @ DC 230kV Bus
50MVAR Off-line @ Mesa 115kV Bu
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
40.8 MW, 29.5 MVAR
(Reduced Transfer Condition)
GATES
825.6
-151.7
-212.5
-62.1
528.1
0.973
GATES
149.6
-264.0
23.5
-147.7
150.4
23.3
0.0
45.0
231.8
34.8
6.0
37.8
5.0
222.9
-112.3
-18.1
-110.0
-18.9
1.000
1.000
1.015
1.015
MORROBAY
MIDWAY
80.7
31.8
80.7
31.8
236.0
0.973
MIDWAY 531.3
-429.8
-13.6
-431.8
-12.8
369.6
591.9
213.1
0.0
-42.9
-40.8
13.4
40.8
29.0
DIABLO
VINCENT
-596.3
-9.1
-1880.0
48.7
-596.3
-9.1
-687.4
66.9
535.0
1080.0
-57.9
0.952
0.952
528.0 DIABLO
-214.5
-60.5
MESA PGE
211.2
93.4
44.1
1.099
1.099
-79.9
-31.5
MESA_PGE
112.2
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 15:35:41 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
MASTER NETWORK BASECASE
d:\all/dc_2a_r.drw
d:\all/o23_don.sav

O-23 Case Study with Diablo Canyon and Mesa Shunt Capacitor - TABLE V

Cap Settings used in the study
Diablo on - 231 kV
Mesa on - 228 kV

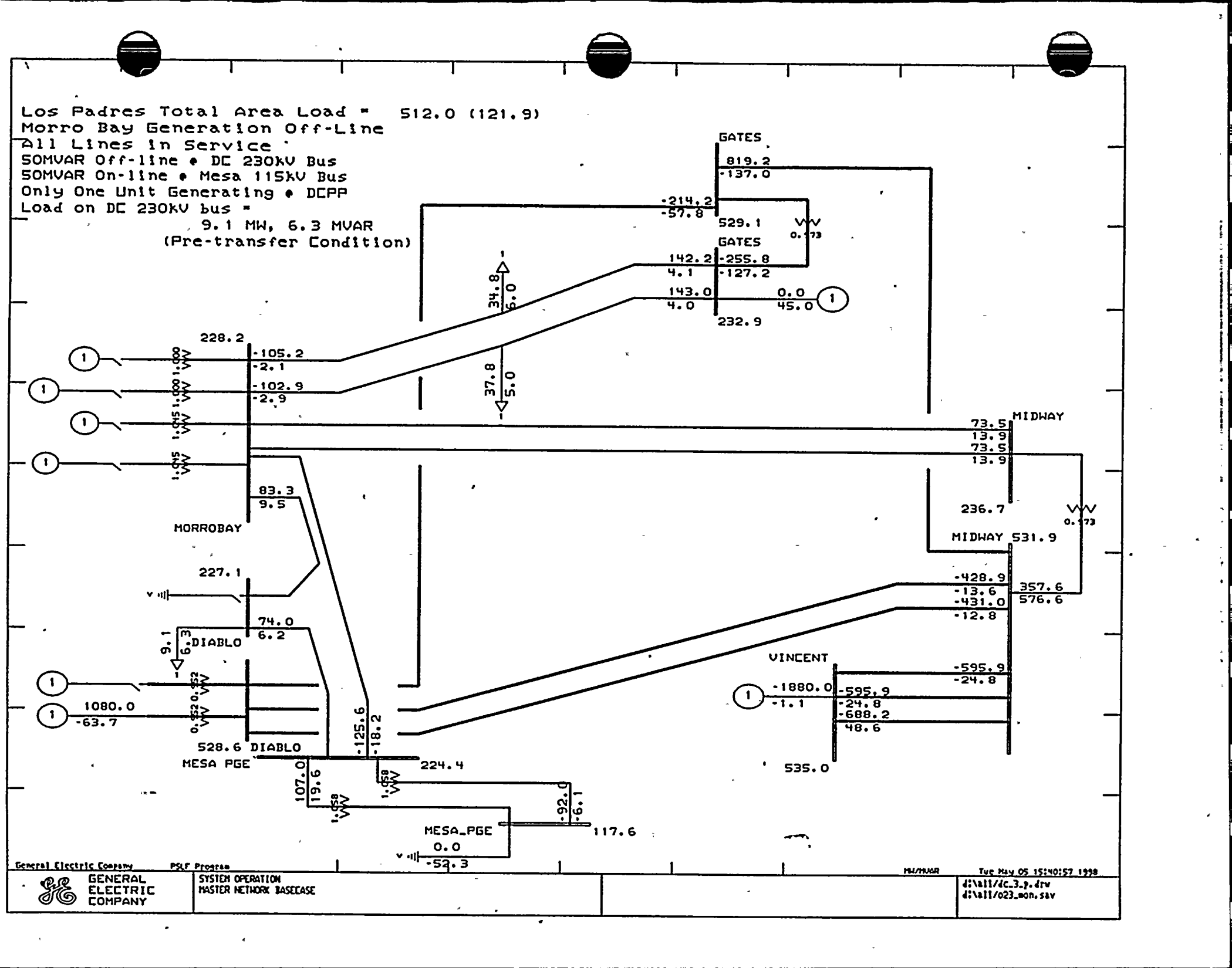
Diablo off - 238 kV
Mesa off - 236 kV

Key base Case Assumptions
Shunt Caps at Mesa 115 kV bus on-line and at Diablo 230 kV bus off-line
Diablo Canyon single unit trip
Los Padres Area Load = 500 MW, 114 MVAR (excluding DCPP load)
Morro Bay Generation = 0 MW
PG&E Control Area Load = 21,613 MW, 5031 MVAR (load + losses)
North Tie = Swing Bus (below 4,800 MW)
South Tie = -1,880

Steady-State Voltages Diablo 230 kV Bus Load

Line Outages	Pre-transfer			Full transfer			Reduced transfer		
	9.3 MW, 6.1 MVAR			56.5 MW, 40.3 MVAR			40.8 MW, 29.5 MVAR		
	Morro Bay	Diablo	Mesa	Morro Bay	Diablo	Mesa	Morro Bay	Diablo	Mesa
All line in service	228.23	227.08	224.40	224.29	221.01	218.65	225.60	223.02	220.58
Morro Bay - Diablo 230 kV	226.95	218.92	219.18	221.56	201.09	207.72	223.50	207.29	211.72
Morro Bay - Mesa 230 kV	225.50	221.23	212.08	221.05	214.29	205.00	222.54	216.61	207.37
Diablo - Mesa 230 kV	226.58	226.30	218.34	222.87	220.35	214.24	224.13	222.34	215.61
Morro Bay - Gates 230 kV	225.40	224.10	220.90	220.10	216.60	214.00	221.90	219.10	216.30
Morro Bay - Midway 230 kV	223.09	221.57	218.03	217.63	214.12	211.46	219.51	216.65	213.72
Morro Bay - Gates 1 & 2 (line down on Morro Bay side)	217.28	215.60	211.73	206.12	202.17	198.91	210.07	206.90	203.46
Morro Bay - Midway 1 & 2, 230 kV lines	210.65	208.85	204.79	198.85	194.65	191.15	203.07	199.70	196.04
Morro Bay - Mesa & Diablo - Mesa 230 kV lines	227.3	227.1	-	223.5	221.0	-	224.8	223.0	-

Los Padres Total Area Load = 512.0 (121.9)
Morro Bay Generation Off-Line
All Lines in Service
50MVAR Off-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
9.1 MW, 6.3 MVAR
(Pre-transfer Condition)



General Electric Company PSLF Program MW/MVAR Tue May 05 15:40:57 1998

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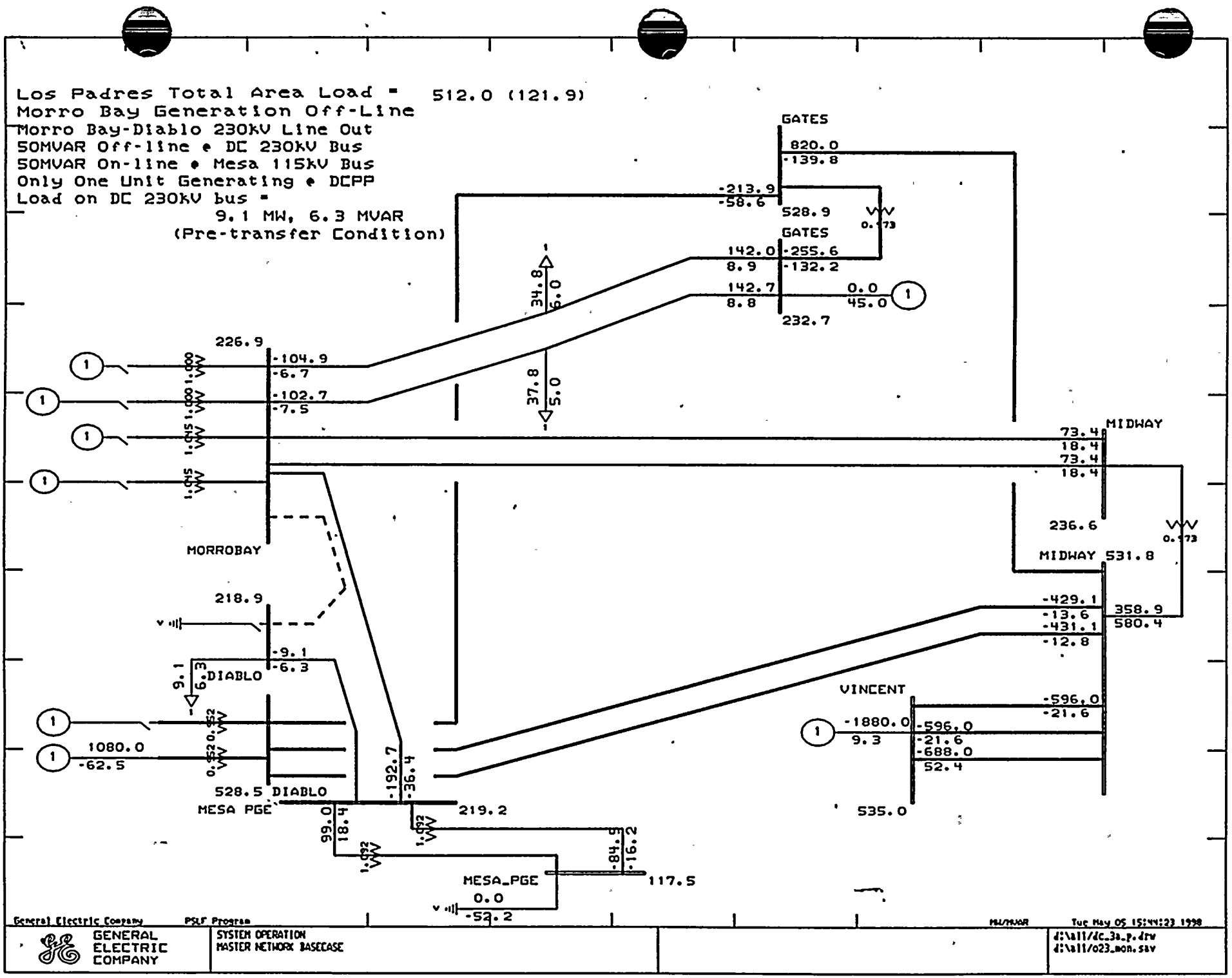
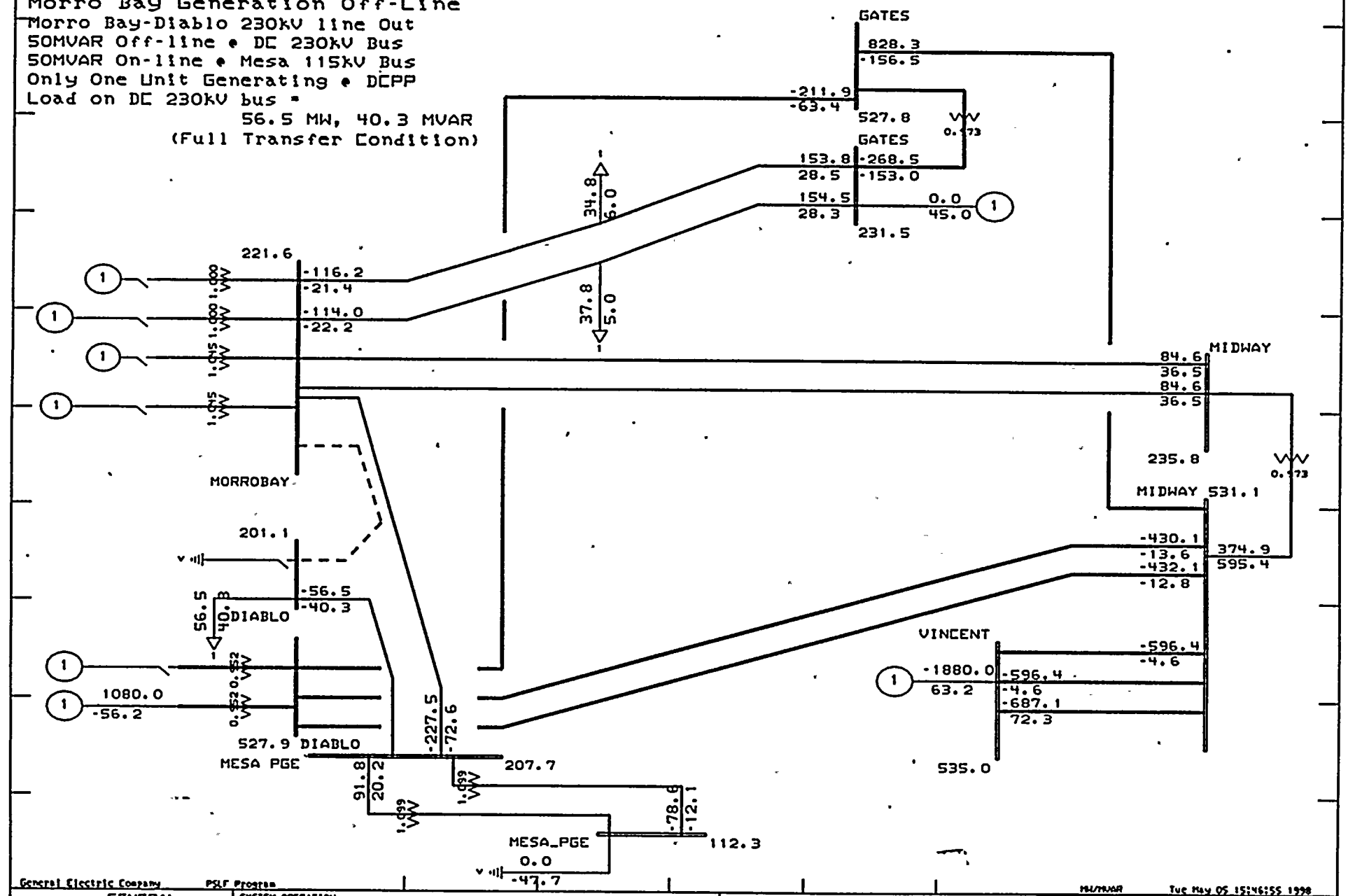
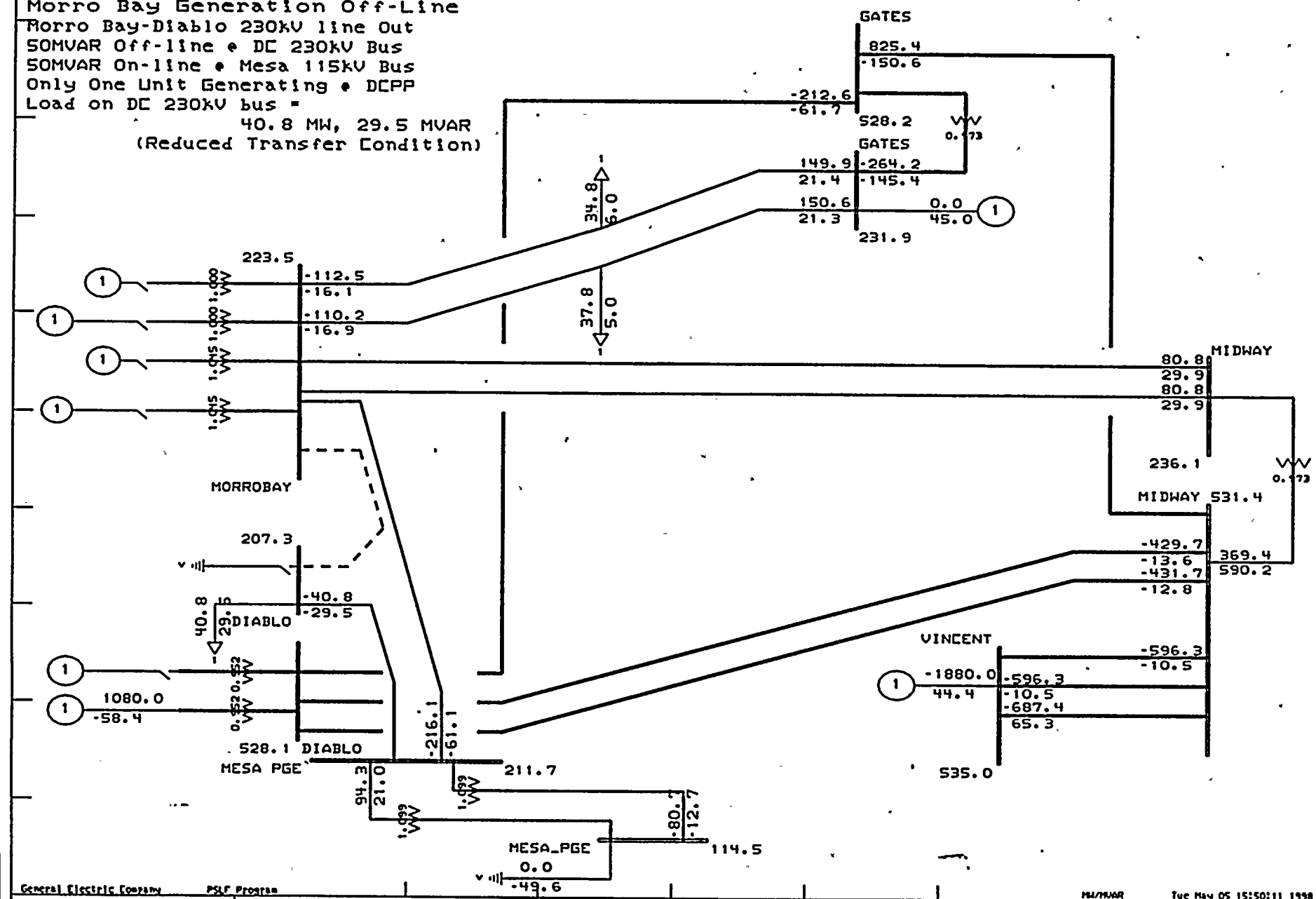

Los Padres Total Area Load = 512.0 (121.9)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV Line Out
50MVAR Off-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
9.1 MW, 6.3 MVAR
(Pre-transfer Condition)
GATES
820.0
-139.8
-213.9
-58.6
528.9
0.173
GATES
142.0
8.9
-255.6
-132.2
142.7
8.8
0.0
45.0
232.7
34.8
6.0
37.8
5.0
226.9
-104.9
-6.7
-102.7
-7.5
1.000
1.000
1.015
1.015
MORROBAY
MIDWAY
73.4
18.4
73.4
18.4
236.6
0.173
MIDWAY 531.8
-429.1
-13.6
-431.1
-12.8
358.9
580.4
218.9
-9.1
-6.3
9.1
6.3
DIABLO
VINCENT
-596.0
-21.6
-1880.0
9.3
-596.0
-21.6
-688.0
52.4
535.0
1080.0
-62.5
0.520
0.520
528.5 DIABLO
MESA PGE
-192.7
-36.4
219.2
99.0
18.4
1.092
1.092
-84.5
-16.2
117.5
MESA_PGE
0.0
-52.2
General Electric Company
PSLF Program
MW/MVAR
Tue May 05 15:44:23 1998
GENERAL ELECTRIC COMPANY
SYSTEM OPERATION
MASTER NETWORK BASECASE
d:\all/dc_3a_p.drw
d:\all/023_mon.sav

Los Padres Total Area Load = 559.4 (155.9)
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR Off-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
56.5 MW, 40.3 MVAR
(Full Transfer Condition)



Los Padres Total Area Load =
Morro Bay Generation Off-Line
Morro Bay-Diablo 230kV line Out
50MVAR Off-line @ DC 230kV Bus
50MVAR On-line @ Mesa 115kV Bus
Only One Unit Generating @ DCPP
Load on DC 230kV bus =
40.8 MW, 29.5 MVAR
(Reduced Transfer Condition)



General Electric Company PSLF Program MW/MVAR Tue May 05 15:50:11 1998

GENERAL ELECTRIC COMPANY

SYSTEM OPERATION
MASTER NETWORK BASECASE

d:\all\dc_3a_r.drw
d:\all\o23_mon.sav

Appendix E of Transmission Control Agreement

Nuclear Protocols

TRANSMISSION CONTROL AGREEMENT

APPENDIX E

Nuclear Protocols

DIABLO CANYON NUCLEAR POWER PLANT
UNITS 1 & 2

REQUIREMENTS FOR OFFSITE POWER SUPPLY OPERABILITY
REVISION 1

DCPP 1&2 REQUIREMENTS FOR OFFSITE POWER SUPPLY OPERABILITY

OVERVIEW

During normal operation, each DCPP unit's electrical loads are supplied from the unit's main onsite electrical generator. If the generator is not available, either due to unit shutdown or other reason, the loads are transferred to an alternative source. The preferred immediate alternate source of electrical power for DCPP electric loads (safety-related and nonsafety-related) is the offsite power supply or 230kV grid In addition DCPP has a delayed 500 kV source. The offsite power source is sometimes referred to as the preferred power supply in the regulatory documents.

The basic requirement for the offsite power supply is that it provides sufficient capacity and capability for safe shutdown and design basis accident mitigation. When this condition is met, the offsite power supply is considered Operable with respect to the DCPP Operating License and Technical Specifications. It is a necessary condition of the Operating License that the offsite power supply be Operable at all times. If the offsite power system is declared Inoperable, action must be taken to shut down an on-line DCPP units(s) and, for an off-line unit, to suspend activities as required by the DCPP Operating License and Technical Specifications. DCPP must also perform additional diesel testing. The offsite power system is considered Inoperable if it is degraded to the point that it does not have the capability to effect safe shutdown and to mitigate the effects of an accident at DCPP. This level of degradation can be caused by an unstable offsite power system, or any condition which renders the offsite power unavailable for safe shutdown and emergency purposes.

In specific terms, the offsite power supply voltage (at the DCPP switchyard) must stay within the range of 207 kV to 240kV under post accident operating conditions During normal operation the voltage must be held enough above 207kV so that when DCPP transfers it's load from the onsite source to the offsite source the voltage does not decrease below 207kV. For normal operation with all lines in service the voltage must be above 211kV. During normal operation, the voltage should be above 218kV. Otherwise the offsite power supply is considered Inoperable. Since a design basis accident can result in a unit trip, it is imperative that the trip not impair the operability of the offsite power system. Therefore, following a trip of a DCPP unit (i.e., the unit breakers open), the DCPP switchyard voltage must recover to and be maintained at or above 207 kV within 16 seconds following the trip. If this condition cannot be met, then the offsite power supply in the pre trip condition is considered Inoperable, and action must be taken to shut down the operating DCPP unit(s). In addition, the 500 and 230 kV grid must remain stable if both DCPP units trip.

System Operating procedures and programs shall be in place to ensure that various system operating conditions (generating unit outages, line outages, system loads, spinning reserve, etc.), including multiple contingency events, are evaluated and understood, such that impaired or potentially degraded grid conditions are recognized, assessed and immediately communicated to the DCPP operating staff for Operability determination.

SPECIFIC REQUIREMENTS

Note: This section identifies the operational requirements for the DCPP offsite power supply. These requirements are part of the DCPP design basis and licensing basis and include PG&E System Operating Instruction 0-23 as revised from time to time. Failure to meet these requirements may render the offsite power supply Inoperable, thus requiring the operating DCPP unit(s) to shutdown. Failure to meet these requirements must be immediately communicated to PG&E and the DCPP operating staff for operability determination. Changes in the operation of the transmission network that conflict with these requirements require prior approval by PG&E.

1. Three transmission lines into the 500 kV switchyard and two lines into the 230 kV DCPP switchyard are normally in service. Any increase or decrease in the number of lines into the DCPP switchyard requires prior approval by PG&E.

   No line may be removed from service at anytime without prior notification to the DCPP Operations Department. At least two independent sources of power, the 500 kV and the 230kV system between the transmission network (grid) and DCPP switchyards shall be available at all times. PG&E System Operating Procedure, 0-23, Operating Instructions for Reliable Transmission Service for Diablo Canyon, provides specific requirements to determine operability of these sources.

2. With both Diablo Canyon units off-line, the DCPP 500 and 230kV offsite power source should be capable of providing 105MW and 78 MVAR to Diablo Canyon for normal operation, safe shutdown, and design basis accident mitigation.

3. The minimum grid voltage at DCPP switchyard shall be maintained at or above 218kV for normal operation with all lines in service. In the event of a system disturbance or line outage that can cause the voltage to dip below 218kV, including the trip of a DCPP unit, the grid voltage shall recover to 207kV or above within 16 seconds.

4. Planning and operating reliability criteria shall result in plans for the following events without loss of grid stability or availability:

   a) The loss of two DCPP units.

   b) The loss of any generating unit on the PG&E grid.

   c) The loss of any major transmission circuit or intertie on the PG&E grid.

   d) The loss of any large load or block of load on the PG&E grid.

5. The maximum grid voltage at the DCPP switchyard shall be maintained at or below 240kV. (References 10, 11)

6. The normal operating voltage of the DCPP switchyard shall be maintained at 230 kV.

The DCPP switchyard voltage shall not exceed 240kV unless required to preserve transmission network integrity.

7. The 500 kV system shall be maintained between 510kV and 550kV. Operation of DCPP is limited between .97 p.u. and 1.05 p.u. Requests to operate above 1.01 p.u. shall be analyzed prior to implementation to assure viability of the 500kV and 230kV after a DCPP unit trip. If two of three 500 kV lines are out of service, spinning reserve must be available that is equal to the total of DCPP generation.

System studies shall be performed and updated based on changing grid conditions (load growth, etc.) to identify critical conditions that could render offsite power supply Inoperable. The offsite power system is considered Inoperable if it is degraded to the point that it does not have the capability to effect safe shutdown and to mitigate the effects of an accident at DCPP. This level of degradation can be caused by an unstable offsite power system, or any condition which renders the offsite power supply unavailable for safe shutdown and emergency purposes. Procedures and programs shall be in effect to ensure that the DCPP operating staff is immediately notified of such conditions. Grid conditions that are more severe with respect to DCPP switchyard voltages or otherwise unanalyzed, render the offsite power supply Inoperable. DCPP operating staff shall be immediately notified of such conditions. Auditable records of system study results shall be maintained. Study results, including revisions and updates, shall be transmitted via letter to PG&E. Study results and conclusions shall be assessed at least annually and updated, if needed, based on changing grid conditions. Results of the annual assessments shall be transmitted via letter to PG&E.

System studies shall consider the interconnections between PG&E, and other utilities in the Western States Coordinating Council (WSCC) region.

8. In the event of loss of the DCPP offsite power supply:

   Note: With regard to Station Blackout(SB-0) DCPP 1 &2 are 4 hour coping plants. The regulatory requirement is that DCPP be able to withstand a loss of all AC power (loss of offsite power plus loss of both Emergency Diesel Generators) for 4 hours. Therefore, at least one transmission line into the DCPP switchyard should be restored within 4 hours to prevent possible core damage.

   a) Highest possible priority shall be given to restoring power to the DCPP switchyards.

   b) Should incoming lines to the DCPP switchyards be damaged, highest priority shall be assigned to repair and restoration of at least one line into the DCPP switchyards.

   c) Repair crews engaging in power restoration activities for DCPP shall be given the highest priority for manpower, equipment, and materials.

   d) Formal programs and procedures shall be in place to effect items a), b), and c)

above.

9. Grid frequency shall be maintained at 60 Hertz (nominal). The following operations are initiated for low system frequency conditions:

   a) At 59.75 Hz, A- 18 interruptible customers are tripped.

   b) At 59. 1 Hz, PG&E system load shedding is initiated. Two 5% blocks (10%) of load is tripped at this frequency and at 0.2 Hz decrements until 50% of load has been tripped (10 5% blocks).

   c) At 58.2 Hz the north and south 500 kV intertie lines are tripped to separate the PG&E system from SCE and the Northwest systems.

   d) Thermal plants are equipped with 3 setpoint underfrequency relays that would cause underfrequency tripping to protect the turbines and generators from being damaged. The set points are:

      58 Hz with 3-minute time delay
      57 Hz with 1-minute time delay
      55 Hz with 0.5 seconds time delay

   e) Hydro generators are tripped last at 54.0 Hz with 1-minute time delay.

10. PG&E Bulk Power Transmission System Reliability Criteria as described in the DCPP Updated Final Safety Analysis Report shall be maintained. Changes to the reliability criteria that could adversely impact grid reliability and availability as defined in this specification require prior approval of PG&E.

11. PG&E transmission lines shall be patrolled annually to ensure that the physical and electrical integrity of transmission system components is maintained.

12. Line insulators, pole hardware terminals, and tower hardware terminal within the first three miles from the Diablo switchyard shall be washed and inspected at least three times a year to reduce line outages that may result from flashovers due to possible accumulated contamination.

13. Preventive maintenance, testing and calibration of DCPP switchyard circuit breakers and protective relays shall be performed as follows:

    PG&E: 230kV & 500kV circuit breakers are inspected every 2 years and overhauled every 8 years. Transmission line relays are tested every 36 months.

    Preventive maintenance and testing of DCPP switchyard batteries shall be performed per IEEE 450-1972. Preventive maintenance and testing of DCPP switchyard battery chargers and DC system components shall be performed every 3 months.

14. Updates to applicable portions of Section 8.0, Electric Power of DCPP 1&2 Updated

Final Analysis Report (UFSAR) shall be provided annually. These updates will be used by PG&E to prepare a UFSAR change submittal to the NRC. DCPP is required by 10CFR50.71(e) to submit to the NRC periodic updates to the UFSAR.

These Specific Requirements mirror existing operating protocols, equipment, regional and national reliability organization standards and are subject to modification as necessary when new standards, equipment or protocols are adopted or updated.

SONGS 2&3 REQUIREMENTS FOR OFFSITE POWER SUPPLY OPERABILITY

Revised January 5, 1998

OVERVIEW

The preferred source of electrical power for SONGS electrical loads (safety-related and nonsafety-related) is the ***offsite power supply*** or 230 kV grid. The offsite power supply is sometimes referred to as the ***preferred power supply*** in the regulatory documents.

The basic requirement for the offsite power supply is that it provides ***sufficient capacity and capability*** to safely shut down the reactor and to mitigate certain specified accident scenarios. When this condition is met, the offsite power supply is considered Operable with respect to the SONGS Operating License and Technical Specifications. It is a necessary condition of the Operating License that the offsite power supply be Operable at all times. If the offsite power system is declared Inoperable, action must be taken to shut down an online SONGS unit(s) and, for an offline unit, to suspend activities as required by the SONGS Operating License and Technical Specifications. The offsite power system is considered Inoperable if it is degraded to the point that it does not have the capability to supply electrical loads needed to safely shut down the reactor and to mitigate the effects of an accident at SONGS. This level of degradation can be caused by an unstable offsite power system, or any condition which renders the offsite power unavailable to safely shutdown the units or to supply emergency electrical loads.

In specific terms, the offsite power supply voltage (at the SONGS switchyard) must stay within the range of 218 kV to 238 kV under all normal and plant accident (i.e. emergency shutdown or trip) conditions. Otherwise the offsite power supply is considered Inoperable. Since accident scenarios for which the plant is designed can result in a unit trip, it is imperative that the trip not impair the operability of the offsite power system. Therefore, following a trip of a SONGS unit (i.e., the unit breakers open), the SONGS switchyard voltage must recover to and be maintained at or above 218 kV within 2.5 seconds following the trip. If this condition cannot be met, then the offsite power supply is considered Inoperable, and action must be taken to shut down the operating SONGS unit(s). Even though these requirements apply at all times, this condition is primarily of concern when one SONGS unit is online and the other unit offline. If both SONGS units are online and one unit trips (due to an accident or otherwise), the non-tripped unit will provide local voltage support to the SONGS switchyard, and 230 kV system voltage will remain within the required range. In cases where one SONGS unit is online and one unit offline, the offsite power supply must be sufficiently robust to survive a trip of the online unit and meet the SONGS voltage requirements in the post-trip condition. A dual unit trip is not the limiting condition since a plant accident is not postulated simultaneous with a dual unit trip.

System Operating procedures and programs shall be in place to ensure that various system operating conditions (generating unit outages, line outages, system loads, spinning reserve, etc.),

including multiple contingency events, are evaluated and understood, such that impaired or potentially degraded grid conditions are recognized, assessed and communicated to the SONGS Control Room for Operability determination.

The SONGS switchyard is made up of the SCE switchyard and the SDG&E switchyard. Unless specifically stated otherwise, SONGS switchyard requirements contained in this document apply to both the SCE switchyard and the SDG&E switchyard.

SPECIFIC REQUIREMENTS

Note 1: This section identifies the operational requirements for the SONGS offsite power supply. These requirements are part of the SONGS design basis and licensing basis. Failure to meet these requirements may render the offsite power supply Inoperable, thus requiring the operating SONGS unit(s) to shutdown. Failure to meet these requirements must be immediately communicated to SCE and the SONGS Control Room for operability determination. Changes in the operation of the transmission network that conflict with these requirements require prior approval by SCE.

Note 2: Specific requirements, procedures, operating bulletins, division orders, and analysis that support or provide the basis for the specific operational requirements may be revised periodically subject to prior approval of the affected parties.

1. Nine transmission lines into the SONGS switchyard are normally in service. Any increase or decrease in the number of lines into the SONGS switchyard requires prior approval of SCE. (Reference 7)

   No line may be removed from service for greater than 30 days without prior notification to SCE. At least two independent transmission lines (one from SCE and one from SDG&E) between the transmission network (grid) and SONGS switchyard shall be in service at all times. (References 1, 2, 3, 4, 7, 8)

2. With both San Onofre units off-line, the SONGS offsite power source shall be capable of providing 152 MW and 96 MVAR to San Onofre for normal operation and for shutting down the units during plant Design Basis Accident (DBA) conditions. (References 9, 10)

3. The minimum grid voltage at the SONGS switchyard shall be maintained at or above 218 kV. In the event of a system disturbance that can cause the voltage to dip below 218 kV, including the trip of a SONGS unit, the grid voltage shall recover to 218 kV or above within 2.5 seconds. (References 9, 10, 12, 13, 18)

4. The following initiating events shall not result in the loss of grid stability or availability:

   a. The loss of a San Onofre Unit (with the other unit already offline), or

b. The loss of any generating unit on the SCE and SDG&E grids, or

c. The loss of any major transmission circuit or intertie on the SCE and SDG&E grids, or

d. The loss of any large load or block of load (e.g., due to a bus section outage) on the SCE and SDG&E grids.

(References 2, 3, 4, 8)

5. The maximum grid voltage at the SONGS switchyard shall be maintained at or below 238 kV. (References 10, 11, 18)

6. The normal operating voltage of the SONGS switchyard shall be maintained at 230 kV. The SONGS switchyard voltage shall not exceed 232 kV unless required to preserve transmission network integrity. (References 10, 11, 18)

7. The limiting conditions for SONGS offsite power source operability are defined as follows:

1. One SONGS unit is off- line, and
2. One of the critical line (s) outages occurs (see list of the lines below), and
3. VAR flows north and south of SONGS are above the threshold levels for the existing combined SCE and SDG&E import level as defined by the referenced nomograms in the ECC Operating Procedure : SONGS Voltage, dated December 9, 1997.

Based on these nomograms and SONGS offline unit's mode status if the ECC, Grid Control Center (GCC), or ISO determines that the operating point is outside the applicable derated import nomogram line, they shall notify SONGS immediately that a particular transmission line is out of service, and the critical system conditions are sufficient to cause SONGS off site power source to be considered INOPERABLE; i.e., unable to support SONGS voltage at 218 kV if the remaining unit trips. SONGS Control Room will declare the offsite source inoperable (in anticipation of losing the second SONGS unit) and will declare the time period within which the on-line unit will have to initiate shutdown if conditions are not corrected. The time period will be within 1 to 24 hours, based on the SONGS plant and equipment conditions.

List of the critical transmission lines:

Critical Line(s) Out In SCE Territory

Palo Verde -Devers 500 kV Line
Ellis- Johanna & Ellis-Santiago 230 kV Lines

Lugo-Serrano & Mira Loma-Serrano 500 kV Lines
Lugo- Mira Loma 2&3 500 kV Lines
Two Midway - Vincent 500 kV Lines
SONGS- Serrano & SONGS - Chino 230 kV Lines

Critical Line(s) Out in SDG&E Territory

Palo Verde- N. Gila 500 kV Line
N. Gila- Imperial Valley 500 kV Line
Imperial Valley- Miguel 500 kV Line
Imperial Valley- Miguel 500 kV Line & Imperial Valley- LaRosita 230 kV Line
SONGS-San Luis Rey 230 kV Tap & SONGS - Mission 230 kV Line

Systems studies shall be performed and updated based on changing grid conditions (load growth, etc.) to identify critical conditions, such as the above cases, that could render the offsite power supply Inoperable. The offsite power system is considered Inoperable if it is degraded to the point that it does not have the capability to provide electrical support to safe shutdown loads and to mitigate the effects of an accident at SONGS. This level of degradation can be caused by an unstable offsite power system, or any condition which renders the offsite power supply unavailable for safe shutdown and emergency purposes. The following actions are required:

a. Procedures and programs shall be in effect to ensure that the SONGS Control Room is immediately notified of such conditions.

b. Grid conditions that are more severe with respect to SONGS switchyard voltage, or are otherwise unanalyzed, render the offsite power supply Inoperable. The SONGS Control Room shall be immediately notified of such conditions.

c. Auditable records of current system studies shall be made available to SCE as needed to demonstrate compliance with regulatory requirements. Study results, including revisions and updates, shall be formally transmitted to SCE.

d. Study results and conclusions shall be assessed at least annually and updated, if needed, based on changing grid conditions. Results of the annual assessments shall be formally transmitted to SCE.

(References 1, 2, 19, 21)

System studies shall consider the interconnections between SCE, SDG&E, and other utilities in the Western Systems Coordinating Council (WSCC) region. (Reference 7)

8. In the event of loss of the SONGS offsite power supply:

Note: SONGS 2 and 3 are required by NRC regulations to be able to safely cope with a loss of all AC power (Station Blackout) for a maximum of four hours. The four hour coping duration is based on the expectation that at least one source of AC power (offsite transmission line or onsite diesel generator) will be restored to the blacked-out unit within the four hours to ensure the proper functioning of systems required for plant safety.

a. Highest possible priority shall be given to restoring power to the SONGS switchyard. Procedures and training should consider several potential methods of transmitting power from black-start capable units to the SONGS switchyard. This includes such items as nearby gas turbine generators, portable generators, hydro generators, and black-start fossil power plants. (References 15, 26, 28)

b. Should incoming lines to the SONGS switchyard be damaged, highest priority shall be assigned to repair and restoration of at least one line into the SONGS switchyard.

c. Repair crews engaging in power restoration activities for SONGS shall be given the highest priority for manpower, equipment, and materials.

d. Formal programs and procedures shall be in place to effect items a, b, and c above.

(References 14, 15, 16, 17, 26, 27)

9. Grid frequency shall be maintained at 60 Hertz (nominal). A trip of one SONGS unit shall not cause the grid frequency to dip below 59.7 Hertz. The following operations are initiated for low system frequency conditions:

a. At 59.3 Hertz, SCE system load shedding program is initiated.

b. At 58.2 Hertz, automatic separation of the SCE system from the SDG&E system is initiated at the SONGS switchyard when either San Onofre unit is pre-selected to separate with the SDG&E system.

c. At 58.0 Hertz, manual separation of the SCE system from the SDG&E system is initiated at the SONGS switchyard when either San Onofre unit is pre-selected to separate with the SDG&E system.

d. At 57.0 Hertz, automatic separation of the SCE system from the SDG&E system is initiated at the SONGS switchyard when no San Onofre unit is selected to separate with the SDG&E system.

e. At 56.8 Hertz, manual separation of the SCE system from the SDG&E system is initiated at the SONGS switchyard when no San Onofre unit is selected to separate with the SDG&E system.

Note: The above separation setpoints are provided for information only. SCE and SDG&E are currently reviewing the 57 Hz separation setpoint. This setpoint may be changed to ensure that system separation occurs prior to a trip of the nuclear unit(s), which also occurs at approximately 57

Hz. SCE will inform the ISO of any changes to the system separation setpoint.

(References 7, 20)

10. SCE and SDG&E Bulk Power Transmission System Reliability Criteria as described in the SONGS 2&3 Updated Final Safety Analysis Report shall be maintained. It is recognized that the SCE and SDG&E Bulk Power Transmission System Reliability Criteria as described in the SONGS 2&3 Updated Final Safety Analysis Report may be revised from time to time. In the event the reliability criteria are revised, a system assessment and/or study (as described under specification 7) shall be performed to determine if the revised reliability criteria adversely impact grid reliability and availability as defined in this specification. Results of the assessment and/or study together with a copy of the revised reliability criteria shall be provided to SCE. Changes in grid operation based on the revised criteria and associated studies shall not be implemented without prior approval of SCE. (Reference 7)

11. SCE and SDG&E transmission lines shall be patrolled annually to ensure that the physical and electrical integrity of transmission system components is maintained. (References 7, 22)

12. Line insulators, pole hardware terminals, and tower hardware terminals within the first three miles from the San Onofre switchyard shall be inspected annually and washed at least two times a year to reduce line outages that may result from flashovers due to possible accumulated contamination. (References 7, 22)

13. Preventive maintenance, testing and calibration of SONGS switchyard circuit breakers and protective relays shall be performed as follows:

    SCE: 230 kV circuit breakers are overhauled every 300 normal operations or 25 kickouts. Response time/trip testing is performed annually. Transmission line relays are tested biannually. (References 7, 24, 25)

    SDG&E: 230 kV circuit breakers are overhauled every five years. Trip testing is performed annually. Transmission line relays are tested biannually. (Reference 7)

14. Preventive maintenance and testing of SONGS switchyard batteries shall be performed per IEEE 450-1972. Preventive maintenance and testing of SONGS switchyard battery chargers and DC system components shall be performed routinely. (Reference 7, 23)

15. Updates to applicable portions of Section 8.0, Electric Power of the SONGS 2 & 3 Updated Final Safety Analysis Report (UFSAR) shall be provided annually. These updates will be used by SCE to prepare a UFSAR change submittal to the NRC. SONGS is required by 10CFR50.71(e) to submit to the NRC periodic updates to the UFSAR.

REFERENCES

1) SONGS 2&3 Operating License and Technical Specifications, Section 3.8, Electrical Power Systems

2) 10CFR50 Appendix A, General Design Criterion 17 (GDC-17), Electrical Power Systems

3) NUREG 75/087, Standard Review Plan Revision 1, Section 8.2, Offsite Power System

4) NUREG 0800, Standard Review Plan Revision 2, Section 8.2, Offsite Power System

5) NUREG 0800, Standard Review Plan Revision 2, Branch Technical Position ICSB-11 (PSB), Stability of Offsite Power Systems

6) NUREG 0712, SONGS 2&3 Safety Evaluation Report, Section 8.0, Electric Power Systems

7) SONGS 2 & 3 Updated Final Safety Analysis Report, Section 8.0, Electric Power

8) ANSI/IEEE Std. 765-1983 Preferred Power Supply for Nuclear Power Generating Stations

9) SONGS Design Calculation E4C-082, System Dynamic Voltages During Design Basis Accident

10) SONGS Design Calculation E4C-090, Auxiliary System Voltage Regulation

11) SONGS Design Calculation E4C-092, Short Circuit Studies

12) SONGS Design Calculation E4C-098, 4 kV Swgr Protective Relay Setting

13) DBD-SO23-120, SONGS Design Basis Document, 6.9KV, 4.16KV and 480V Electrical Systems

14) 90051, SONGS Station Blackout Analyses

15) NUMARC 87-00 Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors

16) Letter from M. 0. Medford (SCE) to the Document Control Desk (NRC), dated April 17, 1989, Subject: "Response to 10 CFR 50.63, 'Loss of all Alternating Current Power,' San Onofre Nuclear Generating Station Units 1, 2 and 3"

17) Letter from F. R. Nandy (SCE) to the Document Control Desk (NRC), dated May 1, 1990, Subject: "Supplemental Response to 10 CFR 50.63, 'Loss of All Alternating Current Power,' Station Blackout (TAC No. 68599/600), San Onofre Nuclear Generating Station Units 1, 2, and 3"

18) System Operating Bulletin 17 Appendix, System Voltage Control for San Onofre Nuclear Generating Station (Rev. January, 1998)

19) ECC Operating Procedure: Songs Voltage (Rev. 12/09/1997)

20) System Operating Bulletin 113, San Onofre 220 kV System Separation (Rev. April 15, 1995)

21) Regulatory Guide 1.93, Availability of Electric Power Sources

22) SCE Division Order 40.35, Transmission Line Routine Patrol, Inspection, Scheduling, and Record Keeping (Rev. 10/87)

23) SCE Division Order 60.20, Storage Batteries (Rev. 3/82)

24) SCE Division Order 50.10, Predictive Maintenance Circuit Breakers and Switches (Rev. 6/96)

25) SCE Division Order 50.20, Relay and Equipment Tests (Rev. 3/94)

26) System Operating Bulletin 1-A, Thermal Station Start-up and Power System Restoration (Rev. 12/97)

27) System Operating Bulletin 254, Emergency Orders—San Onofre Nuclear Generating Station 220 kV (Rev. March 18, 1996)

28) SDG&E Control Procedure 1150, Capacity & Energy Emergencies - SDG&E System Emergencies (Rev. 12/97)

Independent System Operator (ISO) Commitment to the Use of PG&E Procedure O-23, "Operating Instruction for Reliable Transmission Service for DCPP"

234824

CALIFORNIA ISO

California Independent System Operator

January 27, 1997

Klemme L. Herman
Director, Electrical and Instrument Control Engineering
Nuclear Technical Services
Pacific Gas and Electric Company
333 Market Street, Room 1103-A10R
San Francisco, CA 94105

Dear Mr. Herman:

Following the meeting on Thursday, December 18, 1997, the Operations Engineers at the California Independent System Operator (CAISO) agreed to supply a formal letter to Pacific Gas and Electric Company (PG&E) concerning operating instructions for Diablo Canyon Power Plant (DCPP).

This letter confirms that the CAISO will continue to operate the system using the Operating Procedures provided by PG&E. This includes operating the system such that Diablo Canyon Power Plant (DCPP) will receive reliable transmission service once the CAISO assumes operation of the transmission grid. This includes following PG&E's O-23 Operating Procedure which provides procedures for critical grid equipment forced out of service in the DCPP area.

PG&E will continue to follow the O-23 Operating Procedures and utilize DCPP Units 1 & 2 SUT's (Start-up Transformer), as well as the transmission capacitors and reactors, in order to maintain voltage schedules as specified in the O-23 and PG&E's GTS Standard ET-SO-S001.

Once the CIASO assumes operation of the transmission grid, Operations Engineering will develop CAISO Operating procedures based on PG&E's operating procedures with appropriate revisions which take into account new system conditions. CAISO Operations Engineering will work closely with PG&E's System Operation Department in order to ensure the development of reliable operating procedures.

If you have any questions, please give me a call at (916) 351-2123 or Mark Willis at (916) 351-2196.

Sincerely,

James Detmers
Manager of Operations Engineering

MCW/mcw

Cc: Ed Riley
Kellan Fluckiger

PG&E Procedure O-23, "Operating Instruction for
Reliable Transmission Service for DCPP"