Pico Power Project

Appendix 6-B
PG&E System Impact Study

October 2002

System Impact Study & Facilities Study

Study Results

Pico Power Plant
Silicon Valley Power

120 MW Combined-Cycle Facility

DRAFT

Pacific Gas and Electric Company

September 10, 2002

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Executive Summary

The City of Santa Clara, California, doing business as Silicon Valley Power (SVP), is proposing to install a 120 MW (nominal rating), combined-cycle generating facility – the Pico Power Plant Project ("Project"). The Project will be located next to SVP's Kifer Receiving Station and will be connected into their Scott-Kifer 115kV line. The planned operational date of the proposed project is in 2004. Maximum power output of the plant into the 115 kV transmission system is expected to be 155 MW.

Figures 1 and 2 provide an overview of the vicinity of the proposed project, as well as the transmission facilities in the area. SVP has requested that PG&E conduct a combined System Impact Study and Facilities Study (SIS-FS) for the Project. The Study will determine:

1) impacts on other PG&E transmission system facilities caused by the addition of the Project;
2) the system reinforcements and/or other measures necessary to mitigate the adverse impacts caused by the Project; and
3) the cost to relocate existing PG&E 115kV lines which are located on the site of the proposed facility.

Based upon the 2004 Summer analytical studies conducted as part of this Study, the proposed Pico Power Plant project does not increase loading on any PG&E transmission facilities in the South Bay area. The only facility impacted by the proposed Project is the Scott-Pico section of the Scott-Kifer 115 kV line, which is SVP's transmission line.

SVP has plans to reinforce this line later this year. Based upon the results of this study, PG&E suggests that the Scott-Kifer 115 kV line be reconductored with a conductor size that can accommodate a normal rating of at least 1,200 Amps (more than 40% above the existing normal rating) and an emergency rating of at least 1,650 Amps (more than 70% above the existing rating). These ratings will eliminate all potential normal overloads and all Category B and C emergency overloads for several years. (The most severe Category C contingency is the [L-2] loss of both Newark-Northern 115 kV lines, where all Northern and Scott "load" is served via the Scott-Kifer line.)

The Project eliminates the overloads on PG&E's Newark-Northern # 1&2 115 kV lines due to a bus fault at Kifer. In the existing system, this contingency will overload the lines by more than 20%. With the Project in place, the overloads on the Newark-Northern lines disappear.

PG&E also evaluated the increase in fault duty levels in the San Jose area due to both the Pico Power Plant and SVP's proposed 230 kV line between Northern Receiving Station and Los Esteros. Increases in fault duty levels at PG&E's 115 kV stations in north San Jose were less than 6%. The highest increase in fault duties is at the Los Esteros 230 kV bus: three-phase-to-ground bus fault duty increased by 10% (to 27.9 kA); single-line-to-ground bus fault duty increased 16% (to 24.2 kA). Newark, which has

had problems with high fault duty levels, has a 115 kV "D" bus fault duty of 42.0 kA and a 115 kV "F" bus fault duty of 58.6 kA.

PG&E's Substation Asset Management Department checked these new fault duty levels with existing breaker ratings. The addition of the Pico Projects has not been found to result in any breakers being overstressed.

In summary, the Pico Power Plant Project proposed by SVP does not cause any facility overloads in the San Jose area transmission system and, hence, no equipment upgrades are necessary prior to the Project being put into service. However, there are costs associated with the relocation of existing 115 kV lines and other interconnection work.

SVP also requested that PG&E provide a cost and schedule for undergrounding the existing Newark-Kifer and Kifer-San Jose B 115 kV lines. The proposed underground route would be through the Pico Power Plant site. The estimate for the relocation of these lines and other interconnection work is $2.19 million. These costs are not final and will need to be reconciled with actual costs upon project completion.

Finally, the SVP proposed relocation to an underground route through the Pico Power Plant raises future access and maintenance concerns. PG&E must note that these transmission lines are in a perpetual easement, and PG&E is under no legal obligation to relocate or sell them. We recommend that Santa Clara consider all options for its development, including planning the development to be compatible with the current alignment. PG&E is willing to work with Santa Clara to see if a mutually agreeable solution can be found in the City's timeframe.

Introduction and Project Description

The City of Santa Clara, California, doing business as Silicon Valley Power (SVP), is proposing to install a 120 MW (nominal rating), combined-cycle generating facility – the Pico Power Plant Project ("Project"). The Project will be located next to SVP's Kifer Receiving Station and will be connected into their Scott-Kifer 115kV line. The planned operational date of the proposed project is in 2004.

Figures 1 and 2 provide an overview of the vicinity of the proposed project, as well as the transmission facilities in the area. As part of the facility installation, PG&E will be required to relocate the Newark-Kifer and Kifer-San Jose B 115kV lines.

SVP has requested that PG&E conduct a combined System Impact Study and Facilities Study (SIS-FS) for the Project. The Study will determine:

1) impacts on other PG&E transmission system facilities caused by the addition of the Project;
2) the system reinforcements and/or other measures necessary to mitigate the adverse impacts caused by the Project; and
3) the cost to relocate existing PG&E 115kV lines which are located on the site of the proposed facility.

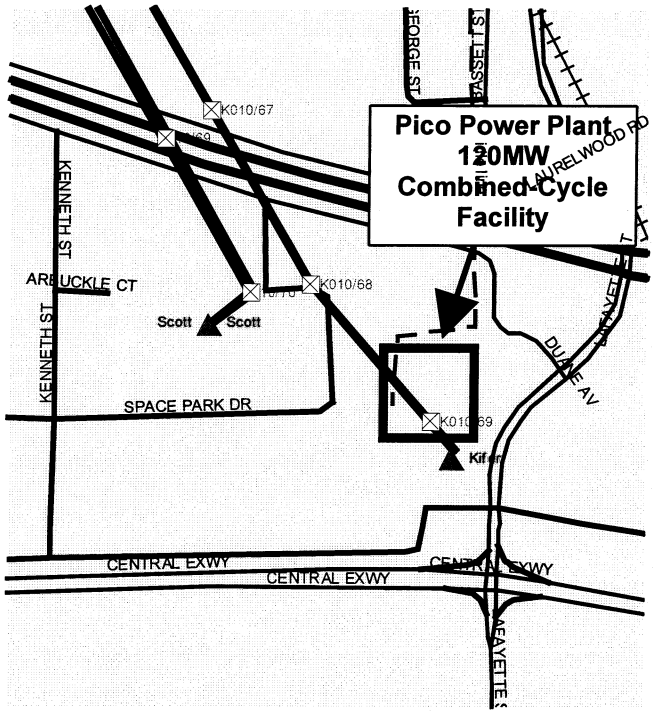

Figure 1: Vicinity Map –Pico Power Plant 120MW Combined-Cycle Facility

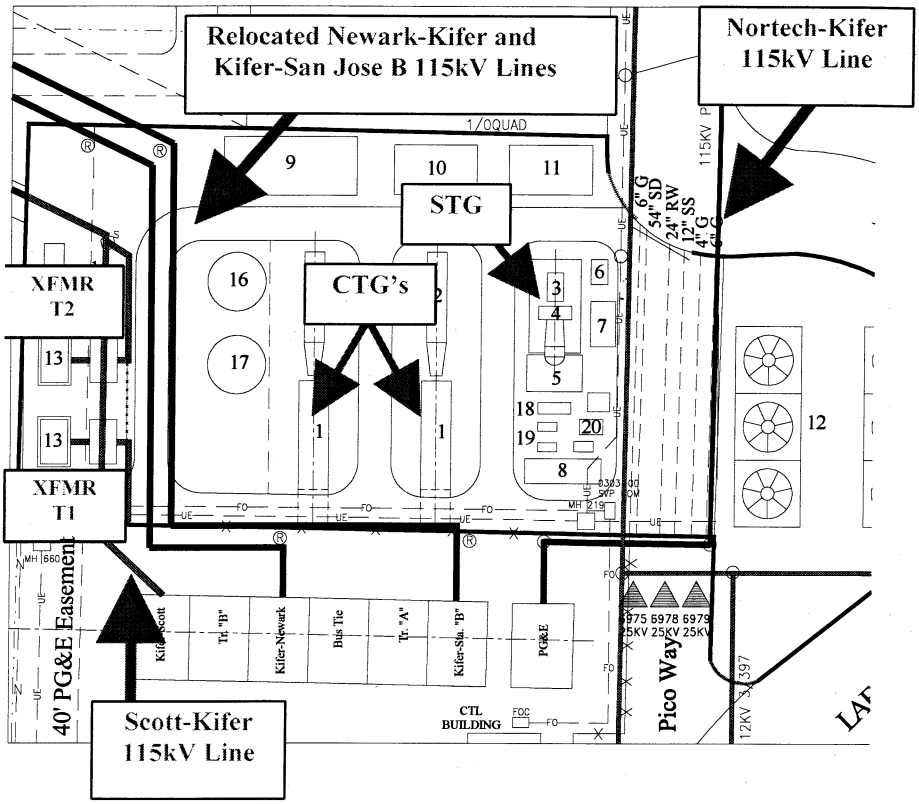

Figure 2: Proposed Layout of the Pico Power Plant 120MW Combined-Cycle Facility

This report summarizes the analytical studies conducted to assess the impact of the proposed Project on the San Jose transmission system, costs associated with mitigating overloads caused by the Project, and costs associated with relocating existing PG&E facilities and installing SCADA telemetry between the Project and PG&E's Transmission Operations Center (TOC) in San Francisco.

In addition to the Pico Power Plant, SVP is also proposing to construct a new 230 kV line between their Northern Receiving Station (NRS) and PG&E's proposed Los Esteros Substation. This new transmission line is planned to be in-service by Summer 2004. As part of this Project study, a sensitivity analysis was conducted with the new 230 kV line in operation.

Existing San Jose Transmission System

The existing PG&E transmission system serving SVP and the north San Jose area is a 115 kV network, fed from Newark Substation in the north and Metcalf Substation in the south. By 2003, the Northeast San Jose Transmission Reinforcement Project should be completed, with the new Los Esteros Substation providing another source of power into the San Jose area. Figure 3 shows the arrangement of the 115 kV system in 2004.

The Greater San Jose Area, which includes the cities of San Jose, Santa Clara, Milpitas, Morgan Hill, Gilroy, Campbell and south Fremont, had a peak demand this summer of over 2,000 MW.[1] Of that, roughly 1,700 MW of load is served by the 115 kV system located between Newark and Metcalf Substations. (The remaining Greater San Jose area load is served from Hicks Substation (about 150 MW supplied by the 230 kV system) and Morgan Hill and Llagas Substations (about 135 MW south of Metcalf in Morgan Hill and Gilroy and 10 MW at Gilroy Foods).

The City of Santa Clara had a peak load this summer of ~410 MW. (The 2000 summer peak was 457 MW.) Power is delivered by the San Jose 115 kV system to SVP's system at three interconnection points: Northern, Scott and Kifer Receiving Stations. Power is transformed to 60 kV at each station and distributed to SVP's internal 60 kV network. Each receiving station supplies about one-third of the SVP load.

[1] The Summer 2000 peak demand for the Greater San Jose Area was ~2,240 MW.

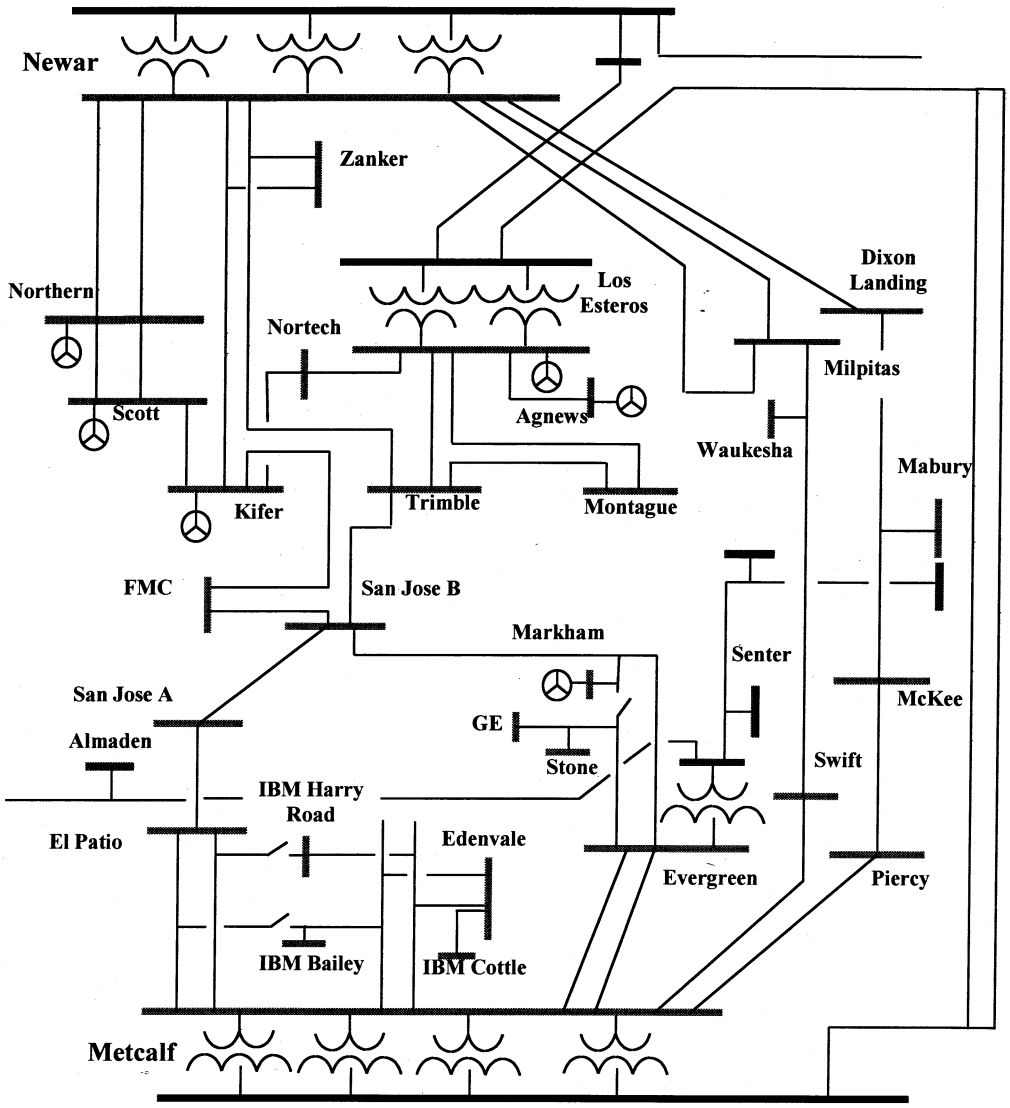

Figure 3: San Jose Transmission System by Summer 2004

Current forecasts have load levels in the San Jose area rising substantially over current levels. SVP expects its load to be roughly 540 MW by Summer 2004. The PG&E forecast for its load in the Greater San Jose Area is ~1,880 MW in 2004, of which 1,555 MW is served by the San Jose 115 kV system.

The San Jose 115 kV system has only a small amount of internal generation. Presently, the largest generators installed within the San Jose 115kV system are:

Gianera CT's (2 x 25 MW)

Container Corp of America (23 MW)

CSC Cogen (5 MW)

Calpine Agnews (30 MW)

Catalyst (6 MW) .

The first three locations listed (~80 MW) are sited within the SVP system (connected into SVP's 60 kV network) and represent ~20% of SVP's peak demand. The total generation within the San Jose 115 kV system is less than 150 MW – or less than 10% of the area's peak demand.[2]

There are a number of generation projects proposed to be on-line in Northern California by 2004. Generation projects that are expected to be on-line in 2004 were modeled in the base cases used for the Study. Attachment 1 lists the proposed generation projects that were modeled in the base cases. However, some generation projects, which are electrically far from the proposed project, were either turned off or modeled with reduced generation to balance the loads and resources in the power flow model. The generation projects in the Mission, De Anza, San Jose and Central Coast transmission planning areas were modeled at 100% generation.

In the South Bay area, there are two proposed generation projects which will have a major influence on equipment loadings within the San Jose 115 kV system:[3]

Metcalf Energy Center (600 MW)

Los Esteros Critical Energy Facility Phases 1&2 (240 MW).

Two proposed generation projects (Mirant's Potrero 7 Project and the East Altamont Energy Center) are not expected to be operational by 2004 and were not included in this study.

Project Information and Interconnection Plan

The proposed Project will connect onto the Scott-Kifer 115 kV line. Plant output is nominally expected to be 120 MW, with a maximum output of 155 MW. The plant design will consist of two combustion turbine-generators and one steam turbine-generator. The two 115/13.8 kV step-up transformers will connect into the Scott-Kifer line, with three 115 kV breakers providing separation between the two banks and the Scott and Kifer terminals. (Figure 4 is a schematic of the proposed electrical arrangement for the Project. Figure 5 shows where the Project fits into the San Jose 115 kV system.) Attachment 2 has the detailed Project information provided to PG&E by SVP.

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[2] The 250 MW of generation in Gilroy is not included in this total, since the generation is south of Metcalf in the Morgan Hill-Gilroy pocket.

[3] The 635 MW Russell City Energy Center, to be located in Hayward (and feeding into Eastshore Substation), will have an impact on Bay Area 230 kV flows, but it will have a minimal impact on the San Jose 115 kV system.

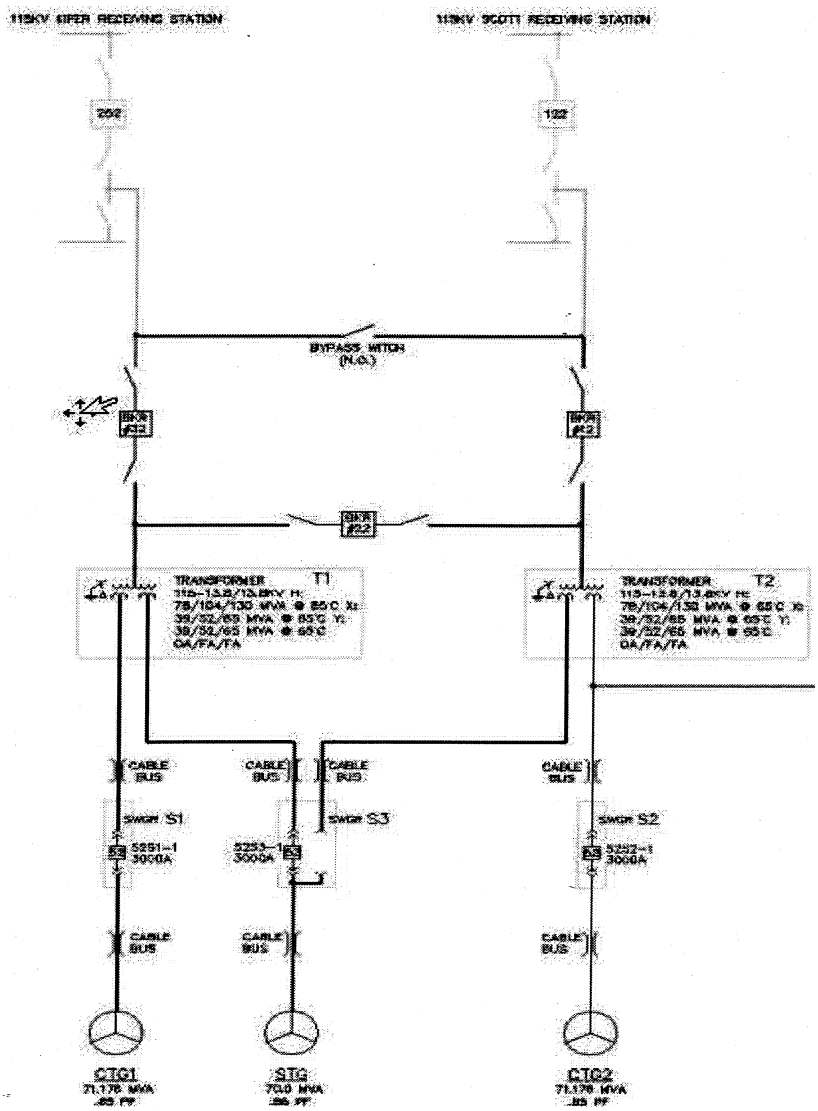

Figure 4: Schematic of Pico Power Plant Project

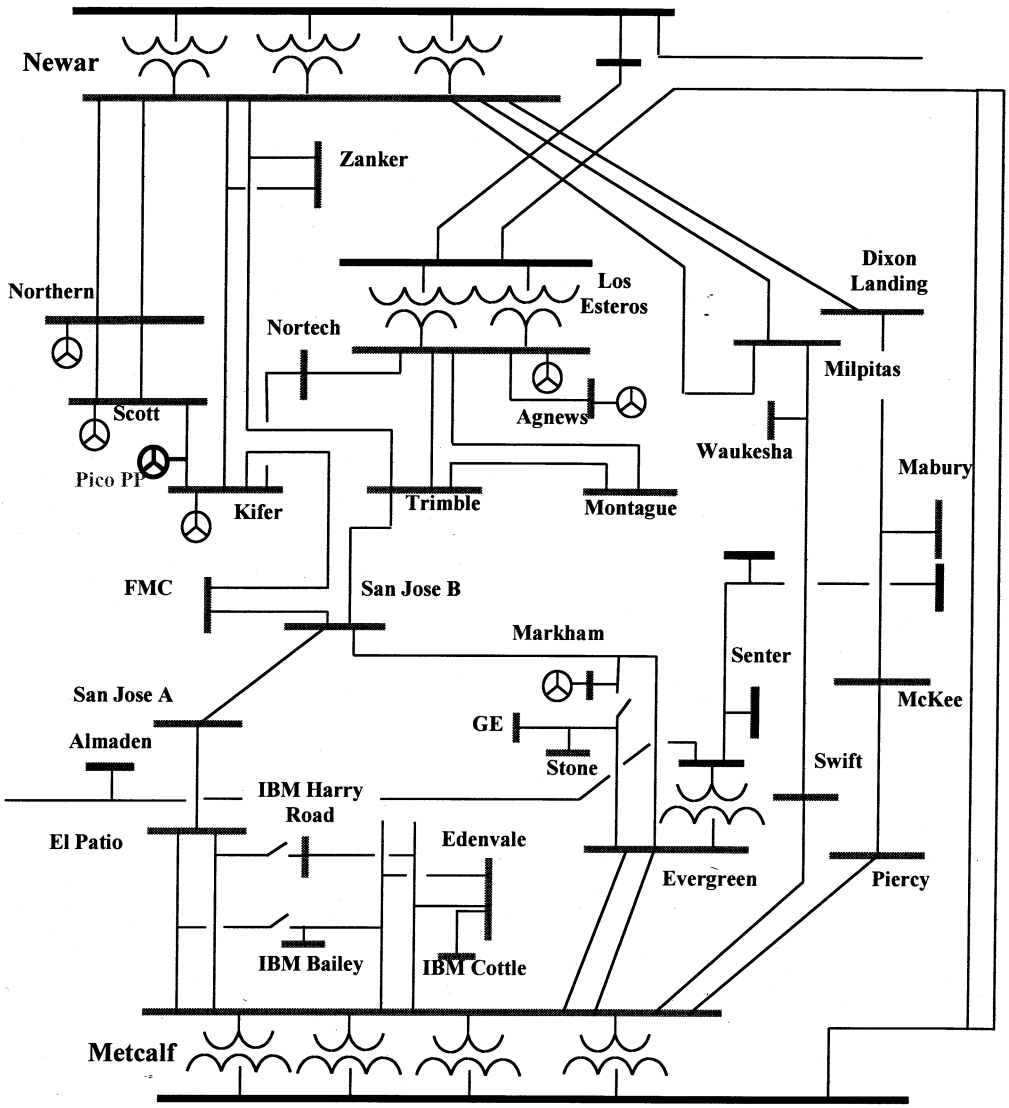

Figure 5: San Jose Transmission System with Pico Power Plant Project

Technical Study Scope

This Study investigated the impact of the Pico Power Plant generation on PG&E's transmission system for system conditions expected by Summer 2004. For this study, peak load in the Greater San Jose Area, including SVP, was assumed to be 2,420 MW. Of this total, ~2,100 MW will be served by the San Jose 115 kV system.

SVP's 2004 summer peak load was assumed to be 540 MW (the current SVP forecast for 2004). Per information received from SVP, this load is assumed to be served evenly

by the three Receiving Stations (Northern, Scott and Kifer). PG&E's powerflow models do not contain information on the SVP 60 kV network, so the SVP load is modeled at the 115 kV buses of the Receiving Stations. (This becomes important in studying station bus faults.)

The specific technical studies that were conducted to assess the impact of this Project are discussed below.

Steady State Power Flow Analysis

The 2004 Summer Peak and Off-Peak base cases were used to simulate the impact of the new facility during normal operating conditions, as well as, critical single and selected multiple (ISO Categories "B" and "C") outages. The study contingencies will cover the transmission facilities within the South Bay area. Attachment 3 lists the specific contingencies studied as part of this analysis.

ISO Category "B"

- Single generator outages within the study area.
- Single (115 - 230 kV) transmission circuit outages within the study area including each section on SVP's 115 kV Tie Lines.
- Single transformer outages within the study area.
- Overlapping single generator and transmission circuit outages for the transmission lines and generators within the study area.

ISO Category "C"

- Selected bus outages (115 and 230 kV) within the study area including the three SVP Receiving Stations (Northern, Scott and Kifer).[4]
- Outages caused by breaker failures (excluding bus tie and sectionalizing breakers) at the same bus section above.
- Combination of any two-generator/transmission line/transformer outages (except ones included above in Category "B") within the study area.
- Outages of double circuit tower lines (115 and 230 kV) within the study area.

System Protection Analysis

Short-circuit studies were performed to determine the impact of increased fault duty resulting from the added generation due to Pico Power Plant. Existing substation equipment was evaluated with the increased fault duties.

[4] Since PG&E does not model the SVP 60 kV network, bus faults at the Receiving Stations cannot be modeled directly. Adjustments to the power flow models are necessary – see Attachment 3 for details.

Dynamic Stability Analysis

Dynamic stability studies were conducted using the 2004 Summer Full-Loop Base Case to ensure that the transmission system remains in operating equilibrium through abnormal operating conditions after the new facility begins operation. Disturbance simulations were performed for a study period of up to 20 seconds to determine whether the new facility will create any system instability during the following line and generator outages:

NERC/CAISO Category "B" Contingencies:

a) Full load rejection of the Project 120 MW (nominal) generation.

b) A three-phase fault with the normal clearing time at the Kifer 115kV bus, followed by the loss of the Scott-Kifer 115kV circuit and the new 120 MW generating facility.

c) A three-phase fault with the normal clearing time at the Scott 115kV bus, followed by the loss of the Scott-Kifer 115kV circuit and the new 120 MW generating facility.

d) A three-phase fault with the normal clearing time at the Kifer 115kV bus, followed by the loss of the Kifer-San Jose B 115kV circuit, including FMC Substation.

e) A single-phase-to-ground fault with delayed clearing time at the Kifer 115kV bus, followed by the loss of the Scott-Kifer 115kV circuit and the new 120 MW generating facility.

NERC/CAISO Category "C" Contingencies:

a) A three-phase fault with the normal clearing time at the Kifer 115kV bus, followed by the loss of the Scott-Kifer and Kifer-San Jose 115 kV circuits and the new generating facility.

b) A three-phase fault with the normal clearing time at the Northern 115kV bus, followed by loss of the Newark-Northern # 1 and 2 115kV circuits.

c) A three-phase fault with the normal clearing time at the Scott 115kV bus, followed by loss of the Northern-Scott # 1 and 2 115kV circuits.

Reactive Power Deficiency Analysis

With the Project included in the system model, Category B and Category C contingencies were analyzed to identify any reactive power deficiency

- If they result in voltage drops of 5% or more from the pre-project levels,

OR

- If they fail to meet applicable voltage criteria.

Post-transient power flow analysis were performed, if deemed necessary, after considering the network topology or power transfer paths involved when a significant amount of power transfer occurs.

Power Flow Analysis of 2004 Summer Peak Conditions

The San Jose transmission system was evaluated for over 1,000 Category B and C contingencies under 2004 Summer Peak conditions, with and without the proposed Project. Results of the 2004 Summer Peak power flow analyses are summarized in Attachment 4.

In the existing San Jose 115 kV system, there are only two overload problems that appear during summer peak conditions:[5]

1) Scott-Kifer 115 kV line overloads, and

2) Newark-Northern 115 kV line overloads.

The Scott-Kifer line loads to 97% of its normal rating by Summer 2004 with all lines and existing generation in-service. The strength of Los Esteros and Metcalf and their associated generation "push" power into Kifer and up to Scott. Total load served by Northern and Scott amounts to 360 MW. There is less than 50 MW of generation helping to serve this load, which means that 310 MW of power must be imported via the 115 kV lines into Northern and Scott – and over 160 MW of that is delivered via the Scott-Kifer line. So, the Scott-Kifer line overloads for any line or generation outage at Northern and Scott.

In the existing system, the most severe overloads on the Scott-Kifer line are:

103% of normal rating for [G-1] contingency

122% of emergency rating for [G-1/L-1] contingency

173% of emergency rating for DCTL [L-2] contingency.

Attachment 4 details the specific contingencies which cause these overloads. SVP is planning on reconductoring this line before the end of 2002. The proposed conductor size is bundled 795 AAC, or larger. This reconductoring work should eliminate overloads on this line before and after the Pico Project is installed.

The Newark-Northern 115 kV lines could experience overloads for a Kifer 115 kV bus-fault outage during summer peak conditions. For this contingency, the only 115 kV import lines into SVP are the two Newark-Northern lines. With currently less than 100

[5] Contingencies involving Newark 230/115 kV Bank # 9 resulted in overloads of Eastshore 230/115 kV Bank # 1. These overloads are a result of Russell City Energy Center (RCEC). As part of the system reinforcements needed to put RCEC in-service, the Eastshore banks will be replaced with new 420 MVA transformers.

MW of internal generation in the SVP system, over 450 MW of power has to be transmitted on these two lines. (Each line already has a 4 fps emergency rating of 189 MVA.) The overloads could potentially exceed 120% of the emergency rating of the lines.

The overloads on the Scott-Kifer and Newark-Northern #1&2 115 kV lines were the only overloads found in the existing north San Jose transmission system for 2004 Summer Peak conditions.

Attachment 4 shows all of the contingency overloads found after the Project is in-service. With the addition of the proposed Project, the bus-fault overloads on the Newark-Northern lines disappear. The only remaining overloads in the north San Jose transmission system are on the Scott-Pico section of the Scott-Kifer line.

These overloads (assuming the existing conductor ratings) worsen dramatically after the Project is in-service. With all generation in the SVP system on-line, including the Pico Project, the Scott-Pico line section normally loads to more than 1,090 Amps (130% of the line's normal rating). The worst Category B contingency loading is more than 1,340 Amps (142% of the line's emergency rating). The worst Category C contingency loading is more than 1,620 Amps (170% of the line's emergency rating).

For all other Contingency B and C overloads in the South Bay area, the proposed Pico Project reduces the magnitude of the overload.

Power Flow Analysis of 2004 Summer Off-Peak Conditions

The San Jose transmission system was also evaluated for over 1,000 Category B and C contingencies under 2004 Summer Off-Peak conditions, with and without the proposed Project. Load levels in the Summer Off-Peak power flow cases were set at 50% of the levels in the Summer Peak cases. This means that the load served by the San Jose 115 kV system was modeled at a little over 1,000 MW; the SVP load was set to 266 MW.

In addition to the reduced load levels in the San Jose area, there are some other differences between the Summer Peak and the Summer Off-Peak power flow cases. The Gianera CT's were turned off in the Summer Off-Peak cases. Other generation in the San Jose area, however, was kept at maximum output (including generation at LECEF and Gilroy). Transmission lines in the San Jose area with 4 fps ratings had the ratings lowered to the standard 2 fps ratings for the Summer Off-Peak cases.

Results of the 2004 Summer Off-Peak power flow analyses are summarized in Attachment 5. The study found that the Project results in no additional overloads for any Category B or C contingencies. In fact, the Project eliminates or reduces many overloads in the San Jose area.

Dynamic Stability Analysis

Dynamic stability runs were made for eight critical contingencies in the San Jose transmission system (five Category B and three Category C). Each stability run was conducted for 20 seconds to ensure that the system was stable for the contingency. The 2004 Summer Peak case was used for these studies. Attachment 6 has the switchdecks used for each contingency as well as plots of the response of area generators and buses to the distubance. No system instabilities were found for these contingencies.

Reactive Power Deficiency Analysis

In both the Summer Peak and Summer Off-Peak studies, no post-Project contingencies resulted in voltage changes of more than 5% from pre-Project levels. There were no violations of voltage reliability criteria, and so no post-transient studies were conducted as part of this study.

Sensitivity with NRS-Los Esteros 230 kV Line

SVP is also proposing to construct a 230 kV line between Northern Receiving Station and Los Esteros. A separate study is being conducted to fully evaluate the impacts of this proposed transmission project. Figure 6 shows a schematic of how the proposed line will interconnect into the San Jose area transmission system.

The proposed 230 kV transmission line creates a more direct path between Los Esteros and the SVP system. This will help "off load" the 115 kV circuits between Los Esteros and Kifer, and it should reduce the flow from Kifer to Scott.

This study assessed the impact on the San Jose area transmission system of adding the new 230 kV line on top of the new Pico Power Plant. All Category B and C contingencies were re-run for this new system configuration. As expected, the 230 kV line, on top of the Pico Project, eliminated almost all of the remaining overloads in the north San Jose transmission system – including most of the overloads on the Scott-Pico line section. For contingencies resulting in overloads outside of the San Jose transmission system, the NRS-Los Esteros 230 kV line did not increase or reduce the level of overload.

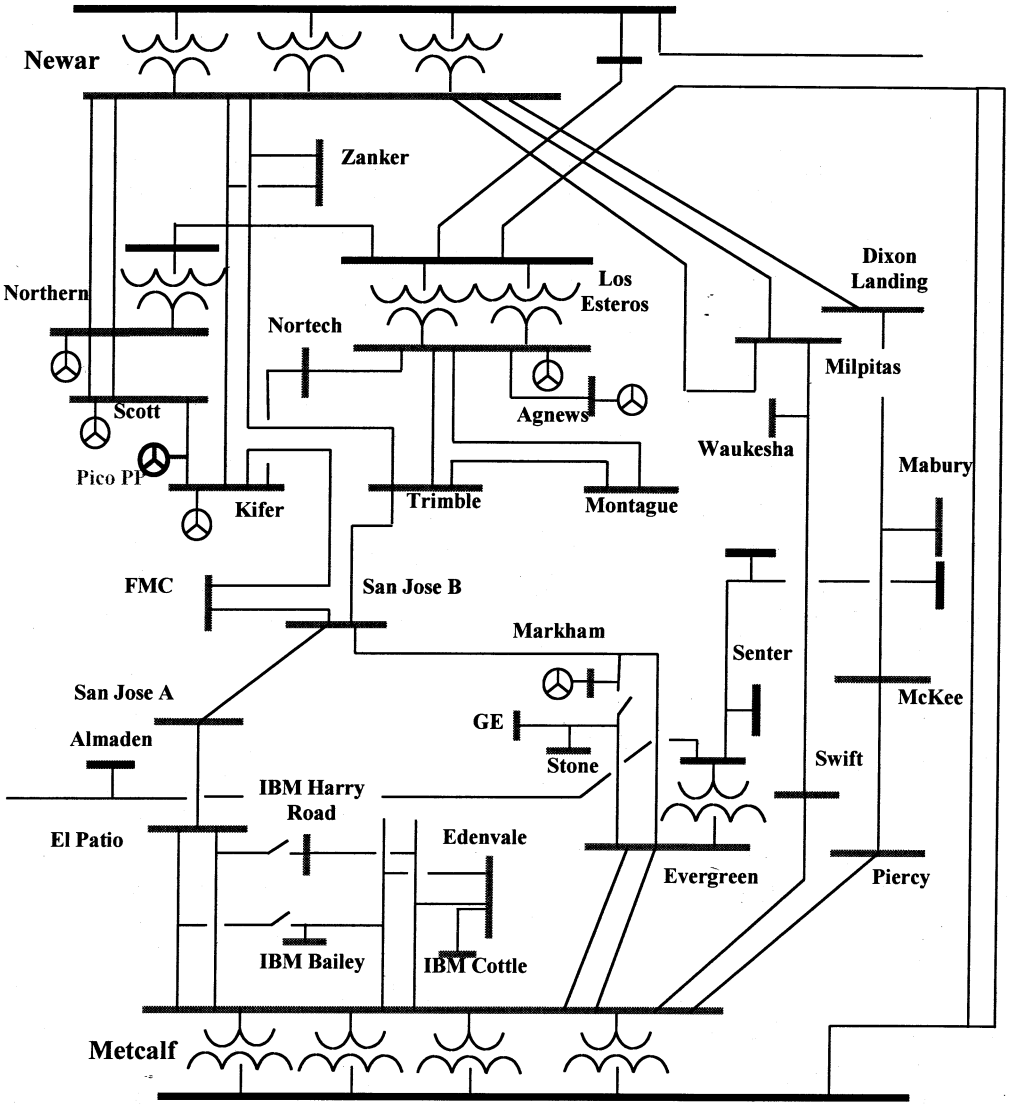

Figure 6: San Jose Transmission System with Pico Power Plant Project And proposed NRS-Los Esteros 230 kV Line

Fault Duty Analysis

Short-circuit studies were performed to determine the impact of increased fault duty resulting from the added generation due to Pico Power Plant and also the 230 kV line between Northern Receiving Station and Los Esteros. Table 1 lists the three-phase and single-line-to-ground bus fault duties for substations in the north San Jose area with both proposed projects in-service.

Table 1: Bus Fault Duties Before and After the Pico Power Plant Project is Placed In-Service (the NRS-Los Esteros 230 kV Line is also included)

Sys. Pro. Results 04-Sep-02 Proposed Project: Before/After Pico PP			Short Circuit Currents on Selected Busses for the Proposed Project (AMPS)					
			Case 1 Base Case System (Before Pico & NRS-LE 230kV Line)		Case 2 Case 1 + Addition of Proposed Project (After Pico & NRS-LE 230kV Line)		DEVIATION PERCENT INCREASE(+) OR DECREASE(-) (Columns 2 over Columns 1)	
	Bus Name	**kV**	**3LG (A)**	**1LG (A)**	**3LG (A)**	**1LG (A)**	**3LG %DIFF**	**1LG %DIFF**
1	FMC	115	23946	20606	24938	21246	4.1%	3.1%
2	KIFER	115	33736	32069	41250	41297	22.3%	28.8%
3	LOS ESTEROS	115	42891	45819	44413	48150	3.5%	5.1%
4	LOS ESTEROS	230	25340	20813	27940	24234	10.3%	16.4%
5	NEWARK D	115	39217	41187	40385	42074	3.0%	2.2%
6	NEWARK F	115	56503	56932	58580	58369	3.7%	2.5%
7	NORTECH	115	33018	27830	34913	29287	5.7%	5.2%
8	NRS	230	0	0	23025	18392	N/A	N/A
9	NRS B1	115	30807	25816	41003	36386	33.1%	40.9%
10	NRS B2	115	30811	25821	41097	36493	33.4%	41.3%
11	NTS 1	115	22037	17693	23390	18610	6.1%	5.2%
12	PICO	115	33689	31990	41239	41314	22.4%	29.1%
13	PICO T1 WX	13.11	0	0	63249	39060	N/A	N/A
14	PICO T1 WY	13.11	0	0	45500	39535	N/A	N/A
15	PICO T2 WX	13.11	0	0	41964	0	N/A	N/A
16	PICO T2 WY	13.11	0	0	45200	39296	N/A	N/A
17	SAN JOSE B	115	29848	28293	30778	28931	3.1%	2.3%
18	SCOTT	115	32912	30969	40632	39462	23.5%	27.4%
19	STS 1	115	22101	17802	23359	18638	5.7%	4.7%
20	ZANKER TAP 2	115	21140	14665	22504	15506	6.5%	5.7%

Existing substation equipment ratings were evaluated in light of the increased fault duties. The addition of the Project into the San Jose area transmission system has not been found to result in any equipment overstress or overload condition.

Cost Summary

Table 2 provides a summary of the facilities cost estimates for relocating PG&E transmission facilities. While this project will not be interconnecting directly to PG&E's transmission system, there are also interconnection related costs. Please note that these costs are not final and will need to be reconciled with actual costs upon project completion.

PG&E recommends that SVP include PG&E's work to relocate the lines in its CEQA application to the local agency. The local agency must consider the environmental impacts of the relocation.

Please see Section III, B.1.(f) in General Order 131-D. This document can be found in the CPUC's web page at:

http://www.cpuc.ca.gov/published/index_pages/general_orders_index.htm

Table 2: Summary of Line Relocation and Other Interconnection Costs

Substation Work (Interconnection)		
Relay Coordination at Existing PG&E Substations	*$33,000*	
Substation Subtotal		$ 33,000
Telecommunication Work (Interconnection)		
Install Communication System Required to Transmit EMS information from proposed plant to PG&E's Transmision Operations Center (TOC) in San Francisco	*$113,000*	
Substation Subtotal		$ 113,000
Transmission Line Work (Relocation)		
Remove existing transmission lines and one tower. Install 2 underground circuits with 4 risers	*$1,494,000*	
Transmission Line Work Subtotal		$ 1,494,000
Land (Relocation)		
Obtain new land rights, perform surveys, quitclaim existing rights and lead CPUC filings and permits applications. Assume local permits are not required.	*$77,000*	
Land Work Subtotal		$ 77,000
Subtotal Relocation Cost		**$ 1,571,000**
Subtotal Interconnection Cost		**$ 146,000**
ITCC Tax for Relocations @ 27%		**$ 424,170**
ITCC Tax for Interconnections @ 34%		**$ 49,640**
Total Estimated Relocation & Interconnection Cost		***$ 2,190,810***

Schedule

At this time PG&E is considering the impacts of relocating a portion of the Newark-Kifer and Kifer-San Jose B 115kV line underground. No schedule has been established. SVP should be aware that these facilities are in a perpetual easement and, therefore, PG&E is under no legal obligation to relocate or sell them. The SVP proposed relocation to an underground route through the Pico Power Plant raises access and maintenance concerns. While selling a portion of the two lines would remove PG&E's responsibility for access and maintenance, PG&E has not had sufficient time to fully evaluate a sale of the lines. With these concerns in mind, PG&E is not in a position to agree with your request to either relocate or sell the lines. We recommend that Santa Clara consider all options for its development, including planning the development to be compatible with the current alignment. PG&E is willing to work with Santa Clara to see if a mutually agreeable solution can be found in the City's timeframe.

Attachment 1 – Generation Projects to be Modeled in Study

	Generation Projects Already On-line	On-line Date	To Be Modeled in Study Case?
	PG&E NEG – La Paloma generation facility interconnecting at Midway 230 kV bus section D; La Paloma generation facility will be will be modeled at 1110 MW in summer and 1160 MW in spring and winter in 2001.	2001	Yes
	Calpine – 500 MW Los Medanos Energy Center (LMEC), interconnecting with the 115 kV bus at the Pittsburg Power Plant switchyard in 2001.	2001	Yes
	GWF – 96 MW Hanford, interconnecting to Kingsburg - Henrietta 115 kV line in Fresno area in 2001.	2001	Yes
	Neo Corporation - 50 MW project, interconnecting at Certainteed Tap 115 kV line in 2001.	2001	Yes
	Neo Corporation - 49.9 MW project, interconnecting at Cottonwood #2 60 kV line in 2001.	2001	Yes
	Fresno Co-Generation Partners – 18 MW project, interconnecting at Kerman - Helm 70 kV line in 2001.	2001	Yes
	California State University Fresno – 12 MW project, interconnecting at Reedley - Dinuba #1 70 kV line in 2001.	2001	Yes
	Yanke Energy – 13.4 MW project, interconnecting at Soledad #3 60 kV line in 2001.	2001	Yes
	Madera Power, LLC – 28.7 MW project, interconnecting at Dairyland - Mendota 115 kV line in 2001.	2001	Yes
	Sunrise Cogen – 338 MW Sunrise Generation Facility interconnecting at La Paloma Switching Station in 2002.	2002	Yes
	Midsun - 25 MW project, interconnecting at Midsun Substation 115 kV bus in 2002.	2002	Yes
	Calpine – 135 MW Gilroy I Project, interconnecting at Gilroy 115 kV bus in 2002.	2002	Yes
	PG&E Generation Projects	**On-line Date**	**To Be Modeled in Study Case?**
1)	Calpine/Bechtel – 880 MW Delta Energy Center (DEC), interconnecting with the 230 kV bus at the Pittsburg Power Plant switchyard in 2002.	2002	Yes

2)	Calpine/Bechtel – 500 MW Metcalf Energy Center (MEC), interconnecting with the Metcalf - Monta Vista #4 230 kV line, through the MEC switchyard in 2003.	2003	Yes
3)	Three Mountain Power Company – 530 MW project interconnecting to PG&E's Pit 1 - Pit 3 and Pit 1 - Cottonwood 230 kV lines in 2004.	2004	No
4)	Duke Energy North America Corporation (DENA) – 1080 MW Moss Landing project (MLPP), interconnecting with the existing 230 kV bus at the Moss Landing Power Plant in 2002.	2002	Yes
5)	Southern Energy Company of California – 590 MW Contra Costa Power Plant Capacity Increase Project, interconnecting to Contra Costa PP 230 kV bus in 2005.	2005	No
6)	The Midway-Sunset generation facility will be 500 MW in summer, 546 MW in spring, and 540 MW winter. Midway-Sunset generation facility will be interconnected at Midway 230 kV bus section E in 2003.	2003	Yes
7)	Sempra – 500 MW Elk Hills Power Project, interconnecting at Midway 230 kV bus in 2002.	2002	Yes
8)	FPLE – 150 MW High Wind, tapping off the Vaca - Contra Costa #2 230 kV line in 2003.	2003	No
9)	Project A - 1156 MW project, interconnecting to the 230 kV bus at Tesla Substation in 2004.	2004	Yes
10)	Project B – 580 MW project, interconnecting to the 230 kV bus at Newark Substation in 2004.	2004	Yes
11)	Project C – 581 MW project, interconnecting to the 230 kV bus at Los Esteros Substation in 2004.	2004	Yes
12)	Morro Bay Modernization Project replacing the existing Morro Bay Power Plant with 1,200 MW of generation in 2003.	2003	Yes
13)	Project D- 49 MW project, interconnecting at Vaca Dixon 115 kV bus in 2002.	2002	Yes
14)	Project E – 49 MW project, interconnecting at Midway Substation 115 kV bus in 2002.	2002	Yes
15)	Project F – 49 MW project, interconnecting at Panoche Substation 115 kV bus in 2002.	2002	Yes
16)	Project G - 48.7 MW project, interconnecting at the Pease-Marysville-Harter 60 kV line in 2002.	2002	Yes
17)	Project H – 1000 MW project in the Fresno area in 2004.	2004	No
18)	Project I - 150 MW project, interconnecting with Vaca Dixon - Contra Costa #1 230 kV line in 2002.	2002	Yes
19)	Mirant – 619 MW Potrero Unit 7 Project, interconnecting at Potrero and Hunters Point Substations in 2004.	2004	No
20)	Project J – 9 MW project, interconnecting at Kernridge Substation115 kV bus in 2001.	2001	Yes
21)	Edison Mission Energy – 200 MW Sunrise 2 Power Project, interconnecting at Midway 230 kV bus in 2003.	2003	Yes

22)	Project K – 49 MW project, interconnecting at Panoche - Schindler #2 115 kV line in 2002.	2002	Yes
23)	Project L – 49 MW project, interconnecting at Gates - Colinga #2 70 kV line in 2002.	2002	Yes
24)	Project M – 96 MW project, interconnecting at Henrietta 70 kV bus in 2002.	2002	Yes
25)	Project N – 258 MW project, interconnecting at Tesla - Kasson and Tesla - Manteca 115 kV lines in 2002.	2002	Yes
26)	Calpine - 45 MW King City Project, interconnecting at Coburn - Basic Energy 60 kV line in 2002.	2002	Yes
27)	Valero Refining Co. – 51 MW Valero Co-Gen I Project, interconnecting at Bahia Substation 230 kV bus in 2002.	2002	Yes
28)	Project O – 620 MW project, interconnecting at the East Shore 230 kV bus in 2004.	2004	Yes
29)	Project P – 1000 MW project, interconnecting at the 230 kV bus at Los Banos Substation in 2004.	2004	No
30)	Project Q – 50 MW project, interconnecting at existing KES Kingsburg Co-Gen 115 kV bus in 2002.	2002	Yes
31)	Project R – 1,000 MW project, interconnecting at Los Banos 500 kV bus in 2005.	2005	No
32)	Project S – 620 MW project, interconnecting at Arco - Gates 230 kV line in 2004.	2004	No
33)	Project T – 146 MW project, interconnecting at Moss Landing - Green Valley 115 kV line in 2002.	2002	Yes
34)	Project U – 49 MW project, interconnecting at Green Valley - Watsonville 60 kV line in 2002.	2002	Yes
35)	Project V – 1367 MW project, interconnecting at Los Banos 230 kV bus in 2004.	2004	No
36)	Project W – additional 146 MW project, interconnecting at Gilroy 115 kV bus in 2002.	2002	No
37)	Project X – 664 MW project, interconnecting at Contra Costa PP 230 kV bus in 2004.	2004	Yes
38)	Project Y – 660 MW project, interconnecting at McCall Substation 230 kV bus in 2003.	2003	No
39)	Project Z – 160 MW project, interconnecting at Kern PP 115 kV bus in 2003.	2003	Yes
40)	Project AA – 195 MW project, interconnecting at Los Esteros 115 kV bus in 2002.	2002	Yes
41)	Project AB - 100 MW project, interconnecting at Evergreen - San Jose "B" 115 kV line in 2002.	2002	No
42)	Project AC - 100 MW interconnecting to Milpitas 115 kV bus in 2002.	2002	No
43)	United Golden Gate Power – 51 MW United Golden Gate Phase 1 Project, interconnecting at existing UCI 115 kV bus in 2003.	2003	No

44)	Project AD - 50 MW project, interconnecting to Bogue 115 kV bus in 2002.	2002	Yes
45)	Project AE - 88 MW project, interconnecting to Los Banos 70 kV system in 2002.	2002	Yes
46)	Project AF - 1100 MW project, looping onto the Tesla-Stagg 230 kV & Tesla-Eight Mile 230 kV lines in 2005.	2005	No
47)	Project AG - 48 MW project, Interconnecting to the Contra Costa #1 115 kV line in 2003.	2003	Yes
48)	Project AH - 512 MW project, Looping onto the Tesla-Manteca 115 kV and Manteca-Vierra 115 kV lines in 2004.	2004	No
49)	Project AI - 20 MW project, interconnecting at the 115 kV bus at El Dorado Power House in 2002.	2002	Yes
50)	Project AJ – 63.5 MW project, interconnecting at Morgan Substation 115 kV (Santa Fe Energy) in 2003.	2003	Yes
51)	Project AK – 62 MW project, interconnecting at Los Esteros 115 kV bus in 2003.	2003	Yes
52)	Project AL- 49 MW project, interconnecting to the Ignacio-Mare Island #2 115 kV line in 2002.	2002	Yes
53)	Project AM - 49 MW project, interconnecting to the Vaca - Suisun 115 kV line i 2003.	2003	Yes
	Non-PG&E Generation Projects to Be Modeled in Base Case per On-line Year	**On-line Date**	**To Be Modeled in Study Case?**
1)	Calpine Corporation – 500 MW Sutter facility, interconnecting with WAPA's Elverta - Olinda and Elverta - Keswick 230 kV in 2001.	2001	Yes
2)	FPLE – 560 MW Elverta Project, interconnecting with WAPA system in 2004.	2004	No
3)	Calpine – 1,070 MW East Altamont Generating Project interconnecting at the Tracy - Westley 230 kV circuit near Tracy Substation in 2004.	2004	No
4)	SMUD - 500 MW project interconnecting with SMUD's Rancho Seco 230 kV bus in 2005.	2005	No

Attachment 2 – Detailed Project Data Supplied by SVP

Below is a summary of the technical data provided by SVP for the proposed Pico Power Plant.

Plant design: 2x1 Combined-cycle facility (two LM6000 CTG's; one STG)

The nominal generation output from the Project will be 120 MW. Maximum output was originally specified as 170 MW. However, an e-mail received on 7/16/2002 from Steve Brock of PB Power, Inc. (the consultants for SVP), stated that "the STG turbine has been reduced in output and consequently the STG generator will be of a similar size and characteristics to the CTG (LM6000) generator."

Units will be connected to the 115 kV system via two, three-winding transformers. The transformers are expected to have the following characteristics:

Winding	Nominal Voltage	Rating	Connection
H	115	130 MVA	Wye
X	13.11	65 MVA	Delta
Y	13.11	65 MVA	Delta

Transformer impedances are given as:

H-X: 18% on 78 MVA base
H-Y: 18% on 78 MVA base
X-Y: 33.6% on 78 MVA base.

The generators will be normally connected to the following windings:

One CTG to Y winding of XFMR T1
One CTG to Y winding of XFMR T2
STG to X winding of XFMR T1
(See Figure 4 for a schematic layout of these connections.)

The generator characteristics are given as:

Rated MVA = 71.176 MVA
Unsaturated Synchronous Reactance = 235%
Saturated Transient Reactance = 20% +/- 10%
Saturated Subtransient Reactance = 14.4% +/- 10%
Unsaturated Negative-Sequence Reactance = 17.6%
Unsaturated Zero-Sequence Reactance = 9.5%
Transient Open-Circuit Time Constant = 9.7 seconds
Transient Short-Circuit Time Constant = 0.65 second
Subtransient Open-Circuit Time Constant = 0.05 second
Subtransient Short-Circuit Time Constant = 0.04 second

Attachment 3 – Specific Contingencies Studied

1. Basecases to be Used

Four initial basecases will be developed:

2004 Summer Peak (without Pico)

2004 Summer Peak (with Pico)

2004 Summer Off-Peak (without Pico)

2004 Summer Off-Peak (with Pico) .

These cases will be used as the starting points for the various contingency and transient stability studies to be conducted.

2. [G-1] Contingencies (ISO Category "B")

Nine generator contingencies will be studied as part of this study. These contingencies apply only to the generators connected to the San Jose 115kV system (and a Metcalf Energy Center [G-1]). Why only these generators? The San Jose 115kV system has over 1,000 MW of load in the off-peak case and over 2,200 MW in the peak case. Generation connected to this 115kV system (including Pico Power Plant) totals less than 850 MW, which means the San Jose 115kV system will always import power from the bulk system. So, [G-1] contingencies involving the Russell City project and generation outside of the South Bay area will not be analyzed for this study.

The eight [G-1] contingencies to be evaluated are:

1 [G-1] Gianera CT (Bus # 36858)
2 [G-1] Calpine Agnews generator (Bus # 35860)
3 [G-1] Catalyst generator (Bus # 35863)
4 [G-1] LECEF CTG & STG (Bus # 35663 & 35665)
5 [G-1] San Jose-Santa Clara Wastewater generator (Bus # 35861)
6 [G-1] Gilroy Cogen generator (Bus # 35850)
7 [G-1] Container Corp of America (Bus # 36856)
8 [G-1] Cogen generator (Bus # 36854)
9 [G-1] Metcalf Energy Center steam turbine-generator (Bus # 35883)

The LECEF Project in the basecases is modeled as Phase 2 – two, 2x1 combined-cycle set-ups.

3. [L-1] Contingencies (ISO Category "B")

At this time, fifty-six single-line contingencies are being proposed for study. The table

below lists the contingencies to be analyzed. The line contingencies fall into three categories:

South Bay Bulk Power Lines (500kV and 230kV)
San Jose 115kV Lines
DeAnza 115kV Lines .

The DeAnza 115kV line contingencies are being studied for completeness, since the San Jose 115kV system and the DeAnza 115kV system operate "in parallel," and an outage within one system can slightly increase line flows in the other system.

LINE SENSITIVITY: A sensitivity for the proposed 230kV line between Northern Receiving Station and Los Esteros will also be conducted. One will note that Contingency # 8 is the [L-1] outage of the proposed line. (There will also be a [T-1] contingency for the 230/115 kV bank at NRS.)

1 [L-1] Tesla-Metcalf 500kV Line
2 [L-1] Metcalf-Moss Landing 500kV Line
3 [L-1] Tesla-Newark 230kV Line # 1
4 [L-1] Tesla-Newark 230kV Line # 2
5 [L-1] Newark-Newark Distribution 230kV Line
6 [L-1] Newark Distribution-Los Esteros 230kV Line
7 [L-1] Los Esteros-Metcalf 230kV Line
8 [L-1] Los Esteros-Northern 230kV Line
9 [L-1] Metcalf-Hicks 230kV Line
10 [L-1] Metcalf-Vasona 230kV Line
11 [L-1] Vasona-Saratoga 230kV Line
12 [L-1] Metcalf-Monta Vista 230kV Line # 3
13 [L-1] Metcalf-MEC 230kV Line # 4
14 [L-1] MEC-Monta Vista 230kV Line # 4
15 [L-1] Metcalf-Moss Landing 230kV Line # 1
16 [L-1] Metcalf-Moss Landing 230kV Line # 2
17 [L-1] Tesla-Ravenswood 230kV Line
18 [L-1] Newark-Ravenswood 230kV Line
19 [L-1] Newark-Northern 115kV Line # 1
20 [L-1] Newark-Northern 115kV Line # 2
21 [L-1] Northern-Scott 115kV Line # 1
22 [L-1] Northern-Scott 115kV Line # 2
23 [L-1] Scott-Kifer 115kV Line # 1
24 [L-1] Nortech-Kifer 115kV Line # 1
25 [L-1] Nortech-Los Esteros 115kV Line # 1
26 [L-1] Los Esteros-Trimble 115kV Line # 1
27 [L-1] Los Esteros-Agnew 115kV Line # 1
28 [L-1] Los Esteros-Montague 115kV Line # 1
29 [L-1] Newark-Dixon Landing 115kV Line # 1
30 [L-1] Trimble-Montague 115kV Line # 1
31 [L-1] Newark-Kifer 115kV Line # 1
32 [L-1] Newark-Trimble 115kV Line # 1
33 [L-1] Newark-Milpitas 115kV Line # 1
34 [L-1] Newark-Milpitas 115kV Line # 2
35 [L-1] Dixon Landing-McKee 115kV Line # 1

36 [L-1] Trimble-San Jose B 115kV Line # 1
37 [L-1] Kifer-FMC 115kV Line # 1
38 [L-1] FMC-San Jose B 115kV Line # 1
39 [L-1] San Jose B-San Jose A 115kV Line # 1
40 [L-1] San Jose A-El Patio 115kV Line # 1
41 [L-1] Metcalf-El Patio 115kV Line # 1
42 [L-1] Metcalf-El Patio 115kV Line # 2
43 [L-1] San Jose B-Evergreen 115kV Line # 1
44 [L-1] Swift-Metcalf 115kV Line # 1
45 [L-1] McKee-Piercy 115kV Line # 1
46 [L-1] Piercy-Metcalf 115kV Line # 1
47 [L-1] Milpitas-Swift 115kV Line # 1
48 [L-1] Metcalf-Evergreen 115kV Line # 2
49 [L-1] Metcalf-Evergreen 115kV Line # 1
50 [L-1] Metcalf-Edenvale 115kV Line # 1
51 [L-1] Metcalf-Edenvale 115kV Line # 2
52 [L-1] Newark-Lockheed1-Lawrence 115kV Line
53 [L-1] Newark-Lockheed2-AMD-AppMat 115kV Line
54 [L-1] Monta Vista-Philips-Lawrence 115kV Line
55 [L-1] Monta Vista-Britton 115kV Line
56 [L-1] Monta Vista-Los Gatos 60kV Line

4. [T-1] Contingencies (ISO Category "B")

At this time, fifteen transformer contingencies are being proposed for study. The table below lists the contingencies to be analyzed. As with the line contingencies, Monta Vista 230/115 kV bank outages are being studied for completeness, since these transformers feed the DeAnza 115kV system. Also note that Contingency # 15 is for the 230/115 kV transformer at NRS, which is part of the proposed 230kV line project.

1 [T-1] Metcalf 500/230 kV Bank # 11
2 [T-1] Metcalf 500/230 kV Bank # 12
3 [T-1] Metcalf 500/230 kV Bank # 13
4 [T-1] Metcalf 230/115 kV Bank # 1
5 [T-1] Metcalf 230/115 kV Bank # 2
6 [T-1] Metcalf 230/115 kV Bank # 3
7 [T-1] Metcalf 230/115 kV Bank # 4
8 [T-1] Newark 230/115 kV Bank # 9
9 [T-1] Newark 230/115 kV Bank # 7
10 [T-1] Newark 230/115 kV Bank # 11
11 [T-1] Monta Vista 230/115 kV Bank # 2
12 [T-1] Monta Vista 230/115 kV Bank # 3
13 [T-1] Los Esteros 230/115 kV Bank # 1
14 [T-1] Los Esteros 230/115 kV Bank # 2
15 [T-1] Northern 230/115 kV Bank # 1

5. [G-1/L-1] Contingencies (ISO Category "B")

The fifty-six single-line contingencies listed in Section 3 will be evaluated for each of the nine generator contingencies listed in Section 2 for both Summer Peak and Off-Peak cases.

6. [N-2] Contingencies (ISO Category "C")

Eleven of the most severe [G-2] contingencies were developed from the nine [G-1] contingencies listed in Section 2. The [G-2] contingencies studied were:

1. [G-2] One LECEF 2x1 Combined-cycle Unit
2. [G-2] Gilroy Cogen and a Gilroy Peaker Unit
3. [G-2] Metcalf Energy Center CTG and STG
4. [G-2] Gilroy Cogen and Metcalf Energy Center STG
5. [G-2] San Jose-Santa Clara Wastewater generator and Agnews generator
6. [G-2] San Jose-Santa Clara Wastewater generator and the Catalyst generator
7. [G-2] Gilroy Cogen and Catalyst generator
8. [G-2] CSC Cogen and Container Corp of America generator
9. [G-2] Both Gianera CT's
10. [G-2] Gianera CT and Container Corp of America generator
11. [G-2] Gianera CT and CSC Cogen generator

The [G-1/T-1] contingencies will be run for all combinations of the nine [G-1] contingencies and the fifteen [T-1] contingencies.

Since all of the critical transformers in the San Jose area are located in "multi-bank" stations, only five [T-1] contingencies will be selected for the [T-1/L-1] contingencies:

Metcalf 500/230 kV Bank # 13
Metcalf 230/115 kV Bank # 3
Newark 230/115 kV Bank # 11
Monta Vista 230/115 kV Bank # 2
Los Esteros 230/115 kV Bank # 1 .

All of the fifty-six [L-1] contingencies will be run for each [T-1] contingency.

7. [L-2] Contingencies (ISO Category "C")

Seventeen, DCTL [L-2] contingencies will be run as part of this study. The contingencies are:

1. [L-2] Tesla-Newark #1/Tesla-Ravenswood 230kV Lines
2. [L-2] Tesla-Newark #2/Los Esteros-Metcalf 230kV Lines
3. [L-2] Tesla-Ravenswood/Newark-Ravenswood 230kV Lines
4. [L-2] Newark Dist-Los Esteros/Metcalf-Los Esteros 230kV Lines
5. [L-2] Metcalf-Moss Landing 230kV Lines # 1&2
6. [L-2] Metcalf-Hicks/Metcalf-Vasona 230kV Lines
7. [L-2] Metcalf-Monta Vista 230kV Lines # 3&4

8 [L-2] Newark-Northern 115kV Lines # 1&2
9 [L-2] Northern-Scott 115kV Lines # 1&2
10 [L-2] Los Esteros-Trimble/Montague 115kV Lines
11 [L-2] Newark-Trimble/Kifer 115kV Lines
12 [L-2] Newark-Dixon Landing/Milpitas 115kV Lines
13 [L-2] Metcalf-El Patio 115kV Lines # 1&2
14 [L-2] Metcalf-Evergreen 115kV Lines # 1&2
15 [L-2] Swift/Piercy-Metcalf 115kV Lines
16 [L-2] Trimble/Kifer-San Jose B/FMC 115kV Lines
17 [L-2] Monta Vista-Lawrence/Britton 115kV Lines

For the non-DCTL [L-2] contingencies, only a select number of contingencies will be studied. First, critical single-line contingencies will be selected. Then the list of fifty-six single-line contingencies will be run on top of each critical single-line contingency. The critical line contingencies to be used are:

Tesla-Metcalf 500kV Line
Metcalf-Moss Landing 500kV Line
Tesla-Newark #1 230kV Line
Newark-Newark Dist. 230kV Line
Los Esteros-Metcalf 230kV Line
Metcalf-Vasona 230kV Line
Metcalf-MEC 230kV Line
Newark-Northern #2 115kV Line
Newark-Trimble 115kV Line
Newark-Dixon Landing 115kV Line
NRS-Scott #1 115kV Line
Los Esteros-Nortech 115kV Line
Los Esteros-Trimble 115kV Line
San Jose A-San Jose B 115kV Line
Evergreen-San Jose B 115kV Line
Metcalf-El Patio #1 115kV Line
Metcalf-Evergreen #2 115kV Line
Piercy-Metcalf 115kV Line

8. Bus Contingencies (ISO Category "C")

At this time, twenty-three bus contingencies will be studied. The most critical bus contingencies for the San Jose 115kV system were selected. There are no Los Esteros bus outages included, since the bus configuration at Los Esteros will be breaker-and-a-half for both the 115kV and 230kV. (The same is true of the proposed NRS 230kV bus.)

1 [B-1] Newark D1 230kV Bus Outage
2 [B-1] Newark D2 230kV Bus Outage
3 [B-1] Newark E1 230kV Bus Outage
4 [B-1] Newark E2 230kV Bus Outage
5 [B-1] Metcalf D1 230kV Bus Outage
6 [B-1] Metcalf D2 230kV Bus Outage

7 [B-1] Metcalf E1 230kV Bus Outage
8 [B-1] Metcalf E2 230kV Bus Outage
9 [B-1] Newark D1 115kV Bus Outage
10 [B-1] Newark D2 115kV Bus Outage
11 [B-1] Newark E1 115kV Bus Outage
12 [B-1] Newark E2 115kV Bus Outage
13 [B-1] Newark F1 115kV Bus Outage
14 [B-1] Newark F2 115kV Bus Outage
15 [B-1] Metcalf D2 115kV Bus Outage
16 [B-1] Metcalf E2 115kV Bus Outage
17 [B-1] Metcalf D1&E1 115kV Bus Outage
18 [B-1] San Jose B 115kV Bus Outage
19 [B-1] Trimble 115kV Bus Outage
20 [B-1] Northern #1 115kV Bus Outage
21 [B-1] Northern #2 115kV Bus Outage
22 [B-1] Scott 115kV Bus Outage
23 [B-1] Kifer 115kV Bus Outage

The three SVP Receiving Stations utilize a main-aux bus design. Except for Northern Receiving Station, there are no bus-tie breakers along the main 115 kV bus. (Northern has a 3000-Amp breaker separating the #1 and #2 buses.) So, at Scott and Kifer, a fault on the 115 kV main bus will clear all of the connections to that bus. Since SVP's underlying 60 kV network is interconnected, there will be no interruption to load. From the perspective of the 115 kV system, the load that had been served from the faulted station will now be served from the other two stations. (It is expected that the other two receiving stations will each serve half of the load of the faulted station.)

In order to model this "load transfer" during a bus fault condition, the power flow cases will be modified by adding a fictitious second load at each SVP Receiving Station. This load will be normally off and will be turned on following a bus fault at another Receiving Station.

The bus connections "dropped" for each bus contingency are listed below:

Newark "D1" 230kV Bus Outage:
Newark-Ravenswood 230kV Line
230/115 kV Bank # 9
Tesla-Newark # 1 230kV Line
230kV Shunt Caps

Newark "D2" 230kV Bus Outage:
Las Positas-Newark 230kV Line
230/115 kV Bank # 7
Vineyard-Newark 230kV Line

Newark "E1" 230kV Bus Outage:
230/115 kV Bank # 11
Tesla-Newark # 2 230kV Line
SVC

Newark "E2" 230kV Bus Outage:

Newark-Newark Dist. 230kV Line
Tassajara-Newark 230kV Line
Castro Valley-Newark 230kV Line

Newark "D1" 115kV Bus Outage:
Moccasin Creek-Newark # 1 115kV Line
Newark-Jarvis # 1 115kV Line
115/12 kV Bank # 3 (De-activate Load # 3)
Newark-Scott # 1 115kV Line
115kV Shunt Caps

Newark "D2" 115kV Bus Outage:
Moccasin Creek-Newark # 2 115kV Line
Newark-Jarvis # 2 115kV Line
115/12 kV Bank # 4 (De-activate Load # 4)
115/60 kV Bank # 2
Newark-Dumbarton 115kV Line

Newark "E1" 115kV Bus Outage:
Newark-Fremont # 1 115kV Line
Newark-Ames # 1 115kV Line
Newark-Ames # 2 115kV Line

Newark "E2" 115kV Bus Outage:
Newark-Fremont # 2 115kV Line
Newark-Ames # 3 115kV Line
Newark-Ames # 4 115kV Line

Newark "F1" 115kV Bus Outage:
Newark-Scott # 2 115kV Line
Newark-Lawrence 115kV Line
Newark-Trimble 115kV Line
Newark-Milpitas # 1 115kV Line

Newark "F2" 115kV Bus Outage:
Newark-Kifer 115kV Line
Newark-Applied Materials 115kV Line
Newark-Dixon Landing 115kV Line
Newark-Milpitas # 2 115kV Line

Metcalf "D1" 230kV Bus Outage:
230/115 kV Bank # 1
Metcalf-Hicks 230kV Line
230kV Shunt Caps

Metcalf "D2" 230kV Bus Outage:
230/115 kV Bank # 4

Los Esteros-Metcalf 230kV Line
Metcalf-Vasona 230kV Line

Metcalf "E1" 230kV Bus Outage:
230/115 kV Bank # 2
Metcalf-Moss Landing # 1 230kV Line
Metcalf-Monta Vista # 3 230kV Line

Metcalf "E2" 230kV Bus Outage:
230/115 kV Bank # 3
Metcalf-Moss Landing # 2 230kV Line
Metcalf-Monta Vista # 4 230kV Line

Metcalf "D1" 115kV Bus Outage:
Metcalf-El Patio # 1 115kV Line
Metcalf-Edenvale # 1 115kV Line
Metcalf-Morgan Hill 115kV Line
Swift-Metcalf 115kV Line

Metcalf "E1" 115kV Bus Outage:
Metcalf-Evergreen # 1 115kV Line
Swift-Metcalf 115kV Line
Metcalf-Coyote Pump 115kV Line

Metcalf "D-E2" 115kV Bus Outage:
Metcalf-El Patio # 2 115kV Line
Metcalf-Edenvale # 2 115kV Line
Metcalf-Llagas 115kV Line
Metcalf-Evergreen # 2 115kV Line
Piercy-Metcalf 115kV Line

Northern 115kV Bus 1 Outage:
Newark-NRS # 1 115kV Line
NRS-Scott # 1 115kV Line
Lower NRS Load by 40% (Turn on # 2 Loads at Scott and Kifer)

Northern 115kV Bus 2 Outage:
Newark-NRS # 2 115kV Line
NRS-Scott # 2 115kV Line
Lower NRS Load by 40% (Turn on # 2 Loads at Scott and Kifer)

Scott 115kV Bus Outage:
NRS-Scott # 1 115kV Line
NRS-Scott # 2 115kV Line
Scott-Kifer/Pico 115kV Line
De-activate Scott Load (Turn on # 2 Loads at NRS and Kifer)

Kifer 115kV Bus Outage:
- Scott-Kifer/Pico 115kV Line
- Nortech-Kifer 115kV Line
- Newark-Kifer 115kV Line
- Kifer-FMC 115kV Line
- De-activate Kifer Load (Turn on # 2 Loads at NRS and Scott)

Trimble 115kV Bus Outage: (ISOLATE BUS)
- Los Esteros-Trimble 115kV Line
- Newark-Trimble 115kV Line
- Trimble-Montague 115kV Line
- Trimble-San Jose B 115kV Line

San Jose B "D" 115kV Bus Outage: (ISOLATE BUS)
- Trimble-San Jose B 115kV Line
- FMC-San Jose B 115kV Line
- De-activate Loads # 1 & 4
- Open connection to "E" Bus Section (Breaker # 162)

9. Breaker Failure Contingencies (ISO Category "C")

Excluding the bus-tie and bus-sectionalizing breakers, there do not appear to many breaker-failure contingencies in the San Jose 115kV system that are worse than the bus-fault contingencies mentioned above. Most of the critical substations within the San Jose area are designed as

- Main-Aux Buses or
- Double-Bus / Single-Breaker.

The only breaker-failure contingencies that will be analyzed as part of this Study are [N-2] contingencies involving equipment at Los Esteros. Both the 230kV and the 115kV buses at Los Esteros are breaker-and-a-half design. The contingencies to be studied will involve connections into the same substation bay:

- Los Esteros-Metcalf 230kV Line & Los Esteros Bank # 1
- Newark-Los Esteros 230kV Line & Los Esteros Bank # 2
- Los Esteros-Agnews 115kV Line & Los Esteros Bank # 1
- Los Esteros-Montague 115kV Line & Los Esteros Bank # 2

Attachment 4 – Results of Summer Peak Power Flow Analyses

Below are the results for the 2004 Summer Peak case studies for the existing San Jose 115kV system, with the Gianera units on-line. (The NRS-Los Esteros 230kV line is not in-service.)

NORMAL OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	97%	130%	(None)

SINGLE GENERATOR OUTAGE [G-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	103%	136%	Gianera CT Out

SINGLE CONTINGENCY: LINE OUTAGE [L-1] AND TRANSFORMER OUTAGE [T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	116%	135%	Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	113%	132%	Newark-Northern #2 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	124%	Swift-Metcalf 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	121%	Piercy-Metcalf 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	111%	139%	Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	113%	109%	Newark 230/115 kV Bank #9

ONE GENERATOR (GIANERA CT) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

Only the largest overloads on the Scott-Kifer and Scott-Pico lines are shown, since the [G-1] overloads on these lines for a Gianera CT outage are already high.

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	122%	142%	Gianera CT Generator Out Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	120%	138%	Gianera CT Generator Out Newark-Northern #2 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	100%	129%	Gianera CT Generator Out Swift-Metcalf 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	99%	128%	Gianera CT Generator Out Piercy-Metcalf 115kV Line

ONE GENERATOR (GIANERA CT) OUT AND TRANSFORMER OUTAGE [G-1/T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	117%	145%	Gianera CT Generator Out Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	114%	110%	Gianera CT Generator Out Newark 230/115 kV Bank #9

ONE GENERATOR (LECEF CT) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	114%	133%	LECEF CT Generator Out Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	111%	130%	LECEF CT Generator Out Newark-Northern #2 115kV Line

ONE GENERATOR (LECEF CT) OUT AND TRANSFORMER OUTAGE [G-1/T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	109%	137%	LECEF CT Generator Out Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	114%	110%	LECEF CT Generator Out Newark 230/115 kV Bank #9

ONE GENERATOR (CONTAINER CORP of AMERICA) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	113%	133%	CCA Generator Out Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	110%	129%	CCA Generator Out Newark-Northern #2 115kV Line

ONE GENERATOR (CONTAINER CORP of AMERICA) OUT AND TRANSFORMER OUTAGE [G-1/T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	108%	135%	CCA Generator Out Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	114%	110%	CCA Generator Out Newark 230/115 kV Bank #9

ONE GENERATOR (CATALYST) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	116%	135%	Catalyst Generator Out Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	113%	132%	Catalyst Generator Out Newark-Northern #2 115kV Line

ONE GENERATOR (CATALYST) OUT AND TRANSFORMER OUTAGE [G-1/T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	111%	139%	Catalyst Generator Out Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	113%	109%	Catalyst Generator Out Newark 230/115 kV Bank #9

ONE GENERATOR (METCALF ENERGY CENTER STG) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	115%	135%	MEC Steam Turbine Generator Out Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	112%	130%	MEC Steam Turbine Generator Out Newark-Northern #2 115kV Line

ONE GENERATOR (METCALF ENERGY CENTER STG) OUT AND TRANSFORMER OUTAGE [G-1/T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	110%	138%	MEC Steam Turbine Generator Out Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	114%	110%	MEC Steam Turbine Generator Out Newark 230/115 kV Bank #9

ONE GENERATOR (GILROY COGEN) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	115%	134%	Gilroy Cogen Generator Out Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	112%	130%	Gilroy Cogen Generator Out Newark-Northern #2 115kV Line

ONE GENERATOR (GILROY COGEN) OUT AND TRANSFORMER OUTAGE [G-1/T-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	110%	138%	Gilroy Cogen Generator Out Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	114%	110%	Gilroy Cogen Generator Out Newark 230/115 kV Bank #9

ONE TRANSFORMER (LOS ESTEROS 230/115 kV BANK #1) AND LINE OUTAGE [T-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	109%	129%	Los Esteros 230/115 kV Bank #1 Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	105%	125%	Los Esteros 230/115 kV Bank #1 Newark-Northern #2 115kV Line
Metcalf-El Patio #2 115kV Line	99%	< 93%	Los Esteros 230/115 kV Bank #1 Metcalf-El Patio #1 115kV Line
Metcalf-El Patio #1 115kV Line	99%	< 93%	Los Esteros 230/115 kV Bank #1 Metcalf-El Patio #2 115kV Line

TWO TRANSFORMERS (LOS ESTEROS 230/115 kV BANK #1 AND ANOTHER TRANSFORMER) [T-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	101%	129%	Los Esteros 230/115 kV Bank #1 Newark 230/115 kV Bank #9

Eastshore 230/115 kV Bank # 1	115%	111%	Los Esteros 230/115 kV Bank #1 Newark 230/115 kV Bank #9

ONE TRANSFORMER (NEWARK 230/115 kV BANK #11) AND LINE OUTAGE [T-1/L-1] OVERLOADS

There are a number of contingencies in the existing system (Before Project) that result in slight overloads (~ 1-2%) of Eastshore 230/115 kV Bank #1. Only the worst contingencies are listed below. With the proposed Project in place (After Project), the loading on the Eastshore bank drops to ~94% for most contingencies.

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	124%	143%	Newark 230/115 kV Bank #11 Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	113%	132%	Newark 230/115 kV Bank #11 Newark-Northern #2 115kV Line
Eastshore 230/115 kV Bank #1	101%	100%	Newark 230/115 kV Bank #11 Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	102%	< 93%	Newark 230/115 kV Bank #11 Swift-Metcalf 115kV Line
Eastshore 230/115 kV Bank #1	99%	< 93%	Newark 230/115 kV Bank #11 Swift-Metcalf 115kV Line

TWO TRANSFORMERS (NEWARK 230/115 kV BANK #11 AND ANOTHER TRANSFORMER) [T-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	101%	129%	Newark 230/115 kV Bank #11 Newark 230/115 kV Bank #9
Eastshore 230/115 kV Bank # 1	115%	111%	Newark 230/115 kV Bank #11 Newark 230/115 kV Bank #9

ONE TRANSFORMER (METCALF 230/115 kV BANK #3) AND LINE OUTAGE [T-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	115%	134%	Metcalf 230/115 kV Bank #3 Newark-Northern #1 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	111%	130%	Metcalf 230/115 kV Bank #3 Newark-Northern #2 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	121%	Metcalf 230/115 kV Bank #3 Swift-Metcalf 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	121%	Metcalf 230/115 kV Bank #3 Piercy-Metcalf 115kV Line

TWO TRANSFORMERS (METCALF 230/115 kV BANK #3 AND ANOTHER TRANSFORMER) [T-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Metcalf 230/115 kV Bank #4	110%	107%	Metcalf 230/115 kV Bank #3 Metcalf 230/115 kV Bank #1

Metcalf 230/115 kV Bank #1 Metcalf 230/115 kV Bank #4	136% 110%	131% 106%	Metcalf 230/115 kV Bank #3 Metcalf 230/115 kV Bank #2
Metcalf 230/115 kV Bank #1 Metcalf 230/115 kV Bank #2	104% 102%	100% 99%	Metcalf 230/115 kV Bank #3 Metcalf 230/115 kV Bank #4
Scott-Pico 115kV Line Eastshore 230/115 kV Bank #1	110% 114%	138% 110%	Metcalf 230/115 kV Bank #3 Newark 230/115 kV Bank #9

ONE TRANSFORMER (METCALF 500/230 kV BANK #13) AND LINE OUTAGE [T-1/L-1] OVERLOADS

All of the [T-1/L-1] contingency overloads for Metcalf Bank #13 are almost identical to the ones described above for Metcalf 230/115 kV Bank #3, so no separate tables are shown for these contingencies. There were no [T-2] overloads.

ONE TRANSFORMER (MONTA VISTA 230/115 kV BANK #2) AND LINE OUTAGE [T-1/L-1] OVERLOADS

All of the [T-1/L-1] contingency overloads for Monta Vista Bank #2 are almost identical to the ones described above for the Metcalf banks, so no separate tables are shown for these contingencies.

TWO TRANSFORMERS (MONTA VISTA 230/115 kV BANK #2 AND ANOTHER TRANSFORMER) [T-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Monta Vista 230/115 kV Bank #4 Monta Vista 230/115 kV Bank #4A	178% 157%	174% 154%	Monta Vista 230/115 kV Bank #2 Monta Vista 230/115 kV Bank #3

TWO GENERATORS OUT [G-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	126%	Gianera CTs #1&2 Out

DOUBLE-CIRCUIT TOWERLINE OUTAGE [L-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	95%	123%	Tesla-Newark #1 230kV Line Tesla-Ravenswood 230kV Line
Tesla-Newark #2 230kV Line	100%	96%	Tesla-Newark #1 230kV Line Tesla-Ravenswood 230kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	100%	129%	Tesla-Ravenswood 230kV Line Newark-Ravenswood 230kV Line
Metcalf-Hicks 230kV Line Metcalf-Vasona 230kV Line	104% 100%	102% 99%	Metcalf-Monta Vista #3 230kV Line MEC-Monta Vista 230kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	173%	171%	Newark-Northern #1 115kV Line Newark-Northern #2 115kV Line
Los Esteros-Nortech 115kV Line Nortech-Kifer 115kV Line	113% 109%	100% 96%	Los Esteros-Trimble 115kV Line Los Esteros-Montague 115kV Line
El Patio-San Jose A 115kV Line San Jose A-San Jose B 115kV Line	101% 103%	93% 93%	Metcalf-Evergreen #1 115kV Line Metcalf-Evergreen #2 115kV Line

Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	105%	134%	Swift-Metcalf 115kV Line Piercy-Metcalf 115kV Line
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	125%	Monta Vista-Lawrence 115kV Line Monta Vista-Britton 115kV Line

NON-DCTL TOWERLINE OUTAGE [L-2] OVERLOADS

There were several non-DCTL [L-2] contingencies that result in overloads on the Scott-Kifer 115kV line (Scott-Pico line in the "After Project" cases). Since the overload levels are in the same range as the overloads seen for other Category B and C contingencies, these overloads will not be repeated in this table. This table only lists those contingencies where the "After Project" loadings are noticeably different from the "Before Project" loadings.

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	121%	Tesla-Newark #1 230kV Line Tesla-Newark #2 230kV Line
Swift-Metcalf 115kV Line	99%	96%	Tesla-Newark #1 230kV Line Los Esteros-Metcalf 230kV Line
Metcalf-El Patio #2 115kV Line	101%	95%	Tesla-Newark #1 230kV Line Metcalf-El Patio #1 115kV Line

El Patio-San Jose A 115kV Line San Jose A-San Jose B 115kV Line	104% 106%	94% 95%	Los Esteros-Metcalf 230kV Line Newark-Newark Dist 230kV Line
Kifer-FMC 115kV Line	112%	< 93%	Newark-Northern #1 115kV Line Los Esteros-Nortech 115kV Line
Metcalf-Evergreen #2 115kV Line	106%	99%	San Jose A-San Jose B 115kV Line Metcalf-Evergreen #1 115kV Line
Los Esteros-Trimble 115kV Line	114%	108%	Los Esteros-Nortech 115kV Line Los Esteros-Montague 115kV Line

SINGLE BUSOUTAGE [B-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Emergency Rating)	AFTER PROJECT Loading (% of Emergency Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	119%	147%	Newark 230kV Bus "D1"
Eastshore 230/115 kV Bank #1	104%	< 93%	Newark 230kV Bus "D1"
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	121%	Newark 230kV Bus "D2"
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	122%	Newark 230kV Bus "E1"
Eastshore 230/115 kV Bank #1	101%	< 93%	Newark 230kV Bus "E1"
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	117%	136%	Newark 115kV Bus "D1"

Eastshore 230/115 kV Bank #1	122%	122%	Newark 115kV Bus "D2"
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	112%	131%	Newark 115kV Bus "F1"
Metcalf-El Patio #1 115kV Line Morgan Hill-Llagas 115kV Line	112% 119%	105% 119%	Metcalf 115kV Bus "D&E1"
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	124%	Trimble 115kV Bus
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	131%	129%	Northern 115kV Bus
Newark-Northern #1&2 115kV Lines Eastshore 230/115 kV Bank #1	122% 102%	< 93% < 93%	Kifer 115kV Bus

Attachment 5 – Results of Summer Off-Peak Power Flow Analyses

Below are the results for the 2004 Summer Off-Peak case studies for the existing San Jose 115kV system, with the Gianera units off-line. The Gilroy Peak units ARE on-line in order to maximize San Jose area generation. (The NRS-Los Esteros 230kV line is not in-service.)

NORMAL OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
(None)	---	---	(None)

SINGLE GENERATOR OUTAGE [G-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
(None)	---	---	(None)

SINGLE CONTINGENCY: LINE OUTAGE [L-1] AND TRANSFORMER OUTAGE [T-1] OVERLOADS

There were no [L-1] or [T-1] overloads in the pre-Project or post-Project cases.

ONE GENERATOR (LECEF CT) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

There were no [G-1/L-1] or [G-1/T-1] overloads in the pre-Project or post-Project cases.

ONE GENERATOR (CONTAINER CORP of AMERICA) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

There were no [G-1/L-1] or [G-1/T-1] overloads in the pre-Project or post-Project cases.

ONE GENERATOR (CATALYST) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

There were no [G-1/L-1] or [G-1/T-1] overloads in the pre-Project or post-Project cases.

ONE GENERATOR (METCALF ENERGY CENTER STG) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

There were no [G-1/L-1] or [G-1/T-1] overloads in the pre-Project or post-Project cases.

ONE GENERATOR (GILROY COGEN) OUT AND LINE OUTAGE [G-1/L-1] OVERLOADS

There were no [G-1/L-1] or [G-1/T-1] overloads in the pre-Project or post-Project cases.

ONE TRANSFORMER (LOS ESTEROS 230/115 kV BANK #1) AND LINE OUTAGE [T-1/L-1] OVERLOADS

There were no [T-1/L-1] or [T-2] overloads in the pre-Project or post-Project cases.

ONE TRANSFORMER (NEWARK 230/115 kV BANK #11) AND LINE OUTAGE [T-1/L-1] OVERLOADS

There were no [T-1/L-1] or [T-2] overloads in the pre-Project or post-Project cases.

ONE TRANSFORMER (METCALF 230/115 kV BANK #3) AND LINE OUTAGE [T-1/L-1] OVERLOADS

There were no [T-1/L-1] or [T-2] overloads in the pre-Project or post-Project cases.

ONE TRANSFORMER (METCALF 500/230 kV BANK #13) AND LINE OUTAGE [T-1/L-1] OVERLOADS

There were no [T-1/L-1] or [T-2] overloads in the pre-Project or post-Project cases.

ONE TRANSFORMER (MONTA VISTA 230/115 kV BANK #2) AND LINE OUTAGE [T-1/L-1] OVERLOADS

There were no [T-1/L-1] or [T-2] overloads in the pre-Project or post-Project cases.

ONE TRANSFORMER (NEWARK 230/115 kV BANK #9) AND LINE OUTAGE [T-1/L-1] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	99%	Newark 230/115 kV Bank #9 Newark Dist-Los Esteros 230kV Line

TWO TRANSFORMERS (NEWARK 230/115 kV BANK #9 AND ANOTHER TRANSFORMER) [T-2] OVERLOADS

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	99%	Newark 230/115 kV Bank #9 Newark 230/115 kV Bank #7

TWO GENERATORS OUT [G-2] OVERLOADS

There were no [G-2] overloads in the pre-Project or post-Project cases.

DOUBLE-CIRCUIT TOWERLINE OUTAGE [L-2] OVERLOADS

There were no DCTL [L-2] overloads in the pre-Project or post-Project cases.

NON-DCTL TOWERLINE OUTAGE [L-2] OVERLOADS

There was only one non-DCTL [L-2] contingency that resulted in an overload. It is shown in the table below. There were no other overloads found for the other non-DCTL [L-2] contingencies studied.

Overloaded Component	BEFORE PROJECT Loading (% of Normal Rating)	AFTER PROJECT Loading (% of Normal Rating)	Contingency Causing Overload
Scott-Kifer 115kV Line (Scott-Pico Line in AFTER PROJECT)	< 93%	100%	Newark Dist-Los Esteros 230kV Line Newark-Kifer 115kV Line

Attachment 6 – Dynamic Stability Plots

Dynamic Models Used for Pico Power Plant Units

Each combustion turbine-generator at Pico is modeled with the following components:

gentpf
rexs
gast
ieeest .

The steam turbine-generator at Pico is modeled with the following components:

gentpf
rexs .

Computer Plots for load rejection, fault at Kifer, fault at Scott, fault at Northern Receiving Station, and fault at Scott Receiving Station have been provided to the CEC and are available upon request.