CH2M HILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833-2937
Tel 916.920.0300
Fax 916.920.8463

CH2MHILL

DOCKET 08-AFC-11	
DATE	9/9/2009
RECD.	9/9/2009

September 9, 2009

Mr. Rod Jones
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: CPV Vaca Station (08-AFC-11)
System Impact Study (SIS) Supplemental Final Report dated September 8, 2009

Dear Mr. Jones:

Attached please find one original of CPV Vaca Station, LLC's System Impact Study (SIS) Supplemental Final Report dated September 8, 2009 for the Application for Certification for the CPV Vaca Station Project (08-AFC-11).

If you have any questions about this matter, please contact me at (916) 286-0278.

Sincerely,

CH2M HILL

Douglas M. Davy, Ph.D.
AFC Project Manager

Attachment

cc: A. Welch (CPV)
S. Madams

System Impact Study Supplemental

Generation Interconnection

Competitive Power Ventures, LLC

Vacaville Energy Center

September 8, 2009

TABLE OF CONTENTS

1. INTRODUCTION

Competitive Power Ventures, LLC ("CPV"), proposes to interconnect the 700 MW (net) Vacaville Energy Center ("VEC Project") with Pacific Gas and Electric Company's ("PG&E") 230-kV system south of the Vaca_Dixon Substation in Solano County, California. The planned operation date for the proposed VEC Project is September 1, 2012.

At the request of CPV, Navigant Consulting, Inc. ("NCI") performed a System Impact Study ("SIS") for the VEC Project. The SIS was finalized and was docketed with the California Energy Commission ("Energy Commission") on November 18, 2008.

The VEC Project SIS:

- Identified the transmission system impacts caused solely by the addition of the proposed VEC based on studies 2013 Summer Peak, 2013 Summer Off-Peak, and 2013 Spring Peak system conditions. The studies performed include:
  - Steady State Power Flow
  - Governor Power Flow
  - Dynamic Stability Analysis
  - Short Circuit Analysis
  - Reactive Margin Analysis
- Indentified the System reinforcements necessary to mitigate the adverse impacts of the proposed VEC Project under various system conditions, and

In summary the VEC Project SIS noted that the addition of the Project:

- Would cause a number of pre-existing normal and/or emergency overloads to increase.
- Would result in new Category "A" overloads on the Tesla-Q171[1] 500-kV line and on the Contra Costa-Brentwood 230-kV line which would be mitigated by the reconductoring the lines (at an estimated cost of approximately $33 million).
- Would result in new Category "B" overloads on the Vaca_Dixon-Q171 500-kV line as well as six (6) 230-kV lines which would be mitigated by reconductoring the lines (at an estimated cost of approximately $49.5 million). Two of the impacted 230-kV lines (Vaca_Dixon-Project #1 and #2) would likely be unable to be reconductored because the existing conductor is the largest possible conductor for the existing structures. Mitigation of these overloads would require curtailment of the VEC Project generation.
- Would result in new Category "C" overloads on two (2) 230-kV lines which would be mitigated by reconductoring the lines (at an estimated cost of approximately $5.5 million).

[1] The Q171 500-kV bus serves as the interconnection point for a 500 MW wind project (which has position 171 in the CAISO interconnection queue).

- Would not result in any transient stability concerns for the system.
- Would meet all reactive margin criteria.
- Would increase the short circuit duty at the Vaca_Dixon 230-kV bus by approximately 8% and the Peabody 230-kV bus by approximately 6%.
- Would increase the short circuit duty of other busses in the area in amount ranging from 1-4%.

This VEC SIS Supplement has been prepared to address certain items that resulted from discussions with representatives of the Energy Commission. This report summarizes the following sensitivity studies and study updates:

- Powerflow sensitivity studies:
  - Studies without the 500 MW wind project (Q171) interconnected with the Vaca_Dixon-Tesla 500-kV Line.
  - Studies with certain Energy Commission approved projects on-line.
- Post-transient powerflow voltage analysis.
- Additional reactive margin studies.
- Additional transient stability studies.
- Additional short circuit studies.
- Information on mitigation of overloads.
- Updated SIS Summary Tables 6-2, 6-3, 6-4, 11-1, 11-2, and 14-1.

2. SUMMARY OF FINDINGS

Powerflow Sensitivity Studies

Studies without the 500 MW Wind Project Interconnected with the Vaca Dixon-Tesla 500-kV Line

As discussed in greater detail in Section 3, these studies indicated that, even if the 500 wind project ("Q171") is off-line (or not developed):

- The Vaca_Dixon-Tesla 500-kV line would need to be reconductored to mitigate VEC Project-related overloads.
- There would not be an appreciable change in the number of 230-kV lines impacted by the addition of the VEC Project.

Studies with Certain Energy Commission Approved Projects On-Line

Powerflow studies were performed on the Summer Peak base case with the following Energy Commission "approved projects" on-line:

- Tesla Combined Cycle Project (Phase I) – 578 MW.
- Russell City Energy Center (RCEC) – 600 MW.
- Los Esteros (LECEF – Phase II) – 140 MW (it is noted that this project presently has a higher queue number than does the Project).

As discussed in detail in Section 3 these studies indicated that, if the "approved projects" listed above were included in the system model:

- The addition of the VEC Project would result in a new Category "A" overload on the Tesla-Q171 500-kV line. Mitigation of this overload would require that the line be reconductored.
- The post-VEC overloads on several 230-kV lines decrease but the number of impacted 230-kV lines does not change appreciably.

Post-Transient Powerflow Voltage Analysis

Studies were performed using the 2013 Heavy Summer and 2013 Summer Off-Peak powerflow cases to determine how the addition of the VEC Project impacts post-contingency voltages for Category B and Category C outages. As discussed in greater detail in Section 4 these studies indicated that:

- For Heavy Summer conditions:
  - The largest change in post-contingency voltage for Category B conditions occurred on the Tracy 500-kV bus for the Tesla-Q171 500-kV line outage. The voltage at Tracy decreased from 523.1-kV in the pre-Project case to 518.6-kV in the post-Project case.

- The largest change in post-contingency voltage for Category C conditions occurred on the Tracy 500-kV bus for the Tesla-Table Mountain and Tesla-Tracy 500-kV double line outage. The voltage at Tracy decreased from 535.4-kV in the pre-Project case to 532.2-kV in the post-Project case.
- For Off-Peak Summer conditions:
  - The largest change in post-contingency voltage for Category B conditions occurred on the Los Banos 500-kV bus for the Vaca_Dixon-Q171 500-kV line outage. The voltage at Los Banos increased from 526.6-kV in the pre-Project case to 529.1-kV in the post-Project case.
  - The largest change in post-contingency voltage for Category C conditions occurred on the Los Banos 500-kV bus for the Tracy-Tesla and Tracy-Los Banos 500-kV double line outage. The voltage at Los Banos increased from 515.5-kV in the pre-Project case to 518.9-kV in the post-Project case.

Reactive Margin Studies

The powerflow studies of Category "B" and "C" contingencies indicated that the Project did not cause voltage drops of 5% or more from the pre-Project levels nor cause the PG&E system to fail to meet applicable voltage criteria. NERC/WECC planning standards require that the system maintain post-transient voltage stability (reactive margins greater than zero) when either critical path transfers or area loads are increased by 5% for Category B contingencies and by 2.5% for Category C contingencies.

Using the above criteria, two base cases were developed from the pre-Project and post-Project Summer Peak cases in which COI transfers were increased by 5% and a total of eight Category B contingencies involving 500-kV lines in northern California were then simulated on these two cases. Similarly, two base cases were developed from the pre- and post-Project Summer Peak cases in which COI transfers were increased by 2.5% and a total of four Category C contingencies involving 500-kV lines in northern California were then simulated on these two cases.

As discussed in greater detail in Section 5, these studies revealed that:

- For Category B outages:
  - The lowest reactive margin occurred at the Malin 500-kV bus and decreased from 424 MVAR in the pre-Project case to 344 MVAR in the post-Project case.
  - The average decrease in reactive margin was 104 MVAR.
- For Category C outages:
  - The lowest reactive margin occurred at the Captain Jack 500-kV bus and decreased from 1,039 MVAR in the pre-Project case to 910 MVAR in the post-Project case.

- The average decrease in reactive margin was 56 MVAR
- For an outage of two Palo Verde units, the lowest reactive margin occurred at the Captain Jack 500-kV bus and decreased from 576 MVAR in the pre-Project case to 475 MVAR in the post-Project case.

In addition, studies similar to the above were performed with the Q171 generation project removed. As discussed in greater detail in Section 3, these studies revealed that:

- For Category B outages:
  - The lowest reactive margin occurred at the Captain Jack 500-kV bus and decreased from 579 MVAR in the pre-Project case to 502 MVAR in the post-Project case.
  - The average decrease in reactive margin was 66 MVAR.
- For Category C outages:
  - The lowest reactive margin occurred at the Malin 500-kV bus and increased from 962 MVAR in the pre-Project case to 1,003 MVAR in the post-Project case.
  - The reactive margin decreased for seven other outages; the average decrease was 46 MVAR.
- For an outage of two Palo Verde units, the lowest reactive margin occurred at the Captain Jack 500-kV bus in the pre-Project case (661 MVAR) and at the Malin 500-kV busing he the post-Project case (602 MVAR).

Additional Short-Circuit Studies

The VEC Project SIS summarized pre- and post-Project fault currents at seven 230-kV busses in the Project area and noted that:

- The only appreciable increase in fault duties occurred at Vaca_Dixon (7.8%) and Peabody (5.8%).
- The fault duty at the Vaca_Dixon bus exceeded the minimum breaker rating at the location by 22.5% in the pre-Project case and 32.1% in the post-Project case.
- Based on PG&E's present policies, the VEC Project would be responsible for replacing at least some 230-kV breakers at Vaca_Dixon.

At the request of the Energy Commission, fault currents were also calculated at the following busses:

- Tulucay 230-kV,
- Lakeville 230-kV,
- Moraga 230-kV,
- Lambie 230-kV,
- Cortina 230-kV, and
- CPV Station 230-kV.

These additional studies (discussed in Section 6) indicated that the addition of the VEC Project would increase the fault currents at the above busses by only 1-2%.

Transient Stability Studies

The VEC Project SIS presented the results of the transient stability studies for 17 Category B outages and 3 Category C outages and noted that the system was stable and damped and meet all NERC/WECC Criteria for all 20 outages simulated. At the request of the Energy Commission staff, five additional Category C (three 230-kV and two 500-kV) outages were simulated. As discussed in Section 7, these studies indicated that the system would be stable and damped and would meet all NERC/WECC Criteria for additional outages.

3. POWERFLOW SENSITIVITY STUDIES

STUDIES WITHOUT THE 500 MW WIND PROJECT INTERCONNECTED WITH THE VACA DIXON-TESLA 500-KV LINE

The following summarizes the results of the studies done with the 500 MW wind project ("Q171") proposed for interconnection with the Vaca_Dixon-Tesla removed from the system model. Studies were performed on the Summer Peak and Spring Peak cases.

Impacts on 500-kV Lines

For Summer Peak load conditions:

- The addition of the Vacaville Energy Center (VEC) Project with the 500 MW wind project in-service results in new Category A, B, and C overloads on the Q171-Tesla 500-kV line.
- The addition of the VEC Project without the 500 MW wind project in-service results in new Category B and C overloads on the Vaca_Dixon-Tesla 500-kV line. However, these overloads are slightly smaller than those noted when the 500 MW project is on-line.

For Spring Peak load conditions:

- The addition of the VEC Project with the 500 MW wind project in-service results in a new Category A overload on the Q171-Tesla 500-kV line and increased Category B and C overloads on this line.
- The addition of the VEC Project without the 500 MW wind project also results in a new Category "A" overload on the Vaca_Dixon-Tesla 500-kV line and increased Category "B" and Category "C" overloads on this line. However, these overloads are smaller than those noted when the 500 MW project is on-line.

In conclusion these studies indicate that, even if the 500 MW wind project is off-line (or not developed), the Vaca_Dixon-Tesla 500-kV line would need to be reconductored to mitigate VEC Project-related overloads.

Impacts on 230-kV Lines

For Summer Peak load conditions removing the 500 MW wind project reduces (and in some cases mitigates) overloads on the impacted 230-kV lines. Table 3-1 compares the number of new and increased Category A, B, and C overloads noted when the Project is added to the Summer Peak cases both with and without the 500 MW wind project (additional, more detailed information on system impacts is contained in Appendix A; Table A-1). The information in Table 3-1 shows that the removal of the wind project:

- Does not impact the number of new Category "A" overloads (it does decrease the one new overload from about 6% to about 1%).

- Decreases the number of lines impacted by Category B contingencies from 11 to 9: however, the number of new Project related overloads increases from 5 to 6.
- Decreases the number of lines impacted by Category C contingencies from 13 to 9: however, the number of new Project related overloads remains at 9.

Table 3-1: Impacted 230-kV Lines - Summer Peak Studies

		Studies With Q171 Project	Studies Without Q171 Project
Category A	Number of New Overloads	1	1
	Number of Increased Overloads	0	0
	Number of Impacted Lines	1	1
Category B	Number of New Overloads	5	6
	Number of Increased Overloads	6	3
	Number of Impacted Lines	11	9
Category C	Number of New Overloads	9	9
	Number of Increased Overloads	4	0
	Number of Impacted Lines	13	9

For Spring Peak load conditions removing the 500 MW wind project reduces (and in some cases mitigates) overloads on the impacted 230-kV lines. Table 3-2 compares the number of new and increased Category B and C overloads noted when the Project is added to Spring Peak load cases both with and without the 500 MW wind project (additional, more detailed information on system impacts is contained in Appendix A; Table A-2).

Table 3-2: Impacted 230-kV Lines - Spring Peak Studies

		Studies With Q7171 Project	Studies Without Q171 Project
Category A	Number of New Overloads	0	0
	Number of Increased Overloads	0	0
	Number of Impacted Lines	0	0
Category B	Number of New Overloads	1	3
	Number of Increased Overloads	6	4
	Number of Impacted Lines	7	7
Category C	Number of New Overloads	5	4
	Number of Increased Overloads	3	2
	Number of Impacted Lines	8	6

The information in Table 3-2 shows that, for Spring Peak load conditions, the removal of the wind project:

- Does not change the number of lines impacted by Category B contingencies but increases the number of new Project related overloads from 1 to 3.
- Decreases the number of lines impacted by Category C contingencies from 8 to 6 and reduces the number of new Project related overloads from 5 to 4.

In conclusion these studies indicate that, even if the 500 MW wind project is off-line (or not developed) there is not an appreciable change in the number of impacted 230-kV lines.

STUDIES WITH CERTAIN ENERGY COMMISSION APPROVED PROJECTS ON-LINE

The following summarizes the results of the powerflow studies performed on the Summer Peak base case if the following Energy Commission "approved projects" were added to the system model:

- Tesla Combined Cycle Project (Phase I) – 578 MW
- Russell City Energy Center (RCEC) – 600 MW
- Los Esteros (LECEF – Phase II) – 140 MW (it is noted that this project presently has a higher queue number than does the Project).

Impacts on 500-kV Lines

For Summer Peak load conditions:

- The addition of the Project without the "approved projects" in-service results in new Category A, B, and C overloads on the Q171-Tesla 500-kV line.
- The addition of the Project with the "approved projects" in-service results in a new Category A on the Q171-Tesla 500-kV line which is about 3% higher than that noted without the "approved projects" in-service.
- The addition of the Project with the "approved projects" in-service also results in increased Category B and C overloads on the Q171-Tesla 500-kV line.

In conclusion these studies indicate that, if the "approved projects" were included in the system model, the addition of the Project would still result in a new Category "A" overload on the Tesla-Q171 500-kV line. Mitigation of this overload would require that the line be reconductored.

Impacts on 230-kV Lines

For Summer Peak load conditions adding the "approved projects" (particularly the RCEC and LECEF plants) reduces 230-kV loadings. Table 3-3 compares the number of new and increased Category A, B, and C overloads noted when the Project is added to cases both without and with the "approved projects" in-service (additional, more detailed information on system impacts is contained in Appendix A; Table A-3).

Table 3-3: Impacted 230-kV Lines - Summer Peak Studies

		Studies Without "Approved" Projects	Studies With "Approved" Projects
Category A	Number of New Overloads	1	1
	Number of Increased Overloads	0	0
	Number of Impacted Lines	1	1
Category B	Number of New Overloads	5	5
	Number of Increased Overloads	6	4
	Number of Impacted Lines	11	9
Category C	Number of New Overloads	9	8
	Number of Increased Overloads	4	3
	Number of Impacted Lines	15	11

The information in the Table 3-3 shows that adding the "approved projects":

- Does not impact the number of new Category A overloads.
- Decreases the number of lines impacted by Category B contingencies from 11 to 9; however, the number of new Project related overloads remains at 5.
- Decreases the number of lines impacted by Category C contingencies from 15 to 11 and reduces the number of new Project related overloads from 9 to 8.

In conclusion these studies indicate that adding the "approved projects" reduces the loadings on many of the 230-kV lines but does not appreciably change the number of lines impacted by the addition of the Project.

4. POST-TRANSIENT POWERFLOW VOLTAGE ANALYSIS

Tables 4-1 and 4-2 summarize the largest changes in post-contingency voltages due to Category B and Category C outages for the 2013 Heavy Summer and 2013 Summer Off-Peak cases. As summarized in Table 4-1 (for Summer Peak conditions):

- The largest change in post-contingency voltage for Category B conditions occurred on the Tracy 500-kV bus for the Tesla-Q171 500-kV line outage. The post Project voltage at Tracy decreased by 4.5-kV from the level in the pre-Project case; however, it was still approximately 519-kV.
- The largest change in post-contingency voltage for Category C conditions occurred on the Tracy 500-kV bus for the Tesla-Table Mountain and Tesla-Tracy 500-kV double line outage. The post-Project voltage decreased by 3.2-kV from the level in the pre-Project case; however, it was still approximately 532-kV.

Table 4-1: Largest change in Post - Category B and C Contingency Voltages Between Pre and Post-Projects Cases Under Summer Peak Conditions

		Pre-Project			Post-Project			
OUTAGE	BUS	Pre-Cont. kV	Post-Cont. kV	% Change	Pre-Cont. kV	Post-Cont. kV	% Change	Change in Post-Contingency Voltage
Tesla-Q171 500-kV	Tracy 500-kV	528.0	523.1	-0.9	525.5	518.6	-1.3	-4.5
Tesla-Table Mt.& Tesla-Tracy 500-kV DLO	Tracy 500-kV	528.0	535.4	1.4	525.5	532.2	1.3	-3.2

As summarized on Table 4-2 (for Summer Off-Peak conditions):

- The largest change in post-contingency voltage for Category B conditions occurred on the Los Banos 500-kV bus for the Vaca_Dixon-Q171 500-kV line outage. The post-Project voltage at Los Banos increased by 2.5-kV from the level in the pre-Project case.
- The largest change in post-contingency voltage for Category C conditions occurred on the Los Banos 500-kV bus for the Tracy-Tesla and Tracy-Los Banos 500-kV double line outage. The post-Project voltage increased by 3.3-kV from the level in the pre-Project case.

Table 4-2: Largest change in Post - Category B and C Contingency Voltages Between Pre and Post-Projects cases under Summer Off-Peak Conditions

		Pre-Project			Post-Project			
OUTAGE	BUS	Pre-Cont. kV	Post-Cont. kV	% Change	Pre-Cont. kV	Post-Cont. kV	% Change	Change in Post-Contingency Voltage
Vaca_Dixon-Q171 500-kV	Los Banos 500-kV	525.7	526.6	0.2	527.9	529.1	0.2	2.5
Tracy-Tesla & Tracy-Los Banos 500-kV DLO	Los Banos 500-kV	525.7	515.5	-1.9	527.9	518.9	-1.7	3.3

5. REACTIVE MARGIN STUDIES

The powerflow studies of Category "B" and "C" contingencies indicated that the Project did not cause voltage drops of 5% of more from the pre-Project levels, or cause the PG&E system to fail to meet applicable voltage criteria.

NERC/WECC planning standards require that the system maintain post-transient voltage stability (as demonstrated by positive reactive margins) when either critical path transfers or area loads are increased by 5% for Category B contingencies and by 2.5% for Category C contingencies.

Studies With Q-171 Project In-Service

Using the above criteria, two base cases were developed from the pre- and post-Project Summer Peak cases in which COI transfers were increased by 5% and a total of eight Category B contingencies involving 500-kV lines in northern California were then simulated on these two cases. As shown in Table 5-1, these studies indicated that positive reactive margins of at least 344 MVAR would exist for the post-Project case after the simulated contingencies; this margin is 80 MVAR lower than the lowest amount in the pre-Project case.

Similarly, two base cases were developed from the pre- and post-Project Summer Peak cases in which COI transfers were increased by 2.5% and a total of four Category C contingencies involving 500-kV lines in northern California were then simulated on these two cases. As shown in Table 5-1, these studies indicated that positive reactive margins of at least 910 MVAR would exist for the post-Project case after the simulated contingencies; this margin is 129 MVAR lower than the lowest amount in the pre-Project case.

Simulation of an outage of two of the Palo Verde units results in a 475 MVAR margin in the post-Project case (as compared to 576 MVAR in the pre-Project case).

Table 5-1: Lowest 500-kV Reactive Margins for Original Studies

Outage	2013 Summer Peak Case Original Case				
	Pre-Project		Post-Project		
	Bus with smallest Reactive Margin	Reactive Margin (MVAR)	Bus with smallest Reactive Margin	Reactive Margin (MVAR)	Difference
Category B – COI Flows Increased by 5%					
Captain Jack-Olinda 500-kV	Malin 500-kV	424	Captain Jack 500-kV	344	-80
Malin-Round Mt. #1 500-kV	Captain Jack 500-kV	862	Captain Jack 500-kV	815	-47
Olinda-Tracy 500-kV	Malin 500-kV	863	Olinda 500-kV	760	-103

Round Mt.- Table Mt. #1 500-kV	Captain Jack 500-kV	1007	Captain Jack 500-kV	924	-83
Table Mt-Tesla 500-kV	Captain Jack 500-kV	1073	Malin 500-kV	977	-96
Table Mt-Vaca_Dixon 500-kV	Captain Jack 500-kV	1132	Malin 500-kV	1055	-77
Tesla-Q171 500-kV	Captain Jack 500-kV	1247	Captain Jack 500-kV	1085	-162
Vaca_Dixon-Q171 500-kV	Malin 500-kV	1317	Captain Jack 500-kV	1184	-133
PDCI Bi-pole Outage	Captain Jack 500-kV	952	Malin 500-kV	797	-155
Category C – COI Flows Increased by 2.5%					
Malin-Round Mt. #1 & #2 500-kV	Malin 500-kV	2224	Captain Jack 500-kV	2189	-35
Round Mt.-Table Mt. #1 & #2 500-kV	Round Mt. 500-kV	2160	Round Mt. 500-kV	2115	-45
Table Mt.-Tesla & Table Mt.-Vaca_Dixon 500-kV	Table Mt. 500-kV	1988	Table Mt. 500-kV	1969	-19
Round Mt.-Malin & Round Mt.-Table Mt. 500-kV	Captain Jack 500-kV	1543	Captain Jack 500-kV	1533	-11
Table Mt.-Round Mt. & Table Mt.-Vaca_Dixon 500-kV	Captain Jack 500-kV	1039	Captain Jack 500-kV	910	-129
Tesla-Table Mt. & Tesla-Q171 500-kV	Vaca_Dixon 500-kV	1893	Vaca_Dixon 500-kV	1971	78
Tracy-Tesla & Tracy-Los Banos 500-kV	Captain Jack 500-kV	1511	Captain Jack 500-kV	1443	-68
Tesla-Table Mt. & Tesla-Tracy 500-kV	Captain Jack 500-kV	1306	Captain Jack 500-kV	1238	-68
Vaca_Dixon-Table Mt. & Vaca_Dixon Transformer	Captain Jack 500-kV	1317	Captain Jack 500-kV	1242	-76
Two Unit Outage – No Increase in COI Flows					
Palo Verde 2-Unit Trip	Captain Jack 500-kV	576	Captain Jack 500-kV	475	-100

Studies Without Q-171 Project

In addition, studies similar to those discussed above were performed with the Q171 generation project removed. Using the above criteria, two base cases were developed from the pre- and post-Project Summer Peak cases in which COI transfers were increased by 5% and a total of eight Category B contingencies involving 500-kV lines in northern California were then simulated on these two cases. As shown in Table 5-2, these studies indicated that positive reactive margins of at least 502 MVAR would exist in the post-Project case after the simulated contingencies; this margin is 77 MVAR lower than that in the pre-Project case.

Similarly, two base cases were developed from the pre- and post-Project Summer Peak cases in which COI transfers were increased by 2.5% and a total of four Category C contingencies involving 500-kV lines in northern California were then simulated on these two cases. As shown in Table 5-2, these studies indicated that positive reactive margins of at least 1,003 MVAR would exist in the post-Project case after the simulated contingencies; this margin is 42 MVAR higher than that in the pre-Project case.

Simulation of an outage of two of the Palo Verde units results in a 602 MVAR margin in the post-Project case (as compared to 661 MVAR in the pre-Project case).

Table 5-2: Lowest 500-kV Reactive Margins with Q171 Project Off-Line

	2013 Summer Peak Case Alternative 3 (Q171 Removed)				
	Alt3 Pre-Project		Alt 3 Post-Project		
Outage	Bus with smallest Reactive Margin	Reactive Margin (MVAR)	Bus with smallest Reactive Margin	Reactive Margin (MVAR)	Difference
Category B – COI Flows Increased by 5%					
Captain Jack-Olinda 500-kV	Captain Jack 500-kV	579	Captain Jack 500-kV	502	-77
Malin-Round Mt. #1 500-kV	Captain Jack 500-kV	975	Malin 500-kV	904	-70
Olinda-Tracy 500-kV	Malin 500-kV	981	Olinda 500-kV	974	-7
Round Mt.- Table Mt. #1 500-kV	Captain Jack 500-kV	1124	Captain Jack 500-kV	1054	-70
Table Mt-Tesla 500-kV	Captain Jack 500-kV	1228	Malin 500-kV	1182	-46
Table Mt-Vaca_Dixon 500-kV	Captain Jack 500-kV	1185	Captain Jack 500-kV	1130	-54
Tesla-Q171 500-kV	Captain Jack 500-kV	1263	Captain Jack 500-kV	1191	-72
Vaca_Dixon-Q171 500-kV	Captain Jack 500-kV	1272	Captain Jack 500-kV	1201	-71
PDCI Bi-pole Outage	Captain Jack 500-kV	1149	Captain Jack 500-kV	1018	-130
Category C – COI Flows Increased by 2.5%					
Malin-Round Mt. #1 & #2 500-kV	Captain Jack 500-kV	2180	Captain Jack 500-kV	2137	-43
Round Mt.-Table Mt. #1 & #2 500-kV	Round Mt. 500-kV	2090	Round Mt. 500-kV	2083	-6
Table Mt.-Tesla & Table Mt.-Vaca_Dixon 500-kV	Table Mt. 500-kV	1988	Table Mt. 500-kV	1963	-25
Round Mt.-Malin & Round Mt.-Table Mt. 500-kV	Captain Jack 500-kV	1455	Malin 500-kV	1453	-2
Table Mt.-Round Mt. & Table Mt.-Vaca_Dixon 500-kV	Malin 500-kV	962	Malin 500-kV	1003	42
Tesla-Table Mt. & Tesla-Q171 500-kV	Vaca_Dixon 500-kV	2104	Vaca_Dixon 500-kV	2199	95
Tracy-Tesla & Tracy-Los Banos 500-kV	Malin 500-kV	1547	Captain Jack 500-kV	1495	-52
Tesla-Table Mt. & Tesla-Tracy 500-kV	Captain Jack 500-kV	1352	Captain Jack 500-kV	1253	-98
Vaca_Dixon-Table Mt. & Vaca_Dixon Transformer	Captain Jack 500-kV	1293	Captain Jack 500-kV	1196	-97
Two Unit Outage – No Increase in COI Flows					
Palo Verde 2-Unit Trip	Captain Jack 500-kV	661	Malin 500-kV	602	-59

6. ADDITIONAL SHORT-CIRCUIT STUDIES

Table 6-1 lists the available pre- and post-Project short circuit duty at the busses electrically adjacent to the Project. Based on discussions with Energy Commission staff, bus fault currents at the following locations were added to original list supplied in the SIS:

- Tulucay 230-kV,
- Lakeville 230-kV,
- Moraga 230-kV,
- Lambie 230-kV,
- Cortina 230-kV, and
- CPV Station 230-kV.

As shown in Table 6-1 the only appreciable increase in short circuit duty due to the addition of the Project occurred at the Vaca_Dixon and Peabody 230-kV busses.

Table 6-1: Short Circuit Study Results

Bus	Minimum Breaker Rating (Amps)	Pre-Project Fault Currents		Post-Project Fault Currents		Increase In Fault Current (%)
		Amps	% of Minimum	Amps	% of Minimum	
Vaca_Dixon 230-kV	40,000	49,008	122.5	52,835	132.1	7.8
Vaca_Dixon 500-kV	50,000	32,842	<90	33,594	<90	2.3
Peabody 230-kV	40,000	19,231	<90	20,339	<90	5.8
Lambie 230-kV	36,000	22,980	<90	23,844	<90	3.8
Birds Landing 230-kV	40,000	33,012	<90	33,850	<90	2.5
Contra Costa 230-kV	47,715	42,879	<90	43,354	90.9	1.1
Tulucay 230-kV		12,321		12,430		1.0
Lakeville 230-kV		20,699		20,817		2.0
Moraga 230-kV		29,256		29,405		1.0
Lambie 230-kV		22,980		23,844		3.8
Cortina 230-kV		11,024		11,111		1.0
CPVSTA 230-kV		20,570		20,768		1.0

PG&E applies the following policy to determine responsibility for projects that overstress or increase the level of overstress on existing circuit breakers:

- If a breaker is not overstressed before the project, and the project results in an overstressed condition of the breaker, then the project is responsible for the cost of replacement.
- If a breaker is already overstressed, and a project increases the overstress by 5% or more, or the post-Project overstress level exceeds 25%, then the project is responsible for the cost of replacement.

- If the overstress level exceeds 25% before the Project, and for all other circumstances, PG&E or other generation projects will be responsible for any replacement costs.

Based on the above policy it appears that the Project would be responsible for replacing at least some 230-kV circuit breakers at Vaca_Dixon.

7. TRANSIENT STABILITY STUDIES

At the request of Energy Commission staff the following additional outages were simulated for a 20 second period:

- 230-kV facilities:
  - A three-phase fault on the Vaca_Dixon-Q275 SWT #1 and #2 230-kV lines at the Q275 SWT 230-kV bus with normal clearing time followed by loss of the Vaca_Dixon-Q275 SWT #1 and #2 230-kV lines.
  - A three-phase fault on the Lambie 230-kV bus with normal clearing time followed by loss of the Q275 SWT-Lambie and Lambie-Birds Landing 230-kV lines.
  - A three-phase fault on Peabody-Birds Landing and Lambie-Birds Landing 230-kV lines at the Birds Landing 230-kV bus with normal clearing time followed by loss of the Peabody-Birds Landing and Lambie-Birds Landing 230-kV lines.
- 500-kV facilities:
  - A three-phase fault on the Vaca_Dixon 500-kV bus with normal clearing time followed by the loss of the Vaca_Dixon-Table Mountain 500-kV line and the Vaca_Dixon #1 500/230-kV transformer.
  - A three-phase fault on the Vaca_Dixon 500-kV bus with normal clearing time followed by the loss of the Vaca_Dixon-Tesla 500-kV line and the Table Mountain-Tesla 500-kV line.

Review of the resultant stability study plots (contained in Appendix B) indicates that the system is stable and damped and meets all NERC/WECC Criteria for these additional simulations.

8. UPDATED SIS SUMMARY TABLES

Updates to SIS Tables 6-2, 6-3 and 6-4

Energy Commission staff noted that a post-contingency value for the line loading in amps was not included in the certain summary tables (Tables 6-2, 6-3 and 6-5) of the System Impact Study, when the loadings on a given line were less than 98% of the line's rating. Tables 8-1, 8-2 and 8-3 contain the information requested.

In addition the tables include additional information on the Category C overloads noted on Vaca_Dixon-Project #1 and #2 230-kV lines.

Table 8-1: Category "A" Normal Overloads (Supplemental)

Overloaded Component	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
2013 Summer Peak						
C. Costa – Brentwood 230-kV Line	825	770	93.3	878	106	13
McMullin 1 – Panoche 230-kV Line	825	853	103	860	104	0.8
Q171 – Tesla 500-kV Line	2,430	2,119	87.2	2,488	102	15.2
Wilson-Warnerville 230-kV Line	675	742	110	796	118	8
Moraga 230/115-kV Bk #1	134.4 (MVA)	140	104	142	105	1.2
Moraga 230/115-kV Bk #2	134.4 (MVA)	138	103	140	140	1.1
2013 Spring Peak						
Q250TAP1 – Cortina 115-kV Line	587	761	130	758	129	-0.5
Tesla – Q171 500-kV Line	2,430	2,391	98.4	2,764	114	15.4
2013 Summer Off-Peak						
Q250TAP1 – Cortina 115-kV Line	587	1,000	170	999	170	-0.2

Table 8-2: Category "B" Emergency Overloads

Overloaded Component	Worst Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
Summer Peak – 230-kV Lines							
Bahia-Q257 SWST 230-kV	L-1/G-1 (Parkway-Moraga line and DEC)	954	1,004	105	1,069	112	6.9
Birds Landing-CC Sub	L-1/G-1 (Birds Landing-Contra Costa line and Gateway)	1,893	2,309	122	2,640	140	17.5
Birds Landing-Contra Costa	L-1/G-1 (Birds Landing-CC Sub line and Gateway)	1,893	2,362	125	2,701	143	17.9
Cayetano-North Dublin	L-1/G-1 (Contra Costa-Las Positas line and DEC)	1,004	984	98	1,045	104	6.1
CC Sub-Contra Costa	L-1/G-1 (Birds Landing-Contra Costa line and Gateway)	1,893	2,000	106	2,329	123	17.4
Las Positas-Newark	L-1/G-1 (Contra Costa-Lonetree line and DEC)	975	955	97.9	1,027	105	7.4
Parkway-Moraga	L-1/G-1 (Moraga-Q177 line and DEC)	1,140	1,140	100	1,218	107	6.7
Parkway-Q257SWT	L-1/G-1 (Moraga-Q177 line and DEC)	1,126	1,220	108	1,297	115	6.9
Q177-Moraga	L-1/G-1 (Parkway-Moraga line and DEC)	964	999	104	1,065	110	6.8
Wilson-Warnerville	L-1 (Tesla-Newark 230-kV line)	793	757	95.4	809	102	6.6
Summer Peak – 230-kV Transformers							
Moraga 230/115 #1	T-1 (Moraga 230/115 #3 transformer)	161	226	140	230	143	2.6
Moraga 230/115 #2	T-1 (Moraga 230/115 #3 transformer)	161	223	139	225	141	2.6
Moraga 230/115 #3	L-1/G-1 (San Ramon-Moraga 230-kV line and DEC)	463	470	102	481	104	2.2
Newark 230/115 #11	T-1 (Newark 230/115 #7 transformer)	462	461	99.7	467	101	1.4
Spring Peak – 230-kV Lines							
Bahia-Q257 SWST 230-kV	L-1/G-1 (Parkway-Moraga line and DEC)	954	968	101	1,036	109	7.1
Birds Landing-CC Sub	L-1/G-1 (Birds Landing-Contra Costa line and Gateway)	1,893	2,438	129	2,750	145	16.5

Birds Landing-Contra Costa	L-1/G-1 (Birds Landing-CC Sub line and Gateway)	1,893	2,498	132	2,817	149	16.9
CC Sub-Contra Costa	L-1/G-1 (Birds Landing-Contra Costa line and Gateway)	1,893	2,173	115	2,484	131	16.5
Parkway-Moraga	L-1/G-1 (Moraga-Q177 line and DEC)	1,140	1,133	99.4	1,213	107	7.1
Parkway-Q257SWT	L-1/G-1 (Moraga-Q177 line and DEC)	1,126	1,197	106	1,277	113	7.1
Q177-Moraga	L-1/G-1 (Parkway-Moraga line and DEC)	964	997	103	1,065	111	7.1
Spring Peak – Other Lines							
Tesla-Q171 500-kV	L-1 (Contra Costa-Birds Landing line)	2,816	2,478	88	2,869	102	13.9
Q250Tap1-Cortina 115-kV	L-1 (CPVSTA-Cortina line)	668	820	123	811	122	-1.4
Spring Peak – 230-kV Transformers							
Moraga 230/115 #1	T-1 (Moraga 230/115 #3 transformer)	161	166	103	170	106	2.5
Moraga 230/115 #2	T-1 (Moraga 230/115 #3 transformer)	161	164	102	168	104	2.5
Summer Off-Peak – 230-kV Lines							
Birds Landing-CC Sub	L-1/G-1 (Birds Landing-Contra Costa line and Gateway)	1,893	1,321	69.8	2,012	106	36.5
Birds Landing-Contra Costa	L-1/G-1 (Birds Landing-CC Sub line and Gateway)	1,893	1,355	71.6	2,067	109	37.6
CC Sub-Contra Costa	L-1/G-1 (Birds Landing-Contra Costa line and Gateway)	1,893	1,232	65.1	1,926	101	36
Vaca_Dixon-Project #1 line	Vaca_Dixon-Project #2 line	1,893	-----	-----	1,962	104	
Vaca_Dixon-Project #2 line	Vaca_Dixon-Project #1 line	1,893	-----	-----	1,962	104	
Summer Off-Peak – Other Lines							
Q250Tap1-Cortina 115-kV	L-1 (Fulton-Ignacio line)	668	1,020	153	1,019	153	-0.2

Table 8-3: Category "C" Emergency Overloads

Overloaded Component	Worst Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
Summer Peak – 230-kV Lines							
Bahia-Q257SWT	L-2 (Parkway-Moraga and Parkway-Q257SWT lines)	954	912	95.6	980	103	7.2
Birds Landing-CC Sub	230-kV Bus Fault (Contra Costa Section 1D)	1,893	1,994	105	2,339	124	18.2
Cayetano-North Dublin	L-2 (Contra Costa-Brentwood and Contra Costa-Delta Pump lines)	1,004	981	97.7	1,066	106	8.5
Contra Costa-Birds Landing	230-kV Bus Fault (CC Sub Section 1)	1,893	2,005	106	2,360	125	18.7
Contra Costa-Brentwood	L-2 (Contra Costa-Las Positas and Contra Costa-Lone Tree lines)	1,130	1,130	100	1,263	112	11.8
Contra Costa-CC Sub	230-kV Bus Fault (Contra Costa Section 1D)	1,893	1,690	89.3	2,035	108	18.2
Ignacio-Fulton line	L-2 (Lakeville-Ignacio #1 and Ignacio-Sobrante lines)	975	1,011	104	1,013	104	0.2
Las Positas-Newark D	L-2 (Contra Costa-Brentwood and Contra Costa-Delta Pump lines)	975	983	101	1,090	112	11
Newark Bus Tie	L-2 (Contra Costa-Las Positas and Contra Costa-Lone Tree lines)	1,599	1,597	99.9	1,623	102	1.6
North Dublin-Vineyard	L-2 (Contra Costa-Brentwood and Contra Costa-Delta Pump lines)	1,005	919	91.4	1,017	101	9.8
Parkway-Moraga	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,140	1,057	92.7	1,166	102	9.6
Parkway-Q257SWT	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,126	1,135	101	1,245	111	9.8
Q177-Moraga	L-2 (Parkway-Moraga and Parkway-Q257SWT lines)	964	908	94.2	975	101	7
Vaca_Dixon-Project Tap #1	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,893	-----	-----	2,207	117	-----
Vaca_Dixon-Project Tap #2	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,893	-----	-----	2,207	117	
2013 Summer Peak – 500-kV Lines							
Q171-Tesla	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	2,816	2,622	93.1	3,075	109	16.1
Table Mountain-Tesla	L-2 (Q171-Tesla and Birds Landing-Peabody lines)	2,730 [2]	2,770	102	3,003	110	8.5
2013 Summer Peak – 230-kV Transformers							

[2] Pre-contingency loading exceeded maximum allowable level.

Moraga 230/115 #1	230-kV Bus Fault (Moraga Section 1)	161	212	132	216	134	2.4
Moraga 230/115 #2	230-kV Bus Fault (Moraga Section 1)	161	209	130	213	132	2.3
Newark 230/115 #11	230-kV Bus Fault (Newark D Section 1D)	462	484	105	493	107	2
2013 Spring Peak – 230-kV Lines							
Birds Landing-CC Sub	230-kV Bus Fault (Contra Costa Section 1D)	1,893	2,122	112	2,447	129	17.2
Contra Costa-Birds Landing	230-kV Bus Fault (CC Sub Section 1)	1,893	2,138	113	2,472	131	17.7
Contra Costa-CC Sub	230-kV Bus Fault (Contra Costa Section 1D)	1,893	1,865	98.6	2,190	116	17.1
Parkway-Moraga	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,140	1,070	93.9	1,180	104	9.7
Parkway-Q257SWT	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,126	1,134	101	1,244	111	9.8
Q177-Moraga	L-2 (Parkway-Moraga and Parkway-Q257SWT lines)	964	904	93.8	976	101	7.4
Vaca_Dixon-Project Tap #1	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,893	-----	-----	2,038	108	
Vaca_Dixon-Project Tap #2	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,893	-----	-----	2,038	108	
2013 Spring Peak – 500-kV Lines							
Q171-Tesla	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	2,816	2,933	104	3,387	120	16.1
Q171-Vaca_Dixon	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	2,816 [2]	-----	84.7	2,842	101	>2
Table Mountain-Tesla	L-2 (Q171-Tesla and Birds Landing-Peabody lines)	2,730 [2]	3,045	112	3,288	120	8.9
2013 Spring Peak – 230-kV Transformers							
Moraga 230/115 #1	230-kV Bus Fault (Moraga Section 1)	161	164	102	167	104	1.8
Moraga 230/115 #2	230-kV Bus Fault (Moraga Section 1)	161	162	101	165	102	1.7
2013 Summer Off-Peak – 230-kV Lines							
Birds Landing-CC Sub	L-2 (Vaca_Dixon-Project #1 and #2 lines)	1,893	-----	<98	2,021	107	>9
Contra Costa-Birds Landing	L-2 (Vaca_Dixon-Project #1 and #2 lines)	1,893	-----	<98	2,026	117	>19
Contra Costa-CC Sub	L-2 (Vaca_Dixon-Project #1 and #2 lines)	1,893	-----	<98	1,938	102	>4
Vaca_Dixon-Project Tap #1	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,893	-----	-----	2,084	110	
Vaca_Dixon-Project Tap #2	L-2 (Birds Landing-Contra Costa and Birds Landing-CC Sub lines)	1,893	-----	-----	2,084	110	

Updates to SIS Tables 11-1 and 11-2

Tables 11-1 and 11-2 in the SIS contain a column entitled "Maximum Generation Without Overload" which presents the amounts of Project generation that could be on-line without resulting in overloads on the existing pertinent facilities for the conditions studied. Energy Commission staff suggested that the Tables be reformatted to clarify the intent of the column entitled "Maximum Generation Without Overloads". In addition, Energy Commission staff requested information be added to Table 11-1 relative to:

- The size of the underground cable used on the Cayetano-North Dublin 230-kV UG line.
- The length of the Project-Vaca_Dixon 230-kV lines.

Tables 8-4 and 8-5 reflect the above requested changes.

Table 8-4: Mitigation of Category "A" and "B" Overloads

Over Loaded Facility	Existing Conductor		Post-Project Loading	Proposed Conductor		Maximum Allowable Generation Without Cat. A or B Overload
	Size	Ratings Normal/ Emergency (Amps)	(Amps)	Size	Ratings Normal/ Emergency (Amps)	
Mitigation of Category A Overloads						
Tesla-Q171 500-kV line (41 Miles)	Bundled 2300 AAC	2,430/3,379 [3]	2,764 4,079 [4]	Bundled 1272 ACSS[5]	4,100 4,100	75
Contra Costa-Brentwood 230-kV line (9 miles)	795 ACSR	825 /1,130	878 1,263 [6]	795 SSAC	1,516	312
Mitigation of Category B Overloads						
Vaca_Dixon-Q171 500-kV line (17 miles)	Bundled 2300 AAC	2,430/3,339 [3]	3,532 [4]	Bundled 1272 ACSS[5]	4,100 4,100	0
Parkway-Moraga 230-kV line (23 miles)	477 SSAC	1,140/1,140	1,218	795 SSAC	1,516	0 [7]
Cayetano-North Dublin 230-kV line (5 miles – underground)	UG	1,004/1,004	1,045 1,066 [6]	UG (477 SSAC Eq.)	1,126	250
Newark 230/115-kV #11 transformer	n/a	462 (MVA)	467 (MVA) 493 (MVA) [6]	-----	-----	312
Las Positas-Newark 230-kV line (22 miles)	1113 AL	825/975	1,027 1,090 [6]	477 SSAC	1,126	210
Vaca_Dixon-Project Tap #1 230-kV line (4 miles)	1113 SSAC [8]	1,893/1,893	1,962 2,207 [6]	-----	-----	655
Vaca_Dixon-Project Tap #2 230-kV line (4 miles)	1113 SSAC [8]	1,893/1,893	1,962 2,207 [6]	-----	-----	655

[3] Short-term emergency rating.
[4] Category B loading from governor power flow studies.
[5] Assumes that existing structures can accommodate the proposed conductors.
[6] Post-Project Category C loading (per power flow studies).
[7] Pre-Project loading on line is 100%.
[8] Information from PG&E indicates that larger conductors could not be installed on existing towers.

Table 8-5: Mitigation of Category "C" Overloads

Over Loaded Line	Existing Conductor		Post-Project Loading	Proposed Conductor		Maximum Allowable Generation Without Cat. C Overload
	Size	Ratings Normal/ Emergency (Amps)	(Amps)	Size	Ratings Normal/ Emergency (Amps)	
Newark 230-kV Bus Tie 230-kV	-----	1,599/1,599	1,623	954 ACSS	1,700	0
North Dublin-Vineyard 230-kV (20 miles)	-----	886/1,005	1,017	477 SSAC	1,126	650

Updates to SIS Table 14-1

Section 14 of the SIS presents the results of studies done to assess how the various overloads noted in the SIS would be impacted if the amounts of wind generation interconnected with the Birds Landing substation were reduced. The pertinent summary table in the SIS (Table 14-1) does not list the critical outages associated with the noted line loadings and Energy Commission staff requested that such be added to the table. Table 8-6 contains the requested information.

Table 8-6: Results of Wind Generation Level Sensitivity Studies

Impacted Line	Line Rating (Amps)	Line Loading (%)				
		Pre-Project		Post-Project		
		100% Wind	70% Wind	100% Wind	70% Wind	45% Wind
Category B Overloads						
Overlapping Outage – Parkway-Moraga line and DEC						
Bahia-Q257	954	105.2	106.0	112.1	113.2	114.0
Moraga-Q177	963	103.6	104.4	110.4	111.6	112.4
Overlapping Outage – Q177-Moraga line and DEC						
Parkway-Moraga	1,140	100.1	100.8	106.8	108.0	108.8
Parkway-Q257	1,126	108.3	109.1	115.2	116.3	117.1
Overlapping Outage – Birds Landing-Contra Costa line and Gateway						
Birds Landing-CC Sub	1,893	122.0	<98	139.5	114.2	98.6
Overlapping Outage – Birds Landing-CC Sub line and Gateway						
Birds Landing-Contra Costa	1,893	124.8	99.9	142.7	116.7	100.6
Category C Overloads						
Parkway-Moraga and Parkway-Q157 lines						
Bahia-Q257	954	<98	<98	102.8	103.8	104.6
Moraga-Q177	963	<98	<98	101.2	102.3	103.1
Contra Costa-Brentwood and Contra Costa-Delta Pumps lines						
Las Positas-Newark	975	100.8	<98	111.8	99.4	<98
Birds Landing-Contra Costa and Birds Landing-CC Sub lines						

Parkway-Q257	1,126	100.8	<98	110.6	105.5	105.9
Vaca_Dixon-Project Tap #1	1,893	-----	-----	116.6	<98	<98
Vaca_Dixon-Project Tap #2	1,893	-----	-----	116.6	<98	<98

APPENDIX A
POWERFLOW SENSITIVITY RESULTS
DETAILED INFORMATION

Table A-1: Comparison of Facility Loadings Impacts of Removing Q171 Project (Summer Peak Load Conditions)

	Original Cases Used in the SIS			With 500 MW Wind Project (Q171) Off-Line		
	Pre-Project (%)	Post-Project (%)	Overload New or Increased	Pre-Project (%)	Post-Project (%)	Overload New or Increased
Category A - 500-kV Lines						
Q171-Tesla 500-kV line	<98	102.4	New	n/a	n/a	n/a
Vaca_Dixon-Tesla 500-kV line	n/a	n/a	n/a	83.2	97.9	n/a
Category A - 230-kV Lines						
Contra Costa-Brentwood 230-kV line	<98	106.3	New	87.7	100.7	New
Category B - 500-kV Lines						
Q171-Tesla 500-kV line	<95	131.6 1/	New	n/a	n/a	n/a
Vaca_Dixon-Tesla 500-kV line	n/a	n/a	n/a	<95	123.5 1/	n/a
Category B - 230-kV Lines/Transformers						
Birds Landing-Contra Costa 230-kV line	124.8	142.7	Inc.	117.9	136.0	Inc.
Birds Landing-CC Sub 230-kV line	122.0	139.5	Inc.	115.3	132.9	Inc.
Parkway-Q257SWT 230-kV line	108.2	115.1	Inc.	102.7	109.4	Inc.
CC Sub-Contra Costa 230-kV line	105.7	123.0	Inc.	99.0	116.6	New
Bahia-Q257SWT 230-kV line	105.1	112.0	Inc.	99.7	106.3	New
Q177-Moraga 230-kV line	103.5	110.4	Inc.	98.1	104.7	New
Parkway-Moraga 230-kV line	100.0	106.8	New	94.6	101.2	New
Newark 230/115-kV #11 transformer	99.6	101.0	New	98.4	99.5	n/a
Cayetano-North Dublin 230-kV line	98.1	104.1	New	95.3	101.3	New
Las Positas-Newark 230-kV line	<98	105.4	New	94.4	101.9	New
Contra Costa-Brentwood 230-kV line	<98	101.9	New	83.5	96.1	n/a
Category C - 500-kV Lines						
Q171-Tesla 500-kV line	96.7	135.6 1/	New	n/a	n/a	n/a
Vaca_Dixon-Tesla 500-kV line	n/a	n/a	n/a	90.8	127.7 1/	New
Category C - 230-kV Lines/Transformers						
Birds Landing-Contra Costa 230-kV line	106.0	124.7	Inc.	99.1	117.9	New
Birds Landing-CC Sub 230-kV line	105.4	123.6	Inc	98.7	117.0	New
Parkway-Q257SWT 230-kV line	100.8	110.6	Inc	94.8	104.4	New
Las Positas-Newark 230-kV line	100.8	111.8	Inc	95.7	107.0	New
Contra Costa-Brentwood 230-kV line	99.9	111.8	New	94.9	106.8	New

	Original Cases Used in the SIS			With 500 MW Wind Project (Q171) Off-Line		
	Pre-Project (%)	Post-Project (%)	Overload New or Increased	Pre-Project (%)	Post-Project (%)	Overload New or Increased
Vaca_Dixon-Project Tap #1 230-kV line	n/a	116.6	New	n/a	116.4	New
Vaca_Dixon-Project Tap #2 230-kV line	n/a	116.6	New	n/a	116.4	New
Contra Costa-CC Sub 230-kV line	<98	107.5	New	<98	100.9	New
Cayetano-North Dublin 230-kV line	<98	106.2	New	<98	102.5	New
Bahia-Q257SWT 230-kV line	<98	102.7	New	<98	<98	n/a
Parkway-Moraga 230-kV line	<98	102.3	New	<98	<98	n/a
North Dublin-Vineyard 230-kV line	<98	101.2	New	<98	<98	n/a
Q177-Moraga 230-kV line	<98	101.2	New	<98	<98	n/a
[1/] Short-term emergency ratings could not be applied because Category A loading is too high						

Table A-2: Comparison of Facility Loadings Impacts of Removing Q171 Project (Spring Peak Load Conditions)

	Original Cases Used in the SIS			With 500 MW Wind Project (Q171) Off-Line		
	Pre-Project (%)	Post-Project (%)	Overload New or Increased	Pre-Project (%)	Post-Project (%)	Overload New or Increased
Category A - 500-kV Lines						
Q171-Tesla 500-kV line	98.4	113.8	New	n/a	n/a	n/a
Vaca_Dixon-Tesla 500-kV line	n/a	n/a	n/a	<98	109.0	New
Category B - 500-kV Lines						
Q171-Tesla 500-kV line [1/]	130.1	144.9	Inc.	n/a	n/a	n/a
Vaca_Dixon-Tesla 500-kV line [1/]	n/a	n/a	n/a	122.3	136.6	Inc.
Category B - 230-kV Lines/Transformers						
Birds Landing-Contra Costa 230-kV line	132.0	148.8	Inc.	125.0	142.0	Inc.
Birds Landing-CC Sub 230-kV line	128.8	145.2	Inc.	122.0	138.6	Inc.
CC Sub-Contra Costa 230-kV line	114.8	131.2	Inc.	108.1	124.6	Inc.
Parkway-Q257SWT 230-kV line	106.3	113.4	Inc.	100.6	107.6	Inc.
Q177-Moraga 230-kV line	103.3	110.4	Inc.	<98	104.7	New
Bahia-Q257SWT 230-kV line	101.3	108.5	Inc.	<98	102.7	New
Parkway-Moraga 230-kV line	99.4	106.4	New	<98	100.7	New
Category C - 500-kV Lines						

Q171-Tesla 500-kV line [1/]	135.8	149.7	Inc.	n/a	n/a	n/a
Vaca_Dixon-Tesla 500-kV line [1/]	n/a	n/a	n/a	128.1	141.6	Inc.
Category C - 230-kV Lines						
Birds Landing-Contra Costa 230-kV line	112.9	130.6	Inc.	106.0	123.7	Inc.
Birds Landing-CC Sub 230-kV line	112.1	129.3	Inc.	105.4	122.6	Inc.
Parkway-Q257SWT 230-kV line	100.7	110.5	Inc.	<98	104.1	New
Contra Costa-CC Sub 230-kV line	98.6	115.7	New	<98	109.0	New
Vaca_Dixon-Project Tap #1 230-kV line	n/a	107.7	New	n/a	107.3	New
Vaca_Dixon-Project Tap #2 230-kV line	n/a	107.7	New	n/a	107.3	New
Parkway-Moraga 230-kV line	<98	103.6	New	<98	<98	n/a
Q177-Moraga 230-kV line	<98	101.2	New	<98	<98	n/a
[1/] Short-term emergency ratings could not be applied because Category A loading is too high						

Table A-3: Comparison of Facility Loadings – Impacts of Energy Commission Recommended Projects (Summer Peak Load Conditions)

	Original Cases Used in the SIS			With added CEC Recommended Generation Tesla CC @ 578 MW RCEC @ 600 MW LECEF @ 140 MW		
	Pre-Project (%)	Post-Project (%)	Overload New or Increased	Pre-Project (%)	Post-Project (%)	Overload New or Increased
Category A - 500-kV Lines						
Q171-Tesla 500-kV line	<98	102.4	New	<98	105.4	New
Category A - 230-kV Line						
Contra Costa-Brentwood 230-kV line	<98	106.3	New	100.1	112.4	Inc.
Category B - 500-kV Line						
Q171-Tesla 500-kV line	92.8	131.6 [1/]	New	119.8[1/]	134.0[1/]	Inc.
Category B - 230-kV Lines/Transformers						
Birds Landing-Contra Costa 230-kV line	124.8	142.7	Inc.	120.5	138.3	Inc.
Birds Landing-CC Sub 230-kV line	122.0	139.5	Inc.	117.9	135.2	Inc.
Parkway-Q257SWT 230-kV line	108.2	115.1	Inc.	101.9	108.5	Inc.
CC Sub-Contra Costa 230-kV line	105.7	123.0	Inc.	101.8	119.1	Inc.
Bahia-Q257SWT 230-kV line	105.1	112.0	Inc.	98.8	105.4	New
Q177-Moraga 230-kV line	103.5	110.4	Inc.	<98	103.8	New
Parkway-Moraga 230-kV line	100.0	106.8	New	<98	100.3	New
Newark 230/115-kV #11 transformer	99.6	101.0	New	<98	<98	n/a
Cayetano-North Dublin 230-kV line	98.1	104.1	New	<98	101.6	New

Las Positas-Newark 230-kV line	<98	105.4	New	<98	100.1	n/a
Contra Costa-Brentwood 230-kV line	<98	101.9	New	<98	107.2	New
Category C - 500-kV Lines						
Q171-Tesla 500-kV line	96.7	135.6[1/]	New	123.3[1/]	136.6[1/]	Inc.
Category C - 230-kV Lines/Transformers						
Birds Landing-Contra Costa 230-kV line	106.0	124.7	Inc.	102.0	120.5	Inc.
Birds Landing-CC Sub 230-kV line	105.4	123.6	Inc.	101.5	119.4	Inc.
Parkway-Q257SWT 230-kV line	100.8	110.6	Inc.	<98	104.6	New
Las Positas-Newark 230-kV line	100.9	111.9	Inc.	<98	107.0	New
Contra Costa-Brentwood 230-kV line	99.9	111.8	New	103.1	114.4	Inc.
Vaca_Dixon-Project Tap #1 230-kV line	<98	116.6	New	<98	116.6	New
Vaca_Dixon-Project Tap #2 230-kV line	<98	116.6	New	<98	116.6	New
Contra Costa-CC Sub 230-kV line	<98	107.5	New	<98	103.5	New
Cayetano-North Dublin 230-kV line	<98	106.2	New	<98	102.2	New
Bahia-Q257SWT 230-kV line	<98	102.7	New	<98	<98	n/a
Parkway-Moraga 230-kV line	<98	102.3	New	<98	<98	n/a
North Dublin-Vineyard 230-kV line	<98	101.2	New	<98	<98	n/a
Q177-Moraga 230-kV line	<98	101.2	New	<98	<98	n/a
Weber-Q172 230-kV line	<98	<98	n/a	99.3	101.7	New
Newark 230/115-kV #11 transformer	106.7	108.7	Inc.	99.1	100.8	New

[1/] Short-term emergency ratings could not be applied because Category A loading is too high

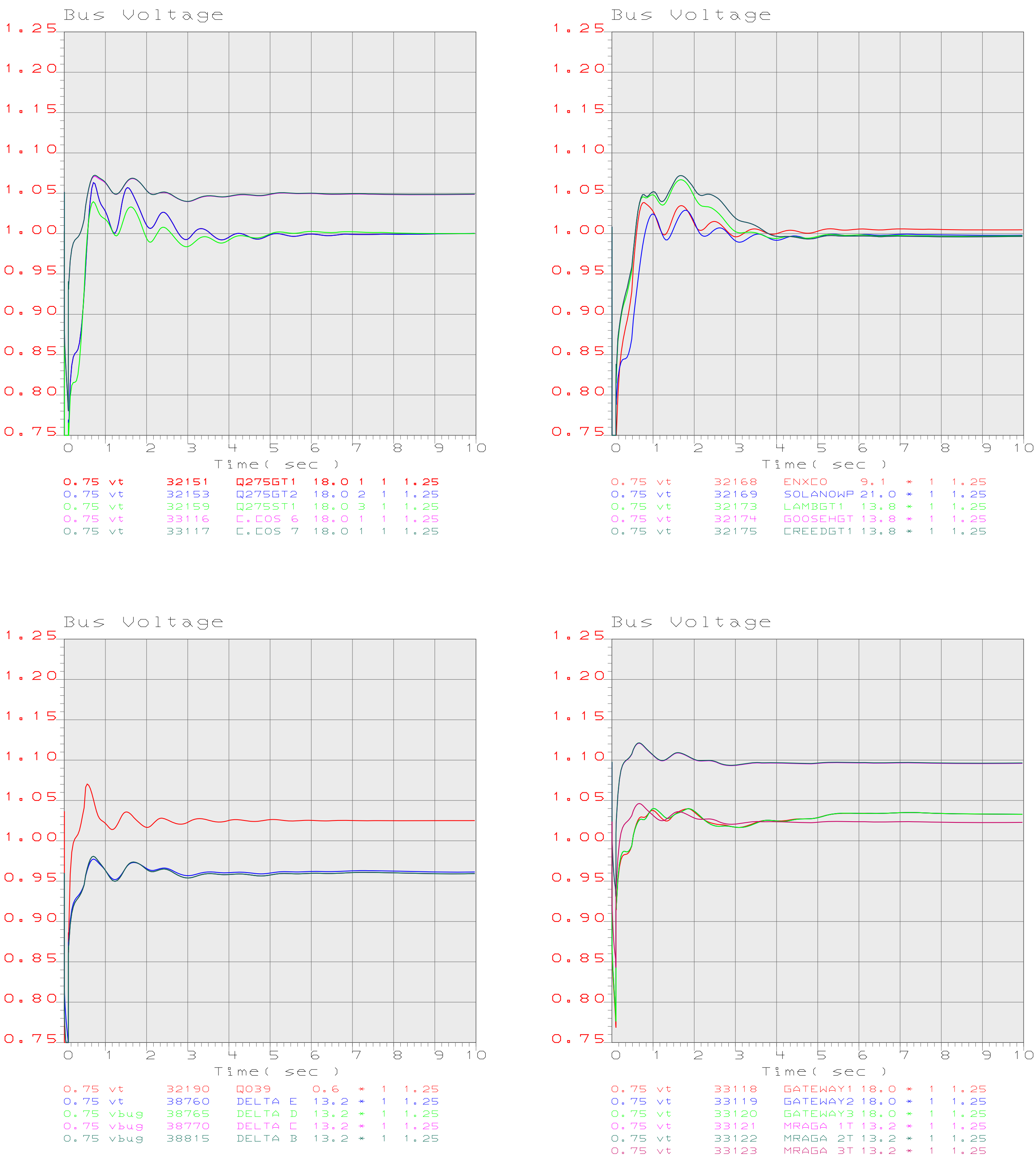
APPENDIX B
TRANSIENT STABILITY STUDIES

CAISO Category "C"

(230-kV Facilities)

A three-phase fault on the Vaca_Dixon-Q275 SWT #1 and #2 230-kV lines at the Q275 SWT 230-kV bus with normal clearing time followed by loss of the Vaca_Dixon-Q275 SWT #1 and #2 230-kV lines.

Bus Voltage

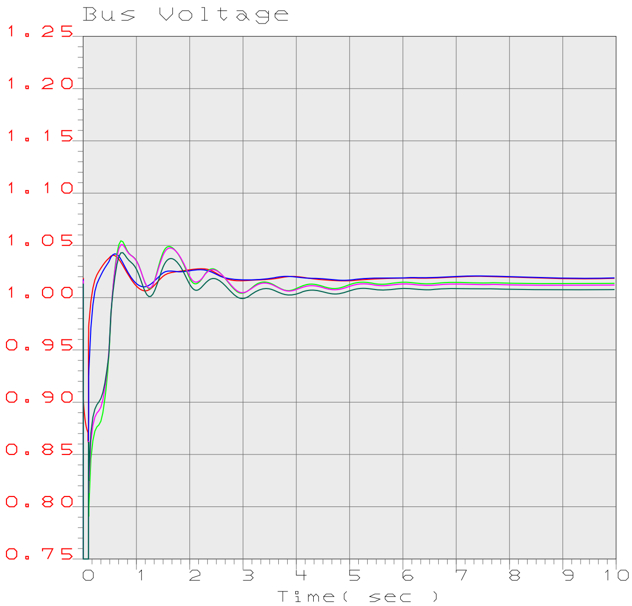


PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca - Q275SWST #1&2 230 kV Double Line Out

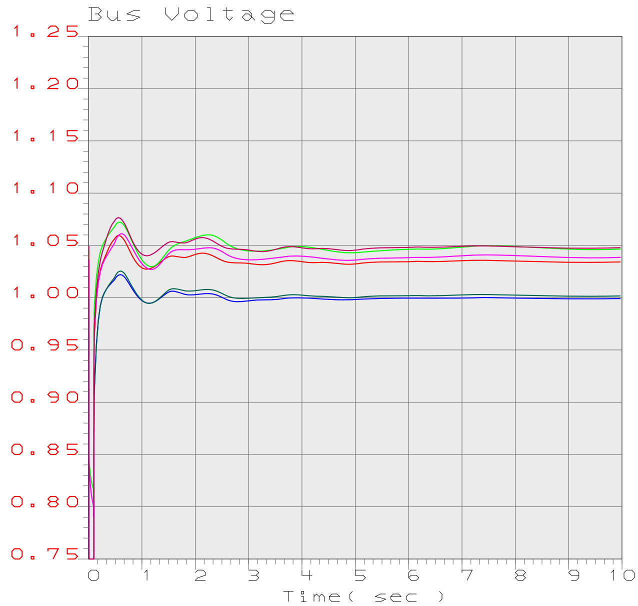
2013sumpk_q275_pst_changed2_VACA-Q275-2.chf

Mon Nov 03 15:07:43 2008

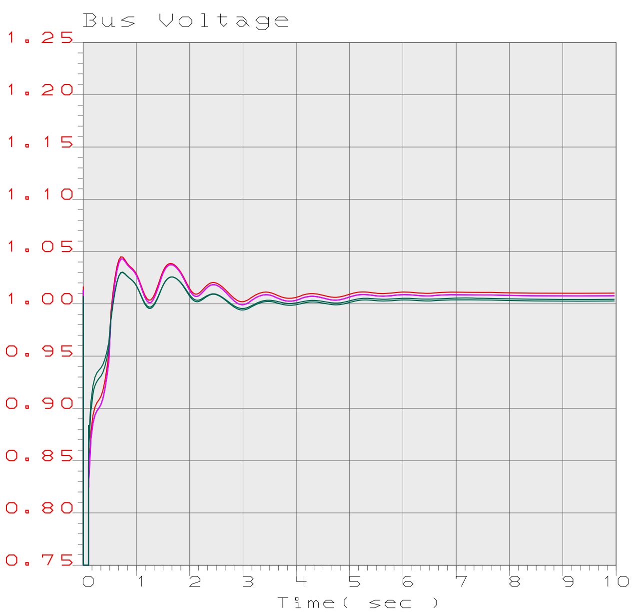
Bus Voltage and Frequency



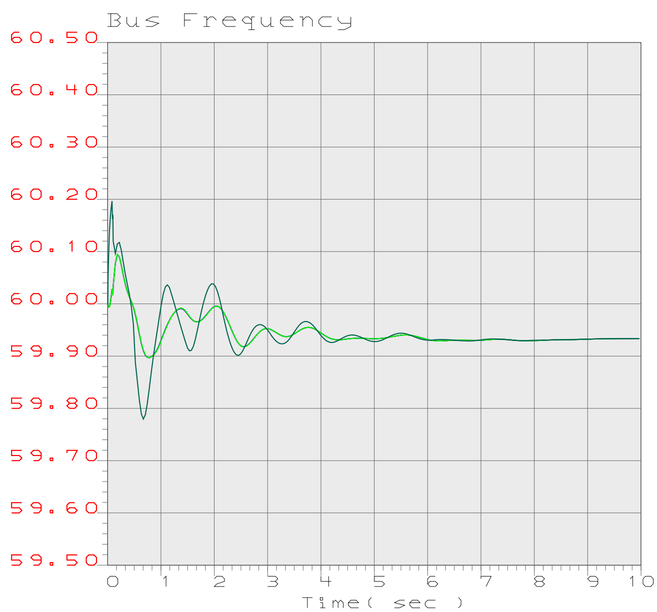
0.75 vbus 30300 TBL MT D 230.0* 1 1.25
0.75 vbus 30460 VACA-DIX 230.0* 1 1.25
0.75 vt 30472 PEABODY 230.0* 1 1.25
0.75 vbus 30478 LAMBIE 230.0* 1 1.25
0.75 vbus 30479 BDLSWSTA 230.0* 1 1.25



0.75 vbus 30450 CORTINA 230.0* 1 1.25
0.75 vbus 30435 LAKEVILE 230.0* 1 1.25
0.75 vbus 30015 TABLE MT 500.0* 1 1.25
0.75 vbus 30040 TESLA 500.0* 1 1.25
0.75 vbus 30440 TULUCAY 230.0* 1 1.25
0.75 vbus 30114 CPVSTA 230.0* 1 1.25



0.75 vbus 30476 SHILO 230.0* 1 1.25
0.75 vbus 30477 SHILOHTP 230.0* 1 1.25
0.75 vbus 30480 USWP-RUS 230.0* 1 1.25
0.75 vbul 30523 CC SUB 230.0* 1 1.25
0.75 vbus 30525 C.COSTA 230.0* 1 1.25



59.5 fbus 30551 MRAGA_1M 13.2 * 1 60.5
59.5 fbus 30552 MRAGA_2M 13.2 * 1 60.5
59.5 fbus 30553 MRAGA_3M 13.2 * 1 60.5
59.5 fbus 32189 Q039 34.5 * 1 60.5

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca - Q275SWST #1&2 230 kV Double Line Out

2013sumpk_q275_pst_changed2_VACA-Q275-2.chf

Mon Nov 03 15:07:43 2008

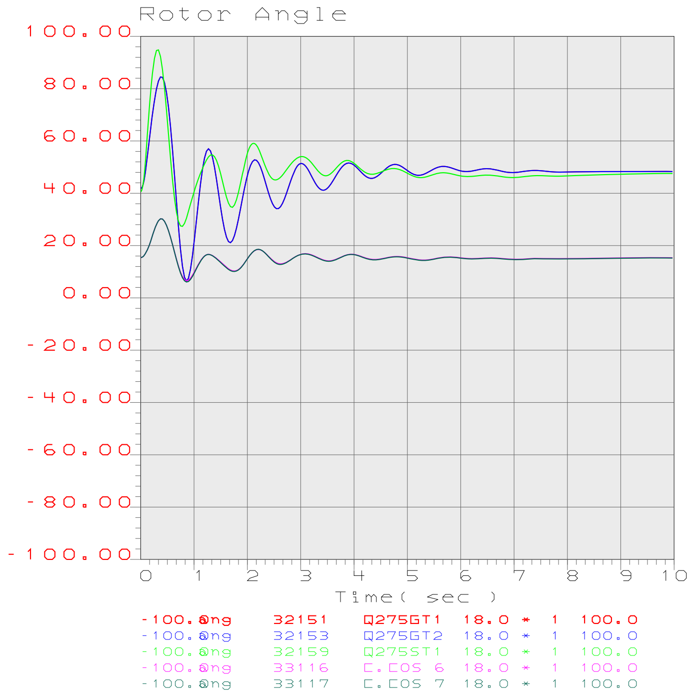
Bus Frequency and Rotor Speed

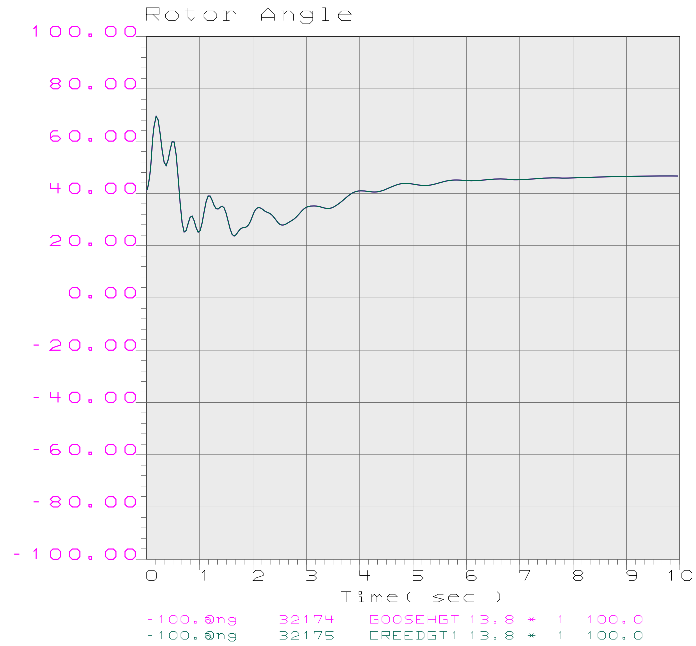
PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca - Q275SWST #1&2 230 kV Double Line Out

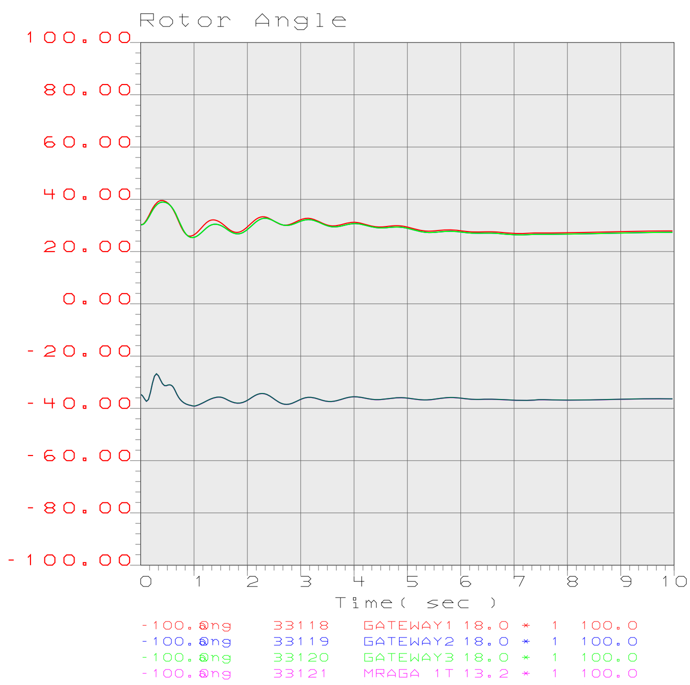
2013sumpk_q275_pst_changed2_VACA-Q275-2.chf

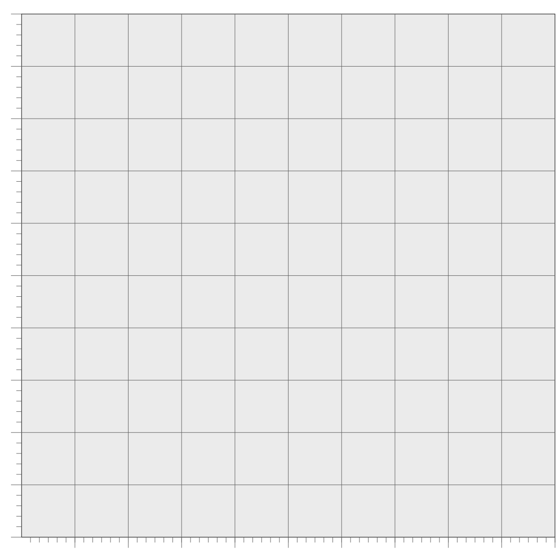
Mon Nov 03 15:07:44 2008

Rotor Angle









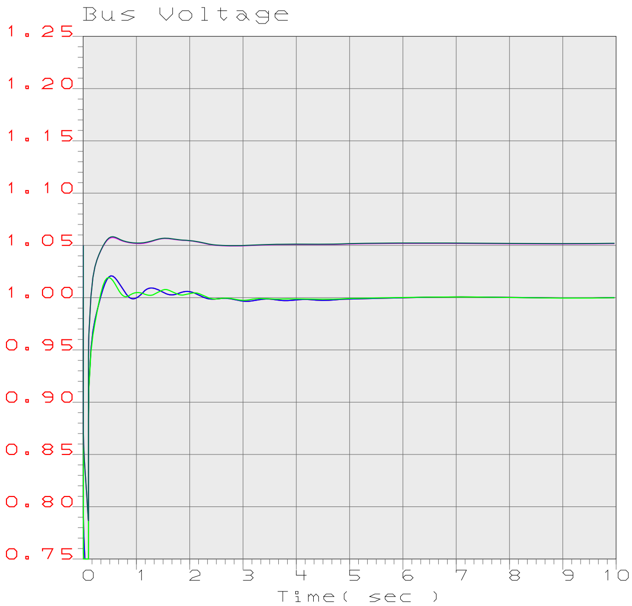
PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca - Q275SWST #1&2 230 kV Double Line Out

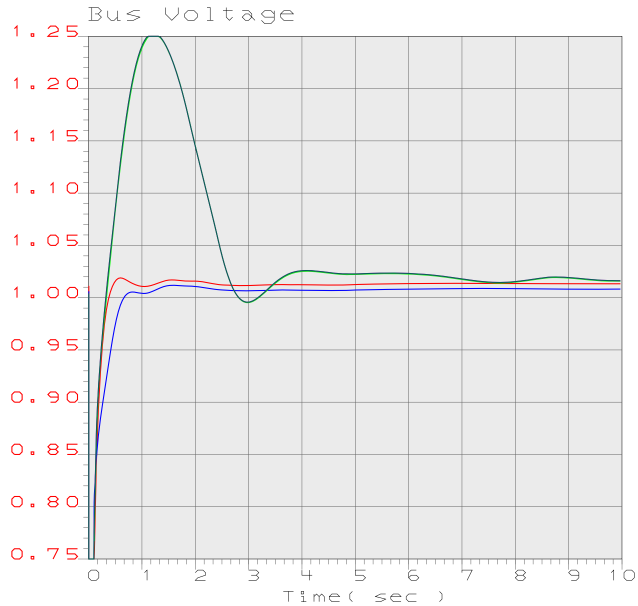
2013sumpk_q275_pst_changed2_VACA-Q275-2.chf

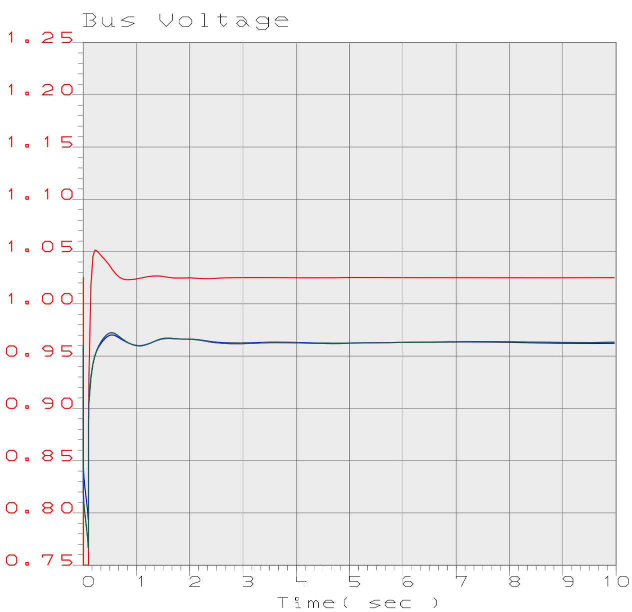
Mon Nov 03 15:07:44 2008

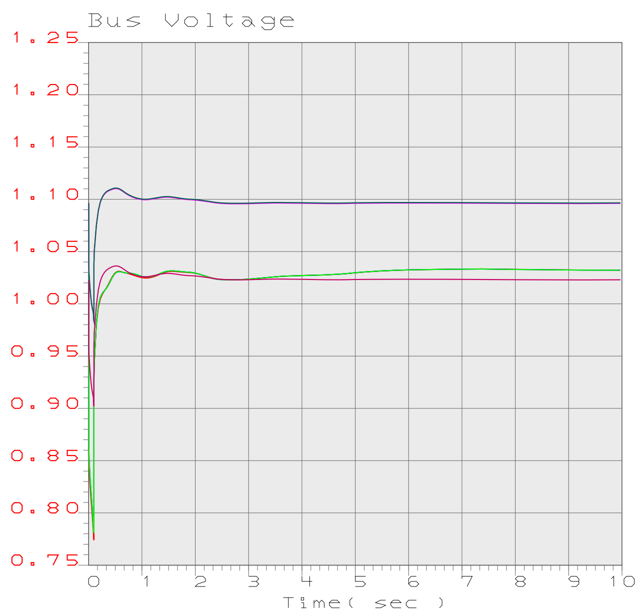
A three-phase fault on the Lambie 230-kV bus with normal clearing time followed by loss of the Q275 SWT-Lambie and Lambie-Birds Landing 230-kV lines.

Bus Voltage









PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Lambie - Q275SWST and Lambie - Birds 230 kV Double Line Out

2013sumpk_q275_pst_LAMBIE-Q275.chf

Mon Mar 30 15:42:43 2009

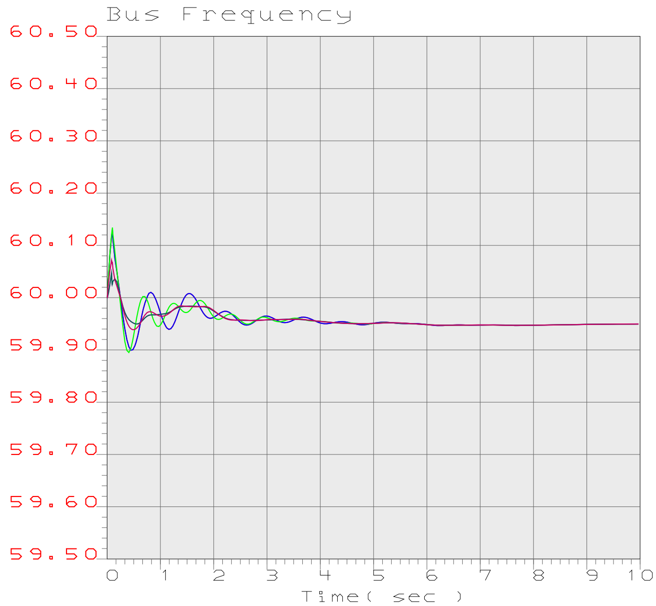
Bus Voltage and Frequency

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Lambie - Q275SWST and Lambie - Birds 230 kV Double Line Out

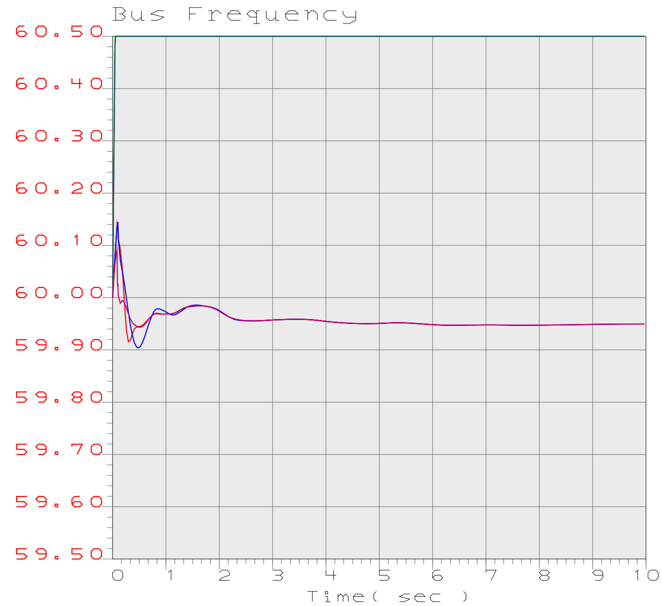
2013sumpk_q275_pst_LAMBIE-Q275.chf

Mon Mar 30 15:42:43 2009

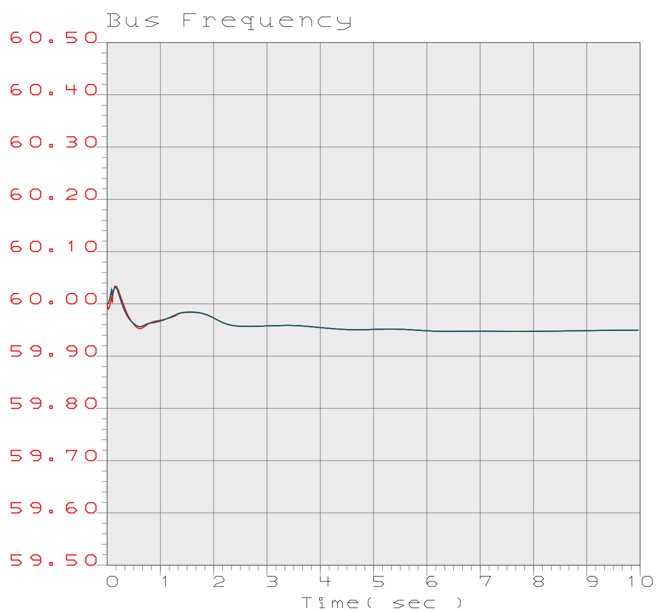
Bus Frequency and Rotor Speed



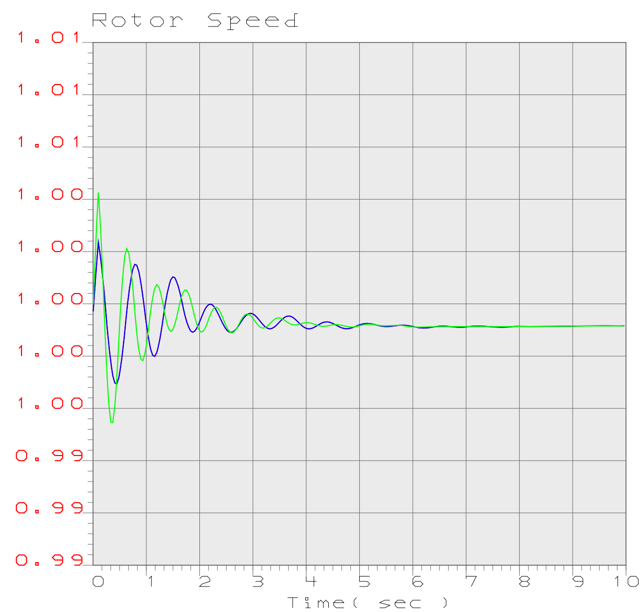
59.5 fbug 32151 Q275GT1 18.0 * 1 60.5
59.5 fbug 32153 Q275GT2 18.0 * 1 60.5
59.5 fbug 32159 Q275ST1 18.0 * 1 60.5
59.5 fbug 33114 C.COS 4 13.8 * 1 60.5
59.5 fbug 33115 C.COS 5 13.8 * 1 60.5
59.5 fbug 33116 C.COS 6 18.0 * 1 60.5



59.5 fbug 32168 ENXCO 9.1 * 1 60.5
59.5 fbug 32169 SOLANOWP 21.0 * 1 60.5
59.5 fbug 32173 LAMBGT1 13.8 * 1 60.5
59.5 fbug 32174 GOOSEHGT 13.8 * 1 60.5
59.5 fbug 32175 CREEDGT1 13.8 * 1 60.5
59.5 fbug 32177 SHILO 34.5 * 1 60.5



59.5 fbug 38760 DELTA E 13.2 * 1 60.5
59.5 fbug 38765 DELTA D 13.2 * 1 60.5
59.5 fbug 38770 DELTA C 13.2 * 1 60.5
59.5 fbug 38815 DELTA B 13.2 * 1 60.5
59.5 fbug 38820 DELTA A 13.2 * 1 60.5



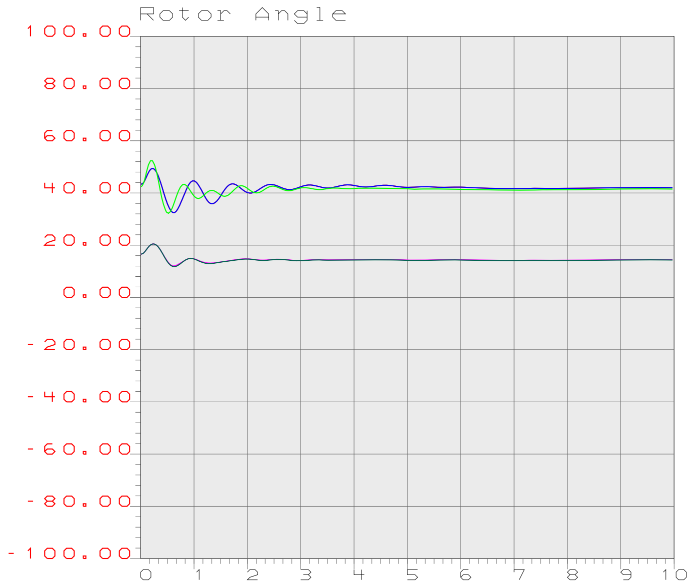
0.99 spd 32151 Q275GT1 18.0 * 1 1.01
0.99 spd 32153 Q275GT2 18.0 * 1 1.01
0.99 spd 32159 Q275ST1 18.0 * 1 1.01

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Lambie - Q275SWST and Lambie - Birds 230 kV Double Line Out

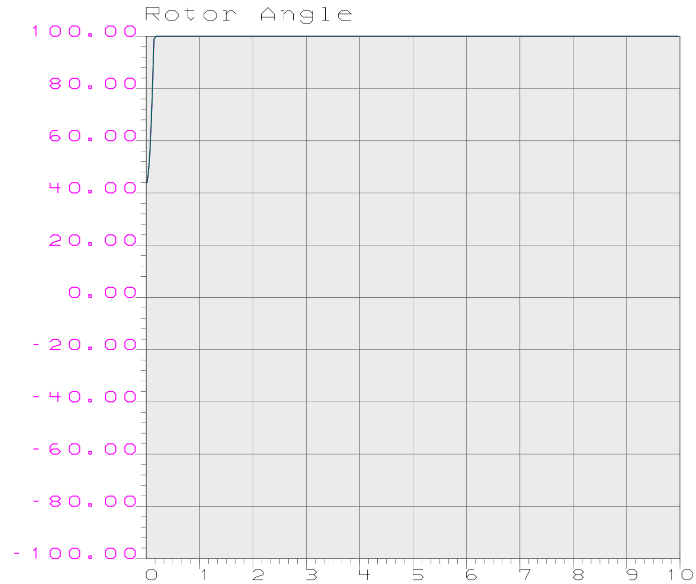
2013sumpk_q275_pst_LAMBIE-Q275.chf

Mon Mar 30 15:42:44 2009

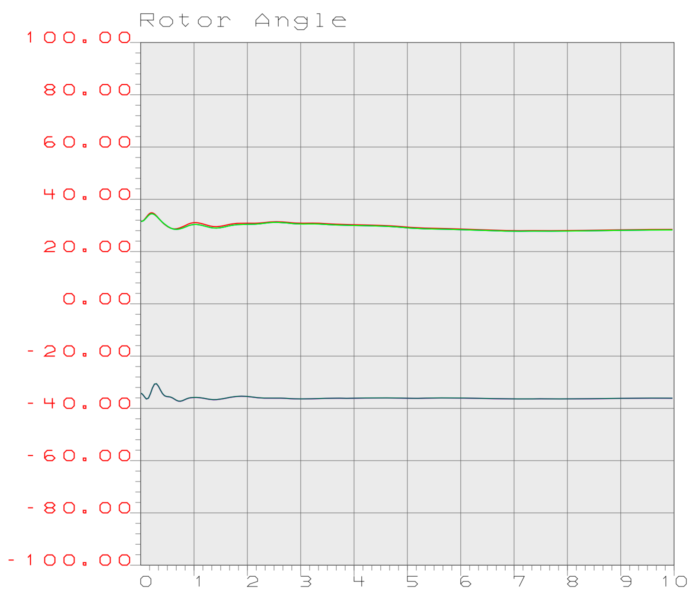
Rotor Angle



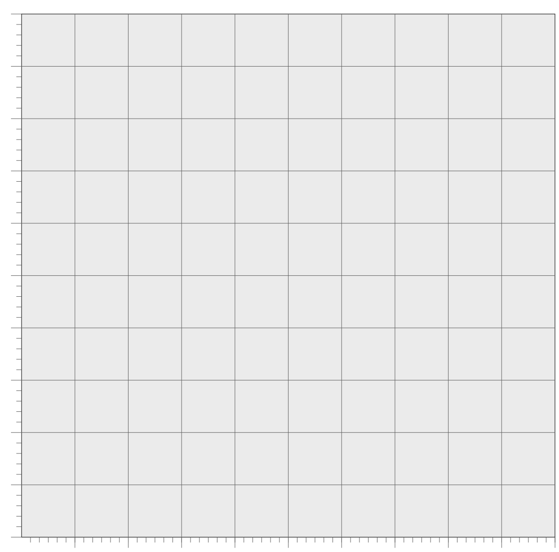
-100.0Ang 32151 Q275GT1 18.0 * 1 100.0
-100.0Ang 32153 Q275GT2 18.0 * 1 100.0
-100.0Ang 32159 Q275ST1 18.0 * 1 100.0
-100.0Ang 33116 C.COS 6 18.0 * 1 100.0
-100.0Ang 33117 C.COS 7 18.0 * 1 100.0



-100.0Ang 32174 GOOSEHGT 13.8 * 1 100.0
-100.0Ang 32175 CREEDGT1 13.8 * 1 100.0



-100.0Ang 33118 GATEWAY1 18.0 * 1 100.0
-100.0Ang 33119 GATEWAY2 18.0 * 1 100.0
-100.0Ang 33120 GATEWAY3 18.0 * 1 100.0
-100.0Ang 33121 MRAGA 1T 13.2 * 1 100.0
-100.0Ang 33122 MRAGA 2T 13.2 * 1 100.0



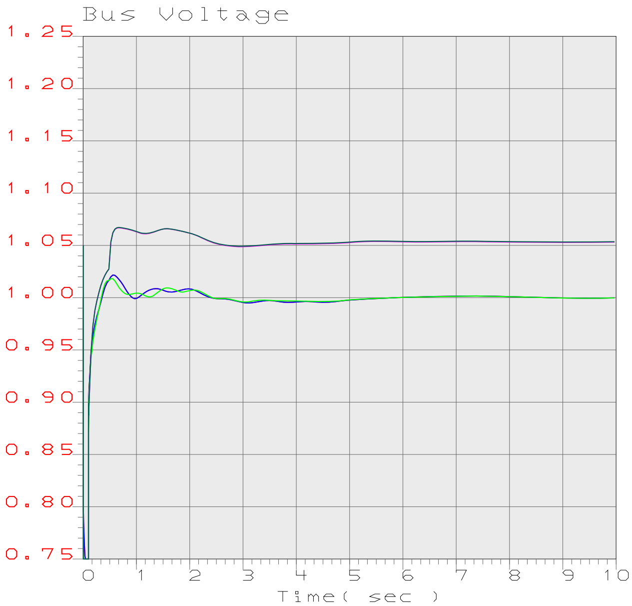
PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Lambie - Q275SWST and Lambie - Birds 230 kV Double Line Out

2013sumpk_q275_pst_LAMBIE-Q275.chf

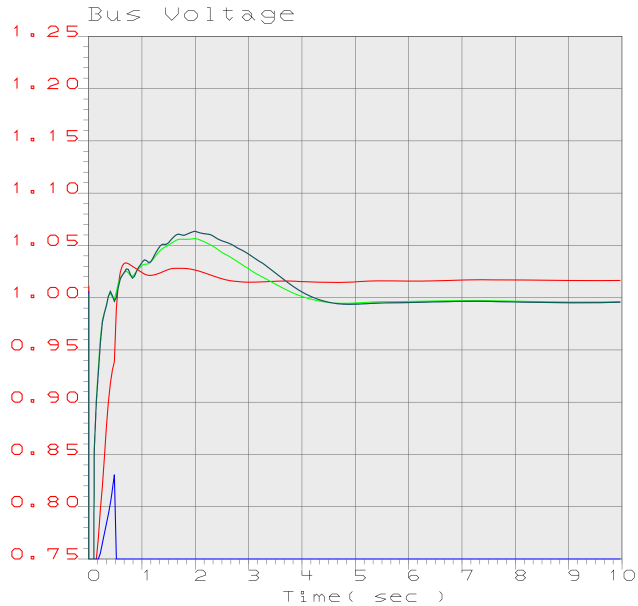
Mon Mar 30 15:42:44 2009

A three-phase fault on Peabody-Birds Landing and Lambie-Birds Landing 230-kV lines at the Birds Landing 230-kV bus with normal clearing time followed by loss of the Peabody-Birds Landing and Lambie-Birds Landing 230-kV lines.

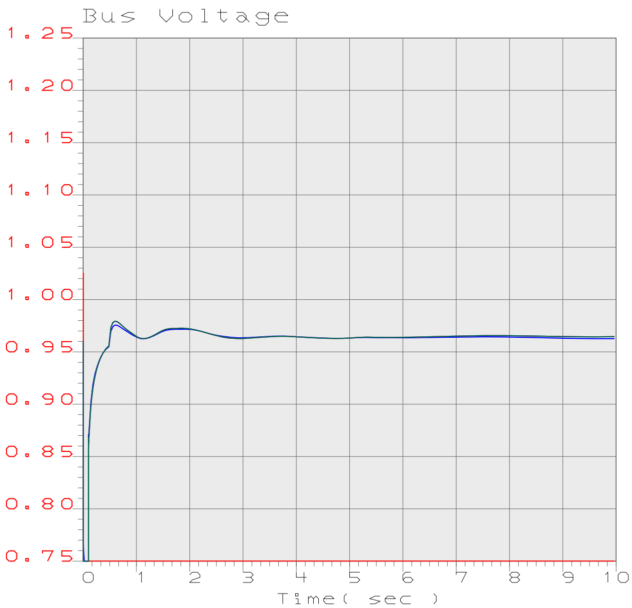
Bus Voltage



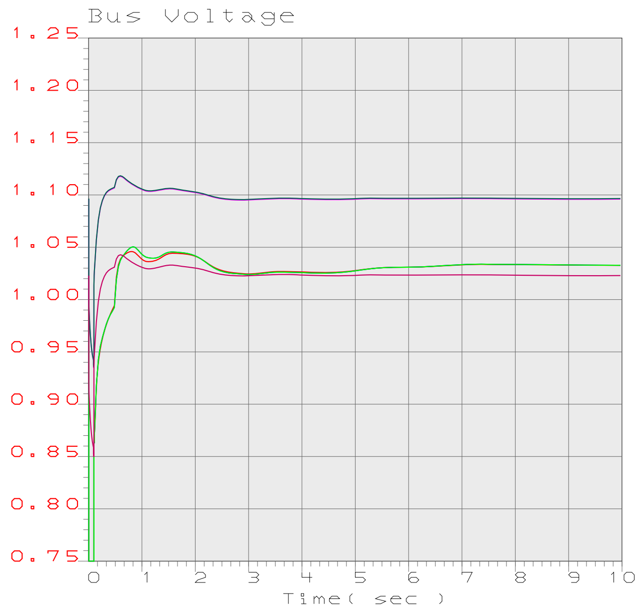
0.75 vt 32151 Q275GT1 18.0 1 1 1.25
0.75 vt 32153 Q275GT2 18.0 2 1 1.25
0.75 vt 32159 Q275ST1 18.0 3 1 1.25
0.75 vt 33116 C.COS 6 18.0 1 1 1.25
0.75 vt 33117 C.COS 7 18.0 1 1 1.25



0.75 vt 32168 ENXCO 9.1 * 1 1.25
0.75 vt 32169 SOLANOWP 21.0 * 1 1.25
0.75 vt 32173 LAMBGT1 13.8 * 1 1.25
0.75 vt 32174 GOOSEHGT 13.8 * 1 1.25
0.75 vt 32175 CREEDGT1 13.8 * 1 1.25



0.75 vt 32190 Q039 0.6 * 1 1.25
0.75 vt 38760 DELTA E 13.2 * 1 1.25
0.75 vbug 38765 DELTA D 13.2 * 1 1.25
0.75 vbug 38770 DELTA C 13.2 * 1 1.25
0.75 vbug 38815 DELTA B 13.2 * 1 1.25



0.75 vt 33118 GATEWAY1 18.0 * 1 1.25
0.75 vt 33119 GATEWAY2 18.0 * 1 1.25
0.75 vt 33120 GATEWAY3 18.0 * 1 1.25
0.75 vt 33121 MRAGA 1T 13.2 * 1 1.25
0.75 vt 33122 MRAGA 2T 13.2 * 1 1.25
0.75 vt 33123 MRAGA 3T 13.2 * 1 1.25

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Birds Landing - Peabody & Birds Landing - Lambie 230 kV Double Line Out

2013sumpk_q275_pst_Birds.chf

Tue Mar 31 13:04:57 2009

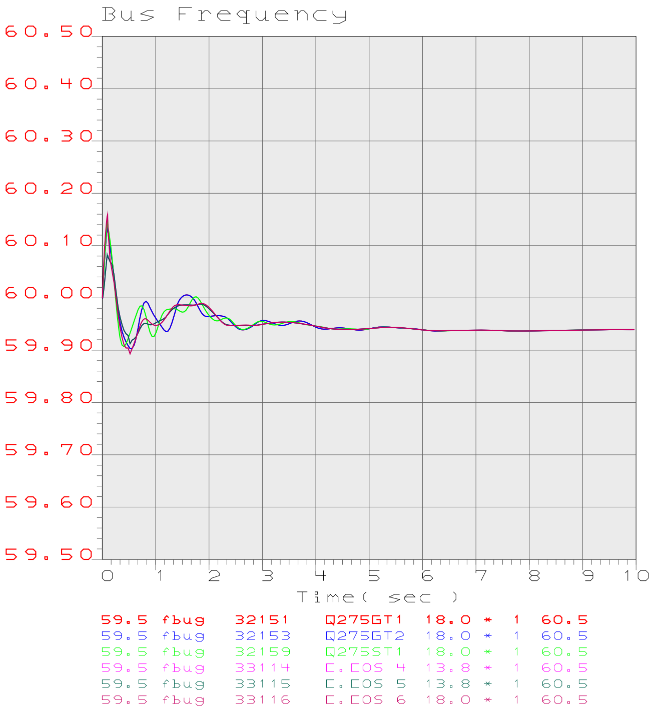
Bus Voltage and Frequency

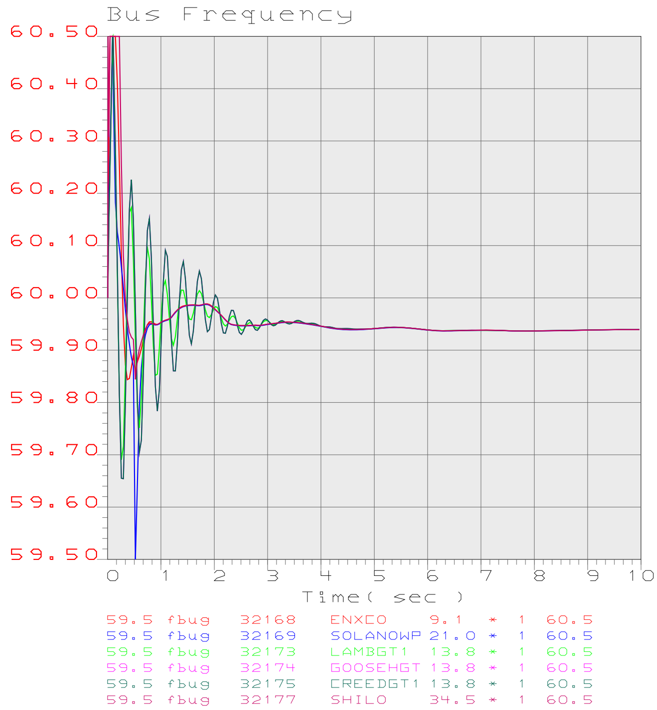
PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Birds Landing - Peabody & Birds Landing - Lambie 230 kV Double Line Out

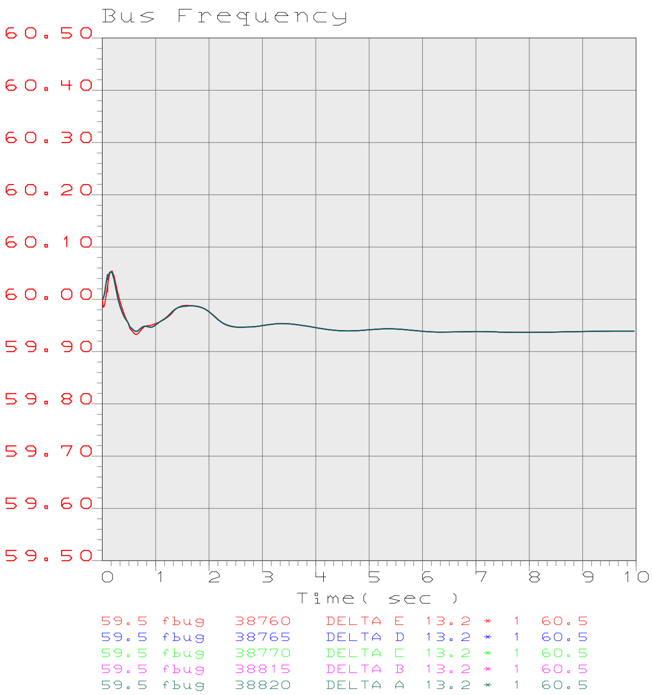
2013sumpk_q275_pst_Birds.chf

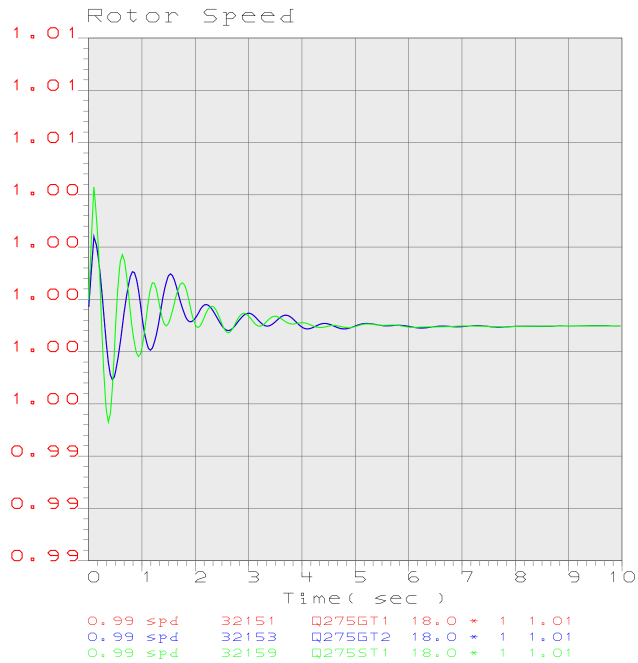
Tue Mar 31 13:04:57 2009

Bus Frequency and Rotor Speed







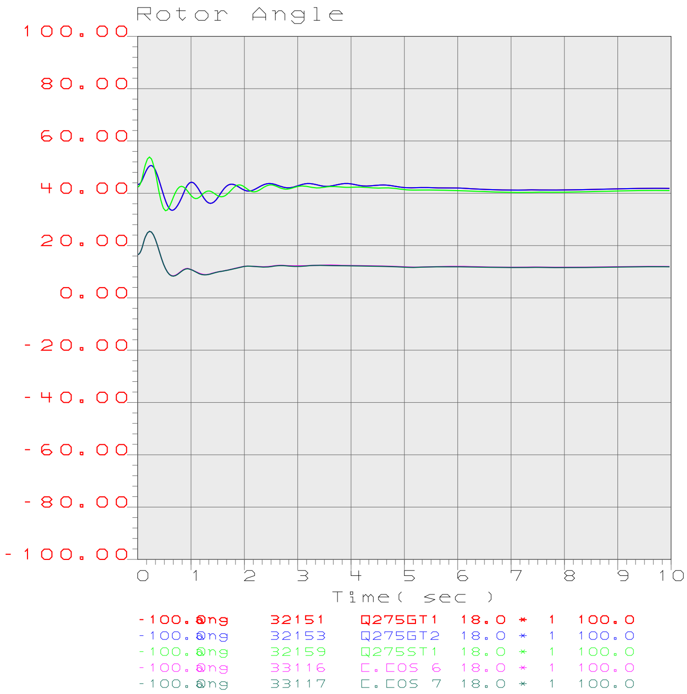


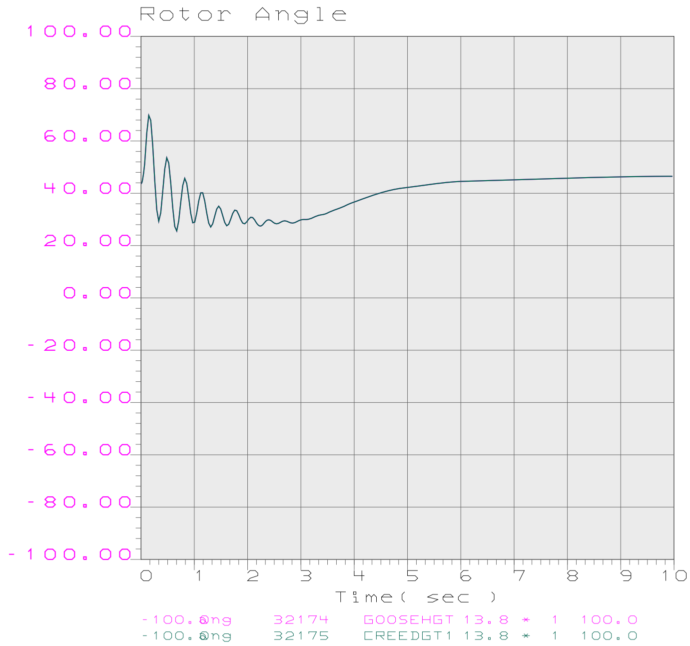
PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Birds Landing - Peabody & Birds Landing - Lambie 230 kV Double Line Out

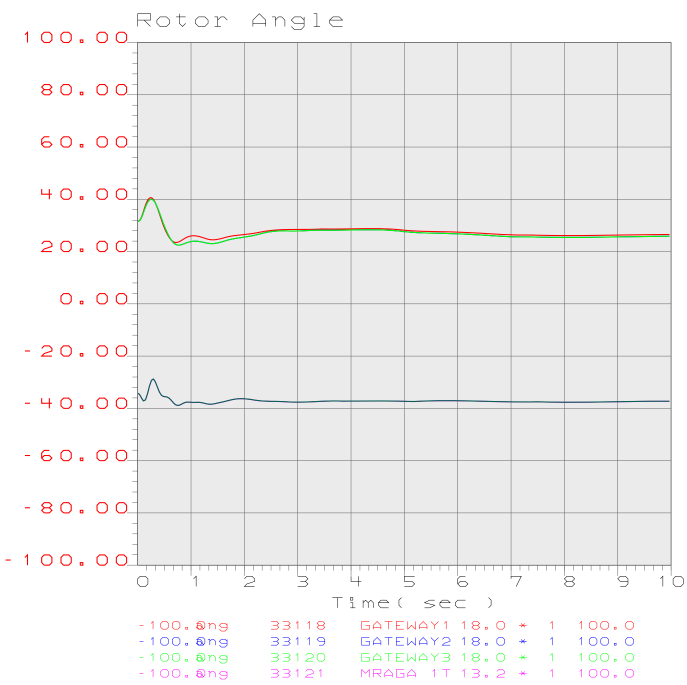
2013sumpk_q275_pst_Birds.chf

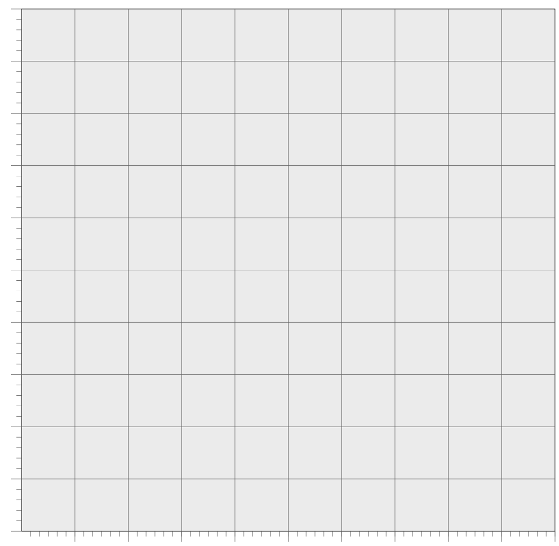
Tue Mar 31 13:04:57 2009

Rotor Angle









PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Birds Landing - Peabody & Birds Landing - Lambie 230 kV Double Line Out

2013sumpk_q275_pst_Birds.chf

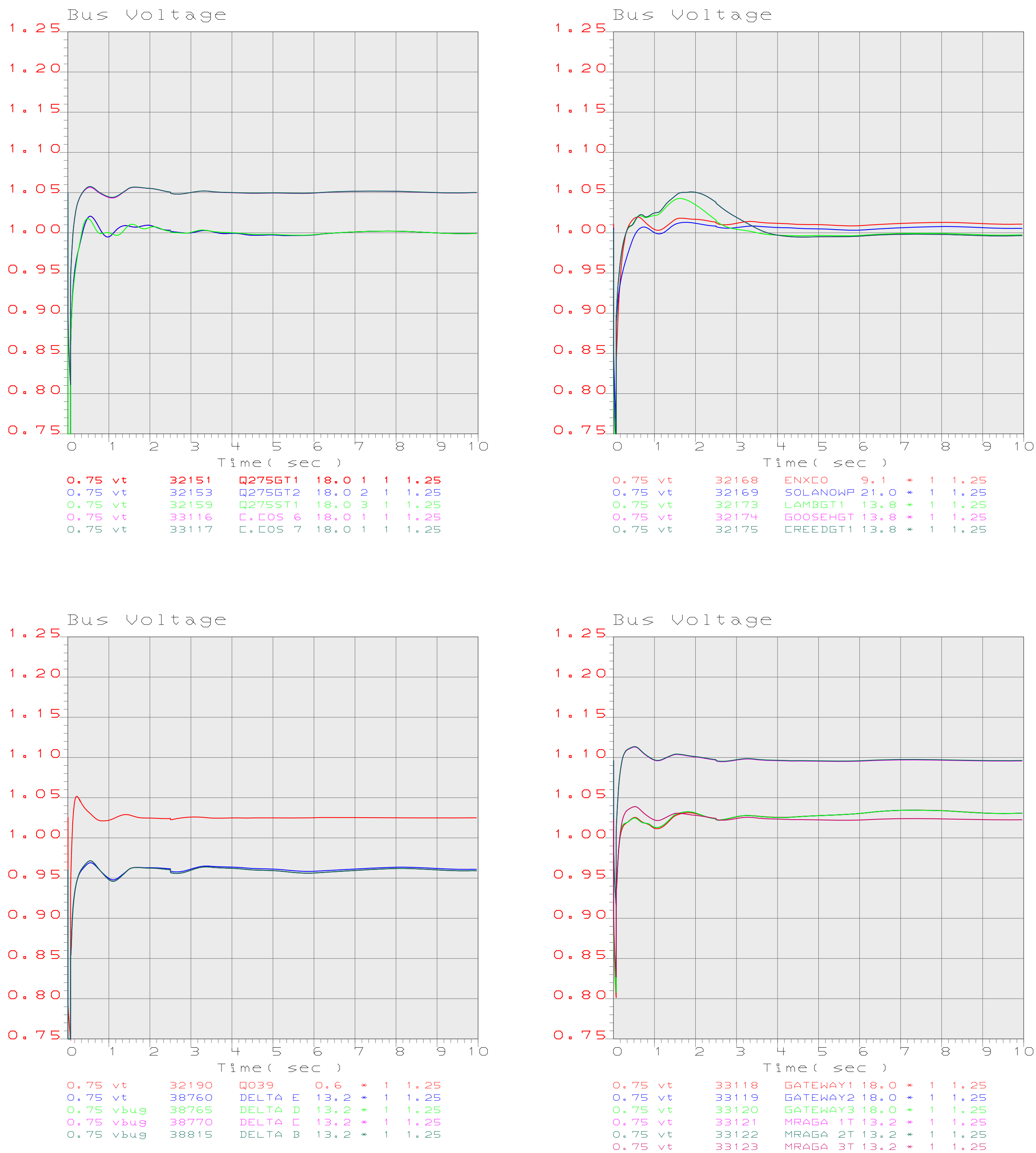
Tue Mar 31 13:04:57 2009

CAISO Category "C"

(500-kV Facilities)

A three-phase fault on the Vaca_Dixon 500-kV bus with normal clearing time followed by the loss of the Vaca_Dixon-Table Mountain 500-kV line and the Vaca_Dixon #1 500/230-kV transformer.

Bus Voltage



PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca Dixon - Table Mt and Vaca Dixon 500/230 kV Tx 500-kV Double Line Ou

2013sumpk_q275_pst_VAC.chf

Mon Mar 30 17:05:54 2009

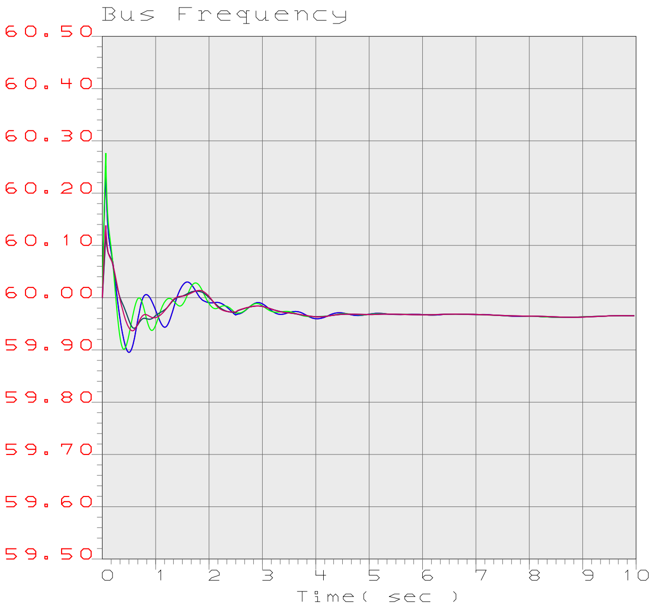
Bus Voltage and Frequency

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca Dixon - Table Mt and Vaca Dixon 500/230 kV Tx 500-kV Double Line Ou

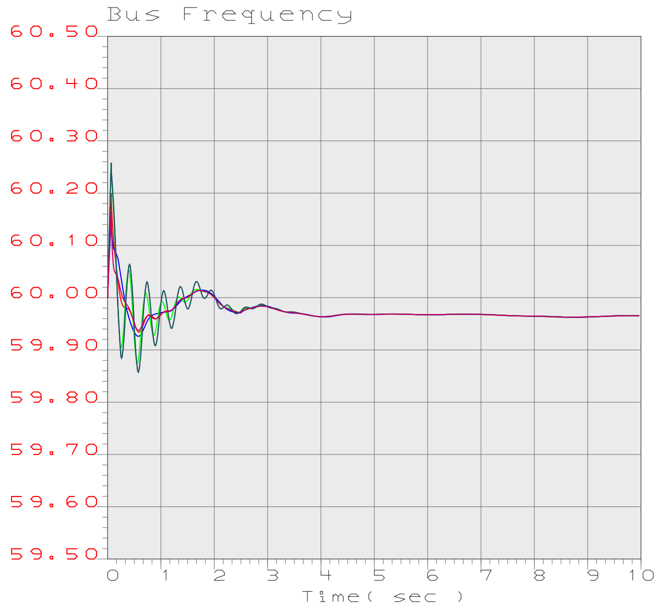
2013sumpk_q275_pst_VAC.chf

Mon Mar 30 17:05:54 2009

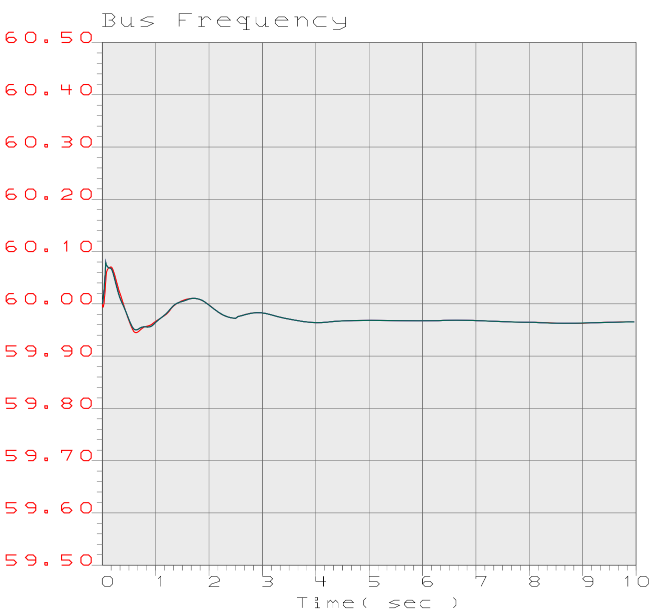
Bus Frequency and Rotor Speed



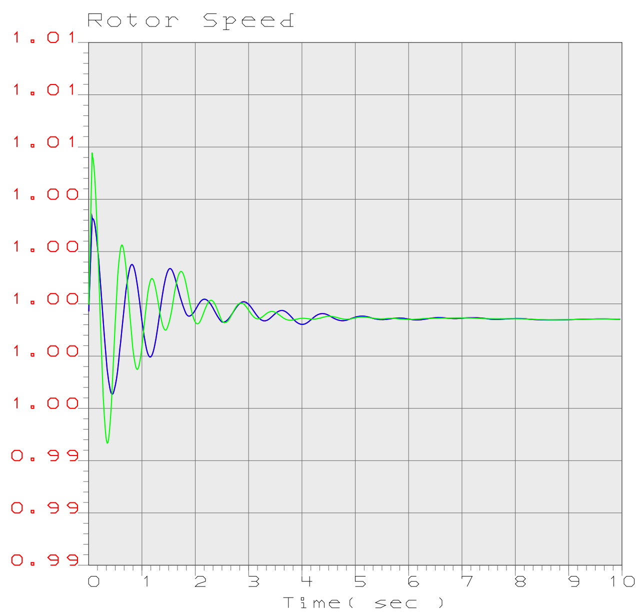
59.5 fbug 32151 Q275GT1 18.0 * 1 60.5
59.5 fbug 32153 Q275GT2 18.0 * 1 60.5
59.5 fbug 32159 Q275ST1 18.0 * 1 60.5
59.5 fbug 33114 C.COS 4 13.8 * 1 60.5
59.5 fbug 33115 C.COS 5 13.8 * 1 60.5
59.5 fbug 33116 C.COS 6 18.0 * 1 60.5



59.5 fbug 32168 ENXCO 9.1 * 1 60.5
59.5 fbug 32169 SOLANOWP 21.0 * 1 60.5
59.5 fbug 32173 LAMBGT1 13.8 * 1 60.5
59.5 fbug 32174 GOOSEHGT 13.8 * 1 60.5
59.5 fbug 32175 CREEDGT1 13.8 * 1 60.5
59.5 fbug 32177 SHILO 34.5 * 1 60.5



59.5 fbug 38760 DELTA E 13.2 * 1 60.5
59.5 fbug 38765 DELTA D 13.2 * 1 60.5
59.5 fbug 38770 DELTA C 13.2 * 1 60.5
59.5 fbug 38815 DELTA B 13.2 * 1 60.5
59.5 fbug 38820 DELTA A 13.2 * 1 60.5



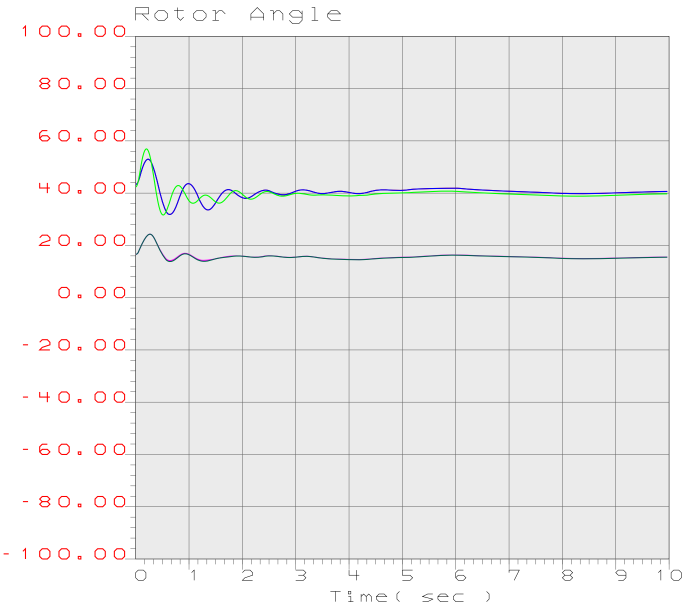
0.99 spd 32151 Q275GT1 18.0 * 1 1.01
0.99 spd 32153 Q275GT2 18.0 * 1 1.01
0.99 spd 32159 Q275ST1 18.0 * 1 1.01

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca Dixon - Table Mt and Vaca Dixon 500/230 kV Tx 500-kV Double Line Ou

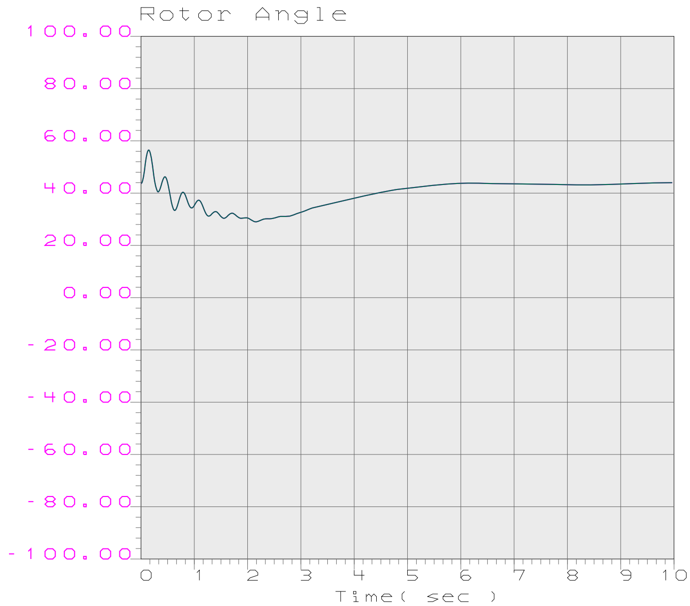
2013sumpk_q275_pst_VAC.chf

Mon Mar 30 17:05:54 2009

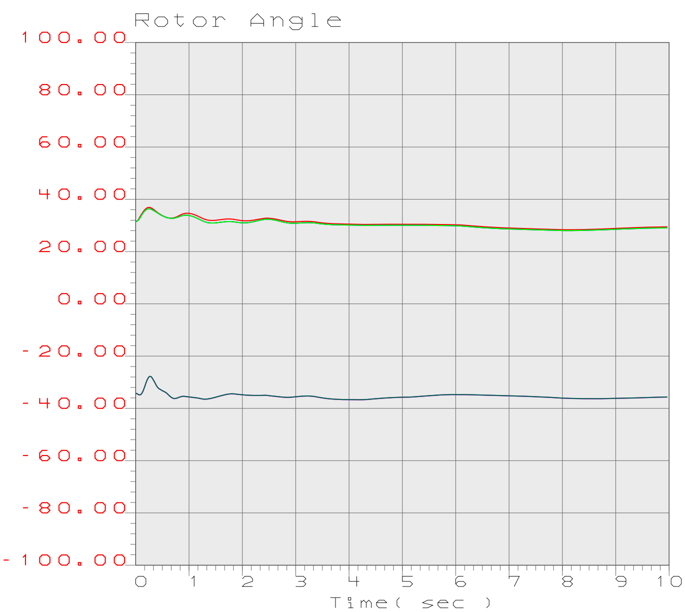
Rotor Angle



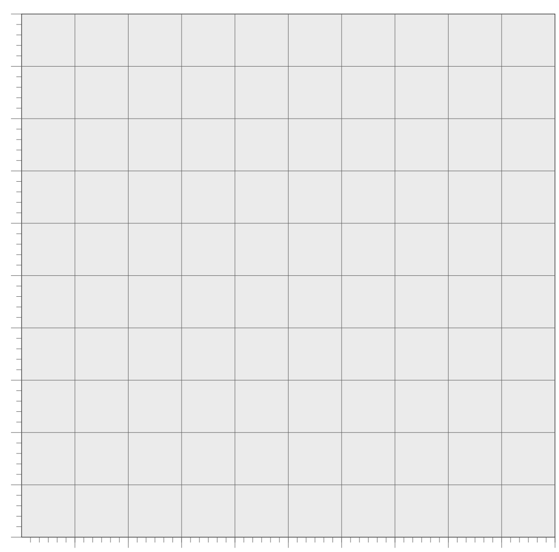
-100.0 ang 32151 Q275GT1 18.0 * 1 100.0
-100.0 ang 32153 Q275GT2 18.0 * 1 100.0
-100.0 ang 32159 Q275ST1 18.0 * 1 100.0
-100.0 ang 33116 C.COS 6 18.0 * 1 100.0
-100.0 ang 33117 C.COS 7 18.0 * 1 100.0



-100.0 ang 32174 GOOSEHGT 13.8 * 1 100.0
-100.0 ang 32175 CREEDGT1 13.8 * 1 100.0



-100.0 ang 33118 GATEWAY1 18.0 * 1 100.0
-100.0 ang 33119 GATEWAY2 18.0 * 1 100.0
-100.0 ang 33120 GATEWAY3 18.0 * 1 100.0
-100.0 ang 33121 MRAGA 1T 13.2 * 1 100.0
-100.0 ang 33122 MRAGA 2T 13.2 * 1 100.0



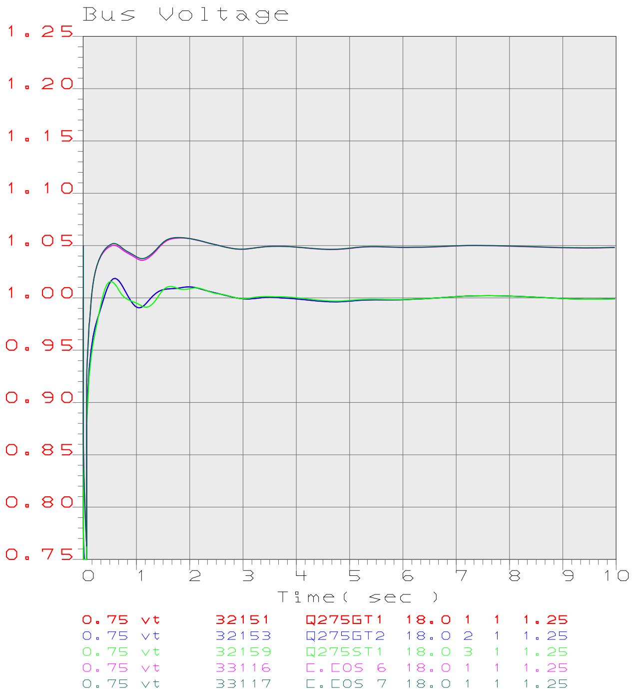
PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Vaca Dixon - Table Mt and Vaca Dixon 500/230 kV Tx 500-kV Double Line Ou

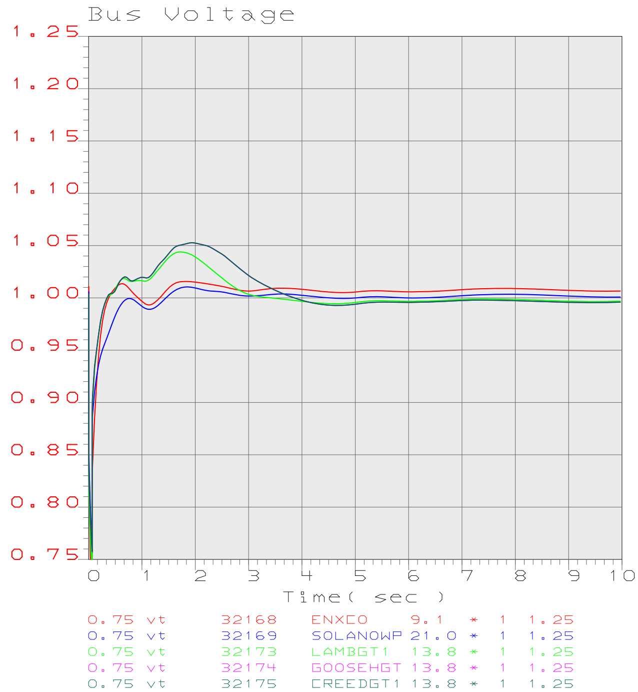
2013sumpk_q275_pst_VAC.chf

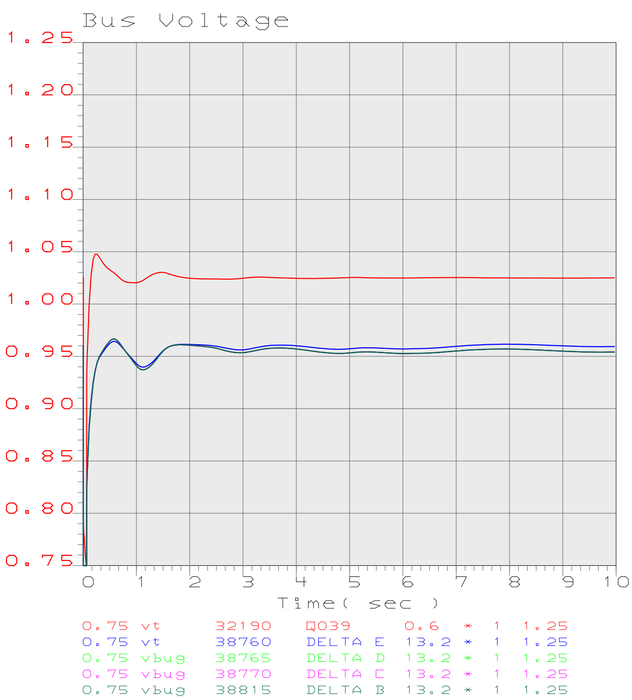
Mon Mar 30 17:05:54 2009

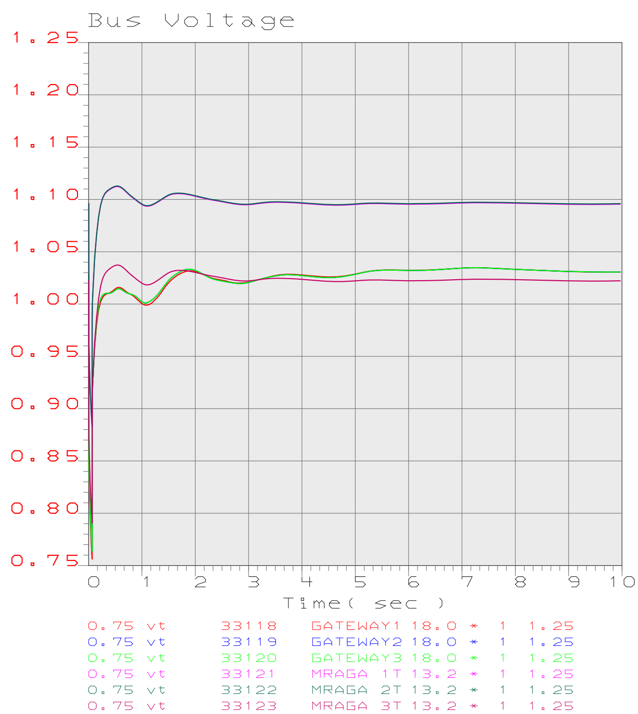
A three-phase fault on the Vaca_Dixon 500-kV bus with normal clearing time followed by the loss of the Vaca_Dixon-Tesla 500-kV line and the Table Mountain-Tesla 500-kV line.

Bus Voltage







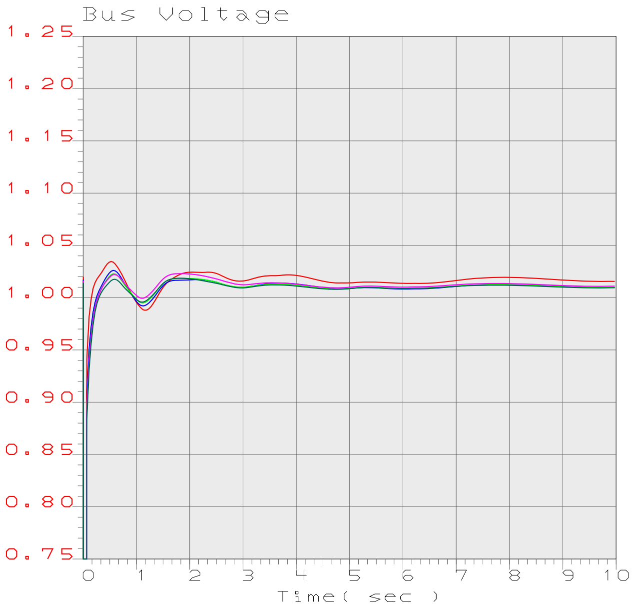


PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Table Mt - Tesla and Vaca-Dixon - Tesla 500-kV Double Line Out

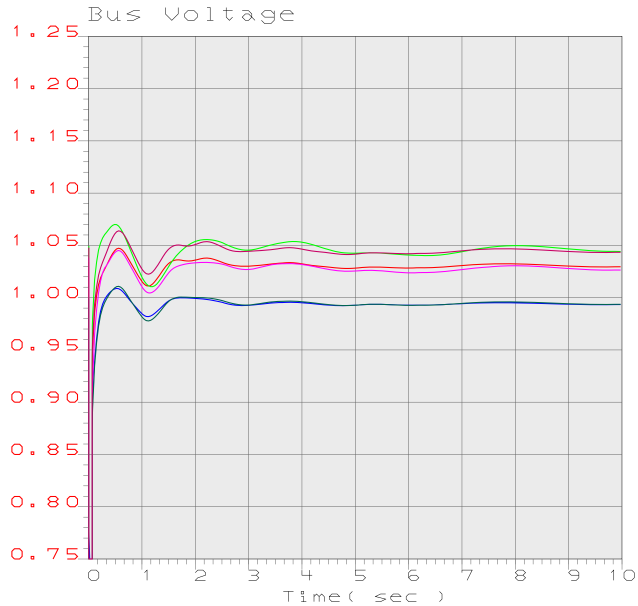
2013sumpk_q275_pst_TSL-TAB_TSL-VCA_NR.chf

Mon Mar 30 15:38:44 2009

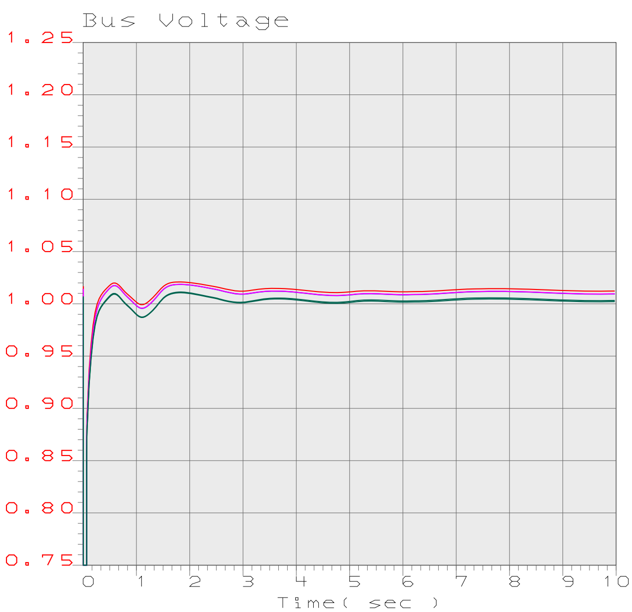
Bus Voltage and Frequency



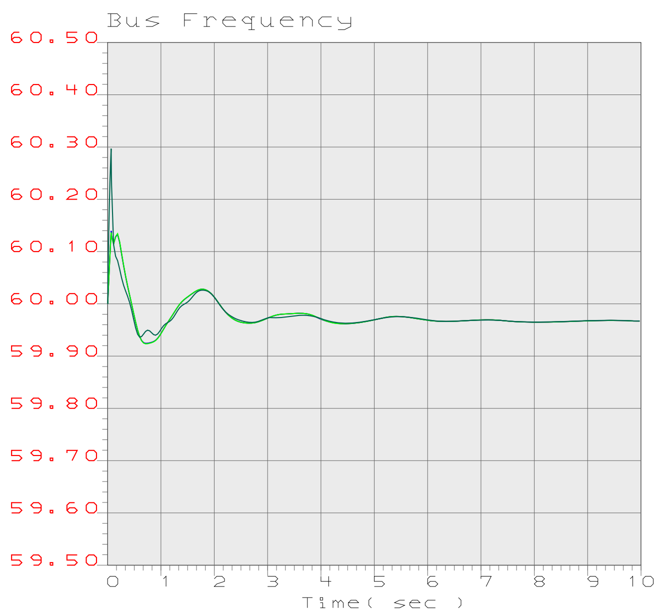
0.75	vbus	30300	TBL MT D 230.0*	1	1.25
0.75	vbus	30460	VACA-DIX 230.0*	1	1.25
0.75	vt	30472	PEABODY 230.0*	1	1.25
0.75	vbus	30478	LAMBIE 230.0*	1	1.25
0.75	vbus	30479	BDLSWSTA 230.0*	1	1.25



0.75	vbus	30450	CORTINA 230.0*	1	1.25
0.75	vbus	30435	LAKEVILE 230.0*	1	1.25
0.75	vbus	30015	TABLE MT 500.0*	1	1.25
0.75	vbus	30040	TESLA 500.0*	1	1.25
0.75	vbus	30440	TULUCAY 230.0*	1	1.25
0.75	vbus	30114	CPVSTA 230.0*	1	1.25



0.75	vbus	30476	SHILO 230.0*	1	1.25
0.75	vbus	30477	SHILOHTP 230.0*	1	1.25
0.75	vbus	30480	USWP-RUS 230.0*	1	1.25
0.75	vbul	30523	CC SUB 230.0*	1	1.25
0.75	vbus	30525	C.COSTA 230.0*	1	1.25



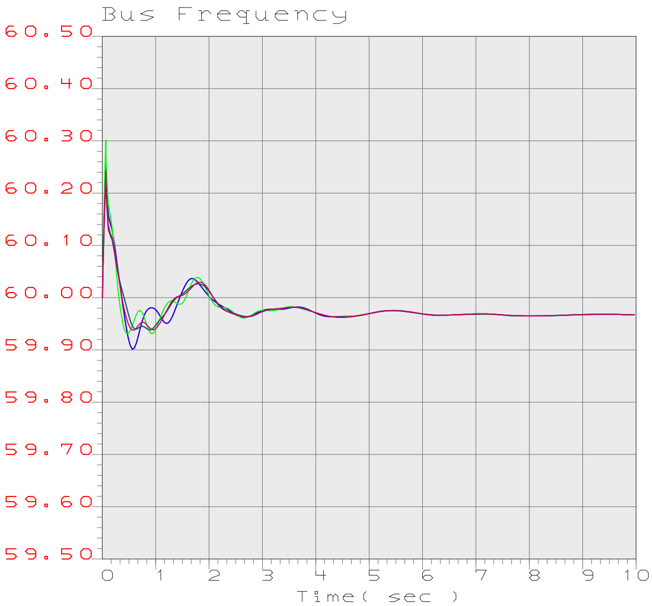
59.5	fbus	30551	MRAGA_1M 13.2 *	1	60.5
59.5	fbus	30552	MRAGA_2M 13.2 *	1	60.5
59.5	fbus	30553	MRAGA_3M 13.2 *	1	60.5
59.5	fbus	32189	Q039 34.5 *	1	60.5

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Table Mt - Tesla and Vaca-Dixon - Tesla 500-kV Double Line Out

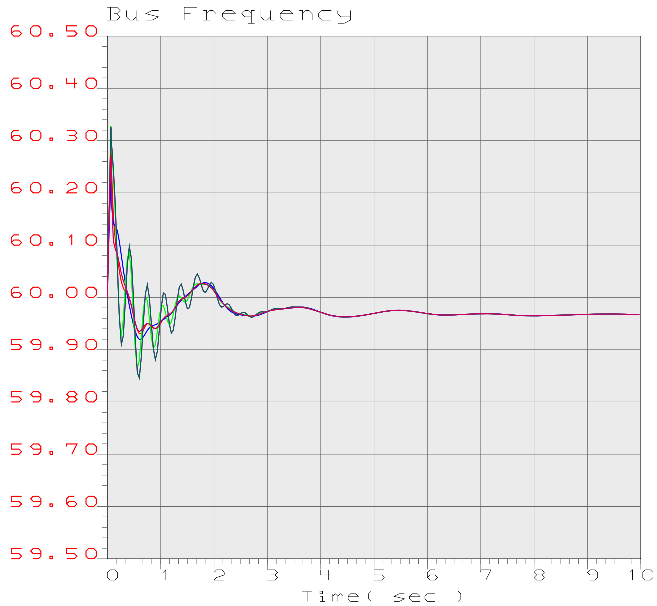
2013sumpk_q275_pst_TSL-TAB_TSL-VCA_NR.chf

Mon Mar 30 15:38:44 2009

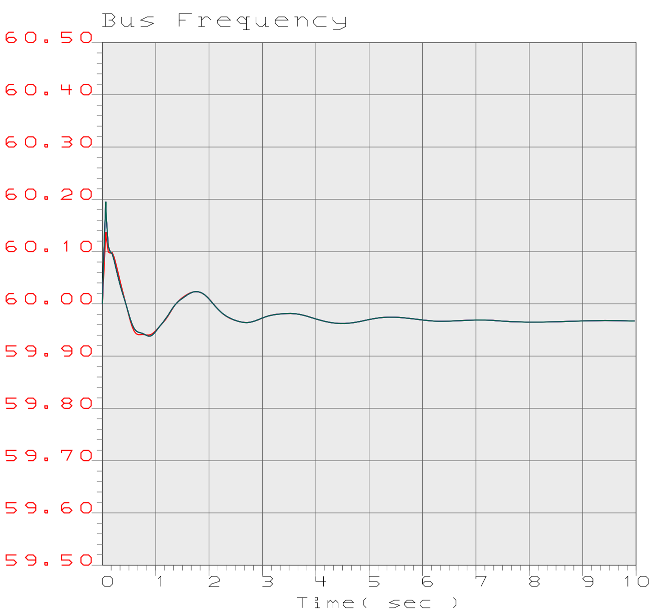
Bus Frequency and Rotor Speed



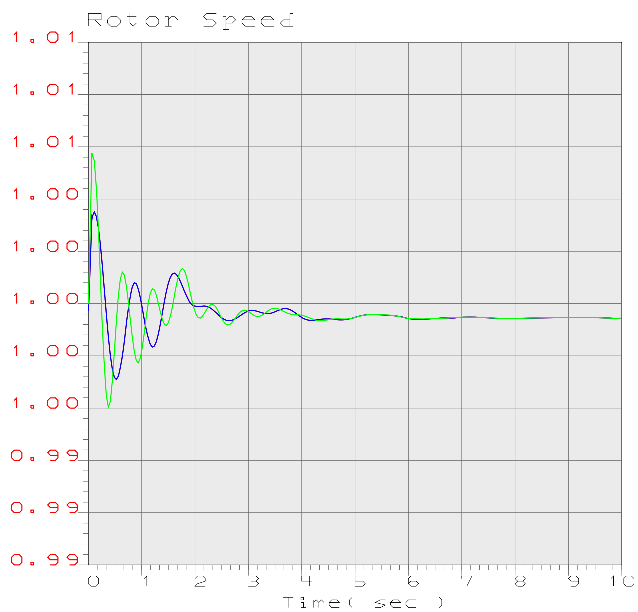
59.5 fbug 32151 Q275GT1 18.0 * 1 60.5
59.5 fbug 32153 Q275GT2 18.0 * 1 60.5
59.5 fbug 32159 Q275ST1 18.0 * 1 60.5
59.5 fbug 33114 C.COS 4 13.8 * 1 60.5
59.5 fbug 33115 C.COS 5 13.8 * 1 60.5
59.5 fbug 33116 C.COS 6 18.0 * 1 60.5



59.5 fbug 32168 ENXCO 9.1 * 1 60.5
59.5 fbug 32169 SOLANOWP 21.0 * 1 60.5
59.5 fbug 32173 LAMBGT1 13.8 * 1 60.5
59.5 fbug 32174 GOOSEHGT 13.8 * 1 60.5
59.5 fbug 32175 CREEDGT1 13.8 * 1 60.5
59.5 fbug 32177 SHILO 34.5 * 1 60.5



59.5 fbug 38760 DELTA E 13.2 * 1 60.5
59.5 fbug 38765 DELTA D 13.2 * 1 60.5
59.5 fbug 38770 DELTA C 13.2 * 1 60.5
59.5 fbug 38815 DELTA B 13.2 * 1 60.5
59.5 fbug 38820 DELTA A 13.2 * 1 60.5



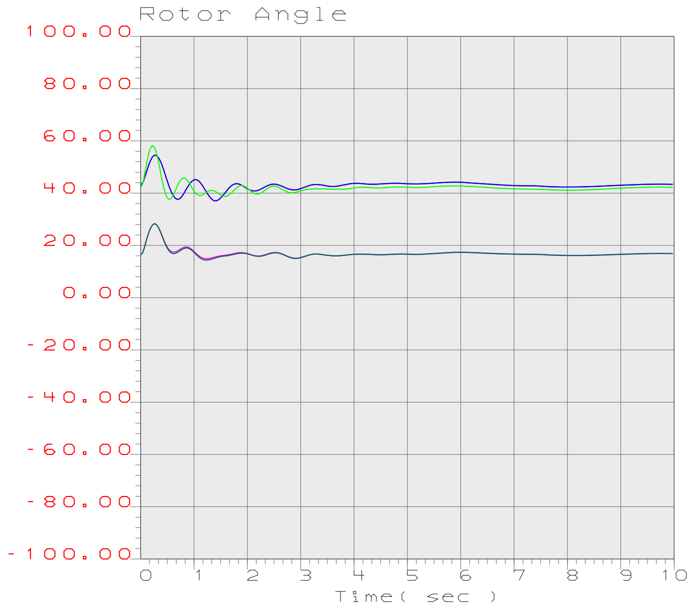
0.99 spd 32151 Q275GT1 18.0 * 1 1.01
0.99 spd 32153 Q275GT2 18.0 * 1 1.01
0.99 spd 32159 Q275ST1 18.0 * 1 1.01

PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Table Mt - Tesla and Vaca-Dixon - Tesla 500-kV Double Line Out

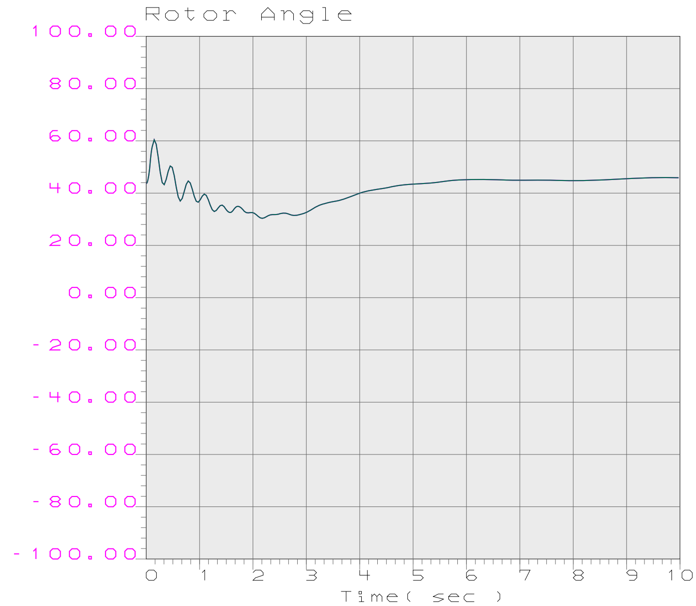
2013sumpk_q275_pst_TSL-TAB_TSL-VCA_NR.chf

Mon Mar 30 15:38:44 2009

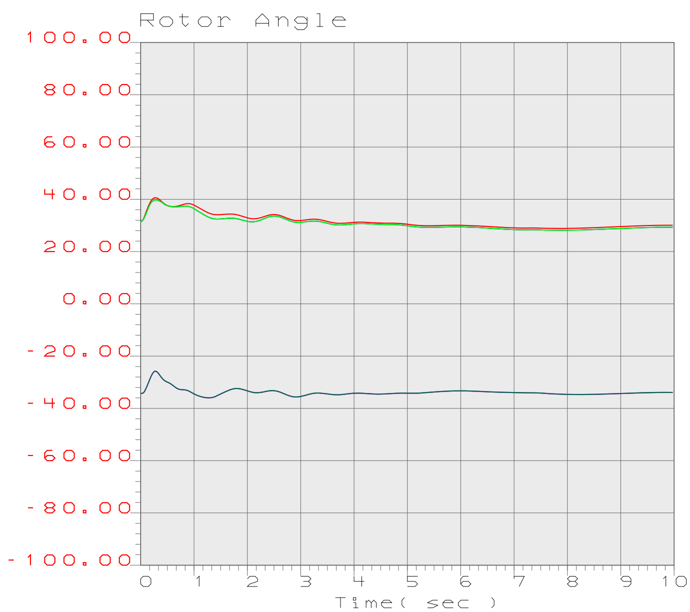
Rotor Angle



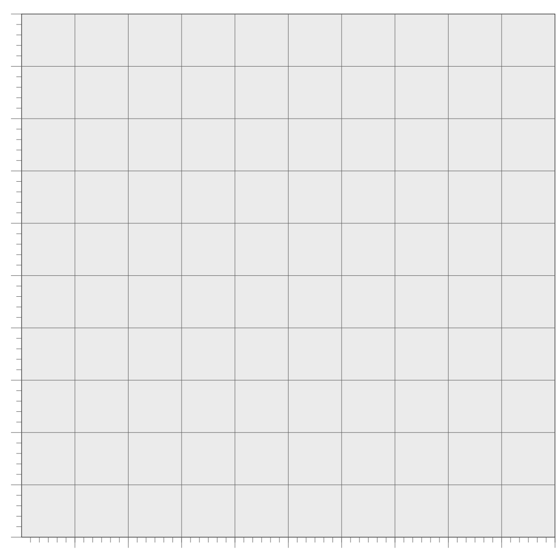
-100.0 Ang 32151 Q275GT1 18.0 * 1 100.0
-100.0 Ang 32153 Q275GT2 18.0 * 1 100.0
-100.0 Ang 32159 Q275ST1 18.0 * 1 100.0
-100.0 Ang 33116 C.COS 6 18.0 * 1 100.0
-100.0 Ang 33117 C.COS 7 18.0 * 1 100.0



-100.0 Ang 32174 GOOSEHGT 13.8 * 1 100.0
-100.0 Ang 32175 CREEDGT1 13.8 * 1 100.0



-100.0 Ang 33118 GATEWAY1 18.0 * 1 100.0
-100.0 Ang 33119 GATEWAY2 18.0 * 1 100.0
-100.0 Ang 33120 GATEWAY3 18.0 * 1 100.0
-100.0 Ang 33121 MRAGA 1T 13.2 * 1 100.0
-100.0 Ang 33122 MRAGA 2T 13.2 * 1 100.0



PG&E 2007 CASE SERIES: 2013 Greater Bay Area Summer Peak Post-Project Case
PATH15=-1714 MW(S-N) PATH26= 3933 MW(N-S) PDCI= 2500 MW(N-S) COI= 4731 MW(N-S)
Q275 630 MW at Vaca-Dixon-Lambie&Peabody IFS - 2013 Summer Peak Post-Project FY
Table Mt - Tesla and Vaca-Dixon - Tesla 500-kV Double Line Out

2013sumpk_q275_pst_TSL-TAB_TSL-VCA_NR.chf

Mon Mar 30 15:38:44 2009

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE *CPV VACA STATION* BY THE *CPV VACAVILLE, L.L.C.*

Docket No. 08-AFC-11

PROOF OF SERVICE
(Established 2/18/2009)

APPLICANT

Andrew Welch - Vice President
Competitive Power Ventures, Inc.
8403 Colesville Road, Suite 915
Silver Spring, MD 20910
awelch@cpv.com

APPLICANT CONSULTANT

Douglas M. Davy - Program Manager
CH2MHill
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833
ddavy@ch2m.com

COUNSEL FOR APPLICANT

Michael J. Carroll
LATHAM & WATKINS LLP
650 Town Center Drive, 20th Floor
Costa Mesa, CA 92626-1925
michael.carroll@lw.com

INTERESTED AGENCIES

California ISO
e-recipient@caiso.com

INTERVENORS

ENERGY COMMISSION

JEFFREY D. BYRON
Commissioner and Presiding Member
jbyron@energy.state.ca.us

ARTHUR H. ROSENFELD
Commissioner and Associate Member
arosenfe@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Rod Jones
Project Manager
rjones@energy.state.ca.us

Deborah Dyer
Staff Counsel
ddyer@energy.state.ca.us

Melanie Moultry
Staff Counsel
mmoultry@energy.state.ca.us

Loreen McMahon
Public Adviser
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, Mary Finn, declare that on September 9, 2009, I served and filed copies of the attached CPV Vaca Station (08-AFC-11) SIS Supplemental Report dated September 8, 2009. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[http://www.energy.ca.gov/sitingcases/vacastation/index.html]**. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

For service to all other parties:

_✓_ sent electronically to all email addresses on the Proof of Service list;

_✓_ by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

_✓_ **sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);**

OR

____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-11
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

[signature]

Mary Finn