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FLEXIBLE AC TRANSMISSION SYSTEMS BENEFITS STUDY

Gray Davis, *Governor*

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Preface

The Public Interest Energy Research (PIER) Program supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

The PIER Program, managed by the California Energy Commission (Commission), annually awards up to $62 million through the Year 2001 to conduct the most promising public interest energy research by partnering with Research, Development, and Demonstration (RD&D) organizations, including individuals, businesses, utilities, and public or private research institutions.

PIER funding efforts are focused on the following six RD&D program areas:

- Buildings End-Use Energy Efficiency
- Industrial / Agricultural / Water End-Use Energy Efficiency
- Renewable Energy
- Environmentally-Preferred Advanced Generation
- Energy-Related Environmental Research
- Strategic Energy Research.

In 1998, the Commission awarded approximately $17 million to 39 separate transition RD&D projects covering the five PIER subject areas. These projects were selected to preserve the benefits of the most promising ongoing public interest RD&D efforts conducted by investor-owned utilities prior to the onset of electricity restructuring.

What follows is the final report for the Flexible AC Transmission Systems project, one of six projects conducted by San Diego Gas & Electric. This project contributes to the Strategic Energy Research program.

For more information on the PIER Program, please visit the Commission's Web site at: http://www.energy.ca.gov/research/index.html or contact the Commission's Publications Unit at 916-654-5200.

Executive Summary

Environmental and regulatory concerns restrict expansion of electric power transmission facilities. San Diego Gas & Electric (SDG&E) has long studied methods to fully use its existing import transmission capacity and thereby delay expanding the transmission system. Presently, SDG&E relies on off system purchases to meet system requirements.

Import capability is constrained by facility overloads and reactive power deficiencies, not by transient or dynamic stability. By mitigating both problems, Flexible AC Transmission Systems (FACTS) are possible means of increasing the usable capacity of existing transmission systems. The FACTS technology offers the following advantages:

- Increase the amount of power that can be imported over existing transmission lines.
- Provide dynamic reactive power support and voltage control.
- Reduce the need for construction of new transmission lines, capacitors, reactors, etc which
  - Mitigate environmental and regulatory concerns.
  - Improve aesthetics by reducing the need for construction of new facilities such as transmission lines.
- Improve system stability.
- Control real and reactive power flow.
- Mitigate potential Sub-Synchronous Resonance problems.

SDG&E technically assessed existing and new FACTS devices as possible means of increasing its import capability.

The FACTS devices studied included:

- Thyristor Controlled Series Capacitor (TCSC)
- Thyristor Controlled Phase Angle regulator (TCPAR)
- Static Condenser (STATCON)
- Unified Power Flow Controller (UPFC)

Results indicated that among the FACTS devices evaluated, the UPFC was the most viable option of increasing SDG&E's import capability.

American Electric Power installed the first UPFC unit in June 1998 at their Inez Substation in eastern Kentucky. This FACTS unit was a 160 Million Volt Ampere (MVA) UPFC that had operated successfully for about a year.

Representatives from SDG&E Transmission Planning and Substation Engineering sections visited the Inez Substation and were encouraged at the results achieved by the installation of the UPFC unit.

Objectives

The objectives of this project were to

- To investigate various FACTS devices to determine which would be most appropriate for use in the SDG&E system.
- Determine by how much a FACTS device can increase the usable capacity of the South-of-San Onofre Nuclear Generating Station (SONGS) transmission system.

The South-of-SONGS path offers the largest increase in imports and connects SDG&E to the rest of the Western System Coordinating Council (WSCC) to the north.

The General Electric Power Flow Program was used to model the UPFC in this study. This report summarizes the study assumptions, methodology, criteria, and results. Detailed real and reactive load flow studies were conducted to determine the benefits of installing FACTS devices in order to increase SDG&E's import capability.

Outcomes

As a result of this study, the following were determined:

- The most beneficial FACTS technology for increasing import capacity into SDG&E's service area is the UPFC unit
- The UPFC installed anywhere on the South-of-SONGS path can redistribute the power flow and increase import capability into SDG&E
- Of the five locations examined in the South-of-SONGS, the installation of a UPFC on the San Onofre - Talega 230 kilovolt (kV) lines at Talega Substation is the preferred alternative to increase SDG&E's import capacity.
- The installation of a FACTS device would increase the import capacity by 300 MW (i.e. by 12%) and delay the construction of additional transmission lines or generating capacity.

Conclusions

- This technology alone probably could not replace the future transmission and generation projects needed to meet load growth. The FACTS technology must be compared with that at conventional facilities on a case by case basis to determine if it would be a viable alternative.
- While this study demonstrated the potential benefits of FACTS technology, the results are still preliminary. Subsequent studies may provide different results.

Recommendations

- Conduct additional research to assess the impact of the UPFC on the SDG&E import capability taking into account recent changes in the South-of-SONGS transmission system, made to accommodate the rapid load growth within the SDG&E's system.
  - Install a UPFC in the location recommended by the new study as a demonstration and research project.
  - Demonstrate the ability of a UPFC unit to be shared by two parallel lines to re-direct flow in order to prevent line overloading.
  - Seek co-funding of this project from various entities such as the California Energy Commission, the Department of Energy (DOE), the Electric Power Research Institute (EPRI), UPFC manufacturers, various electric utilities, etc.

Abstract

This project investigated the benefits of installing Flexible AC Transmission Systems (FACTS) devices in the San Diego Gas & Electric (SDG&E) transmission network. This study focused on the technical assessment of existing and new FACTS devices to improve SDG&E's import capability. SDG&E investigated the benefits of a number of FACTS devices, including Static Synchronous Series Compensators (SSSC), Thyristor-Controlled Phase Angle Regulator (TCPAR), Static Condensers (STATCON), and Unified Power Flow Controllers (UPFC). Study results indicate that among the FACTS devices evaluated, the UPFC was the most viable option for SDG&E to explore the potential to increase its import capability. The impact of a UPFC on SDG&E's transmission system was studied on 230 kilovolt (kV) lines at five different locations on the south of San Onofre Nuclear Generating Station path. An economic evaluation was performed to provide a comparison between five UPFC alternative sites. The preferred site was on the San Onofre - Talega 230 kV lines at the Talega Substation. The UPFC could also provide dynamic reactive power support.

In parallel with this research effort, the SDG&E transmission Capital Budget Project studies identified cost effective transmission projects to increase SDG&E's import capability to respond to the rapid load growth in the system. Several capital budget projects were recently approved that will change the South-of-SONGS transmission system configuration. In addition, voltage support projects were installed to meet significantly higher loads forecasted for the summers of 1999 and 2000 by increasing import capability into SDG&E. These changes will alter the findings of this study on the impact of FACTS devices on the SDG&E transmission system. Additional studies are necessary to accurately determine the impact of a UPFC on the SDG&E system.

1.0 Introduction

Because of a variety of environmental and regulatory concerns, the expansion of electric power transmission facilities in the United States in general, and in San Diego County in particular, is restricted. San Diego Gas & Electric (SDG&E) would benefit if it could increase its import power capability while being able to delay the construction of new transmission lines.

SDG&E has three major points of interconnection: the San Onofre Nuclear Generating Station (SONGS), the Miguel substation, and the Imperial Valley substation. To meet system requirements SDG&E uses off-system purchases which are delivered to the interconnection points.

Additional import capability, beyond the present 2,450 megawatt (MW) limit, will be needed in the near future both to meet system requirements and to provide adequate margin. Since no new internal generation addition is planned, reliance on remote power resources requires improvement in SDG&E's import capability.

Import capability is constrained by facility overloads and reactive power deficiencies, not by transient or dynamic stability. Flexible AC Transmission Systems (FACTS) can be used to mitigate both problems.

1.1 The FACTS Technology

The term FACTS describes a wide range of controllers, many of which incorporate large power electronic converters, that can increase the flexibility of power systems making them more controllable. Some of these are already well established while some are still in the research or development stage.

In general, FACTS devices possess the following technological attributes:

- Provide dynamic reactive power support and voltage control.
- Reduce the need for construction of new transmission lines, capacitors, reactors, etc which
  - Mitigate environmental and regulatory concerns.
  - Improve aesthetics by reducing the need for construction of new facilities such as transmission lines.
- Improve system stability.
- Control real and reactive power flow.
- Mitigate potential Sub-Synchronous Resonance problems.

To determine which FACTS device would be the most beneficial, SDG&E examined the following devices:

- Thyristor Controlled Series Capacitor (TCSC)
- Thyristor Controlled Phase Angle regulator (TCPAR)
- Static Condenser (STATCON)
- Unified Power Flow Controller (UPFC)

While TCSC provides dynamic control of the series compensated lines, which could increase transfer capability, it could not be used to increase SDG&E's import capability because the South-of-SONGS path does not have any series capacitors.

A TCPAR, is equivalent to a mechanically phase shifting transformer but unlike a UPFC it does not provide controlled reactive power generation. The TCPAR could not be used since the South-of-SONGS lines do not have a phase shifting transformer.

Since a STATCON mainly provides dynamic reactive power to the SDG&E system but as it does not directly control the flow of real power on a transmission line it was not considered.

A UPFC, by providing a combination of real and reactive power control, appeared to be the most useful FACTS device for the SDG&E system. It could potentially control power flow on the South-of-SONGS line, reduce the number of lines that can be overloaded, and potentially provide dynamic reactive power control during contingencies.

Simulation results show that at an import level of 2,450 MW, the worst contingency limiting the SDG&E simultaneous import capability is the loss of the Imperial Valley - Miguel 500 kilovolt (kV) and the subsequent loss of Imperial Valley - La Rosita 230 kV lines. The loss of these lines causes overloading of the South-of-SONGS lines.

Installation of a UPFC on any one of the South-of-SONGS lines may allow redistribution of the power flow on the lines, increasing the total South-of-SONGS path flow.

Additional reactive power support is needed for import levels above 2,450 MW. The STATCON, which is the shunt element of the UPFC, can provide this reactive power in a dynamic form.

Additional information regarding FACTS devices can be found in the titles and publications listed in Appendix G.

High-Voltage DC Transmission and Static Var Compensators are examples of power electronic systems (i.e. FACTS devices) that are already well established. There are other ways to configure power electronic components to aid AC power transmission. The initial development techniques for many power electronic devices have been proven in numbers of variable speed motor drive installations. Presently these techniques are being applied to equipment having higher power ratings; i.e., capable of being installed within utility transmission and distribution systems.

1.2 Project Objectives

The UPFC can be installed on one or any combination of the South-of-SONGS lines. Simulation tests were set up to examine and compare the benefits of the UPFC on each of the South-of-SONGS lines. The studies were conducted for five alternatives.

The objectives of this project were to

- To investigate various FACTS devices to determine which would be most appropriate for use in the SDG&E system.
- Determine by how much a FACTS device could increase the usable capacity of the South-of-San Onofre Nuclear Generating Station (SONGS) transmission system.

The South-of-SONGS path offers the largest increase in imports and connects SDG&E to the rest of the Western System Coordinating Council (WSCC) to the north. Currently the existing South-of-SONGS transmission lines can deliver 1800 MW (with all lines in-service) out of a maximum capacity of 2978 MW.

2.0 Project Approach

2.1 General Electric Power Flow Program

The General Electric Power Flow Program was used to model the UPFC in this study. This report summarizes the study assumptions, methodology, criteria, and results. Detailed load flow and reactive power flow studies were conducted to determine the benefits of installing FACTS devices in order to increase SDG&E's import capability.

2.2 The 2003 Load Flow Base Case

This project was based on the Western Systems Coordinating Council (WSCC) 03HS2A case built in 1997. Appendix B lists the load flow data for this case. After resource analysis, SDG&E chose a 2003 base case because it represents the approximate time, depending on load growth, when additional import capability will be needed in the SDG&E system.

However, the SDG&E Annual Assessment has determined that additional system changes will be necessary to allow increased imports. These changes were proposed after this project started and the base case developed

Several changes were made to update this case based on the most recent information available. The significant changes made were:

- The SDG&E distribution system was replaced by a more recent representation. .
- The loads in the Los Angeles Department of Water and Power (LADWP), Southern California Edison (SCE), and Arizona Public Service (APS) control areas were adjusted to 2003 levels based on the most recent load forecasts.
- The Adelanto-Lugo 500 kV line project was removed.
- Palo Verde units were assumed to be on-line.
- SDG&E's generation was adjusted.

SDG&E's net imports were increased to their maximum, about 2,450 MW with 0 MW export to Comision Federal De Electricidad (CFE), Mexico.

Table 1 illustrates the assumptions used in the 2,003 base case. SDG&E prepared a second base case by removing one San Onofre unit. This case was used to examine voltage problems.

Table 1. Assumptions in the 2003 base case

2003 Base Case Data	
SDG&E Load (MW)	4,204
SDG&E Import (MW)	2,450
SDG&E Generation (MW)	1,754
EOR[1](MW)	4,146
COI[2](MW)	2,795
PDCI[3] (MW)	2,400
IPPDC[4] (MW)	1,800

Notes:

1. East-of-the-River
2. California-Oregon Intertie
3. Pacific Direct Current Intertie
4. Intermountain Power Plant Direct Current

Table 2 shows the existing continuous and emergency ratings for the South-of-SONGS lines represented in the base case:

Table 2. Continuous and Emergency Ratings

South of SONGS Line Ratings (Amps)		
Line	Continuous Rating	Emergency Rating
San Onofre - Talega 1 230 kV Line	1,145	1,450
San Onofre - Talega 2 230 kV Line	1,145	1,450
San Onofre - Encina 230 kV Line	2,000	2,290
San Onofre - San Luis Rey Tap 230 kV Line	2,000	2,290
San Luis Rey Tap – Mission 230 kV Line	1,145	None
San Onofre - Mission 230 kV Line	1,145	None

2.3 The South of SONGS Path

SDG&E wholly owns the South-of-SONGS path. This path consists of five 230 kV lines extending from the San Onofre 230 kV Substation into the SDG&E control area territory (Figure 1). The lines terminate at the following SDG&E substations:

- Two lines extend to the Talega Substation.
- One line extends to the Encina Substation.
- Two lines—one of which is tapped to the San Luis Rey Substation--extend to the Mission Substation.

SDG&E imports power from the north and the east through two main interconnections, the South-of-SONGS 230 kV lines and the Southwest Power Link (SWPL) at the Miguel and Imperial Valley substations. These interconnections constitute two parallel paths between generation resources and the SDG&E area load. If the SWPL is out-of service, the South-of-SONGS path can carry 1,900 MW. This rating, only valid when a segment of the SWPL is out of service, allows SDG&E to meet its future load projections. The current rating of South-of-SONGS lines is 1,800 MW during normal conditions.

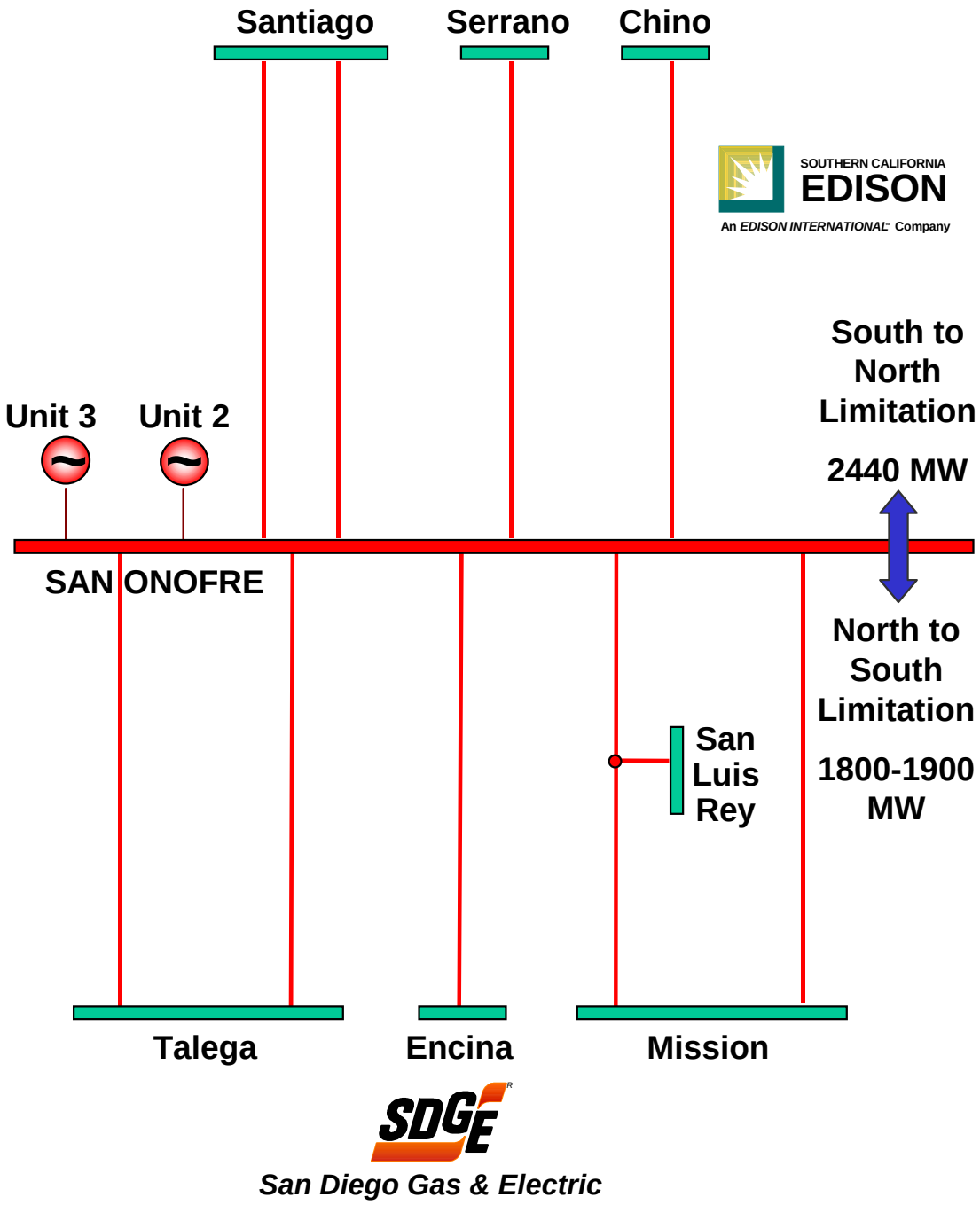


Figure 1. South of San Onofre Lines

2.4 Simultaneous Import Limit

The existing SDG&E simultaneous import limit is depicted by a nomogram (Appendix D). The nomogram defines the simultaneous import capability of the South of SONGS and SWPL paths.

The nomogram approximates the boundary of reliable system import conditions, assuming all transmission and generation is available. System operation will normally be within the envelope defined by the nomogram.

The import nomogram can be summarized as follows:

- The existing SDG&E usable simultaneous import capability is 2,450 MW.
- Imports from the north (nomogram limits along the upper edge of the nomogram) are limited by the South-of-SONGS Path Rating.
- Simultaneous imports, shown as diagonal lines on the nomogram, are limited by the thermal rating of Tie Line (TL) 609 (Kettner 69kV - Station B 69 kV) and TL 13,835C (San Mateo Tap 138 kV - San Mateo 138 kV) for the outage of TL 5,000 (Imperial Valley – Miguel 500kV) with subsequent overload tripping of TL 23,050 (Imperial Valley - La Rosita 230 kV).
- The South-of-San Onofre imports on the vertical axis of the nomogram include both off-system imports from the north and SDG&E's share of the SONGS output. The Miguel imports on the horizontal axis of the nomogram include the interchange with CFE (Mexico) and imports across the SWPL measured at the Miguel 230 kV bus.
- Imports from the SWPL are usually restricted by transmission entitlements more than by system capability. In cooperation with CFE (Mexico), SDG&E has implemented operating procedures and relaying to ensure that the CFE 230 kV system will not overload with the loss of TL 50,001 (Imperial Valley - Miguel).

The nomograms also provide operators and resource schedulers with an indication of wholesale power transactions and transmission service that can be accommodated by the SDG&E transmission system.

2.5 Non-Simultaneous Import Limit

SDG&E’s transmission system has a non-simultaneous import limit at San Onofre whenever any segment of the SWPL is out of service. As part of this study, cases were run to determine if the non-simultaneous import limit could be increased with the installation of FACTS projects. Currently, the south of San Onofre has a dual rating of 1,800 / 1,900 MW. The 1,800 MW rating is applicable under normal conditions. The 1,900 MW rating is applicable only for times when any segment of the Southwest Power-Link is out of service for any reason. The 1,900 MW limit is based on loss of SONGS-Talega #1 230 kV line causing overload of SONGS-Talega #2 230 kV line. The study results indicate that this limit could potentially be increased by installation of the FACTS project.

2.6 Unified Power Flow Controllers (UPFC)

The use of a solid-state phase shifter using the inverter-based synchronous voltage source approach, along with a series solid-state synchronous compensator, represents a fundamentally different approach to transmission angle control. The basic principles of angle control by this method are discussed within the broader concept of the UPFC that can be operated as an ideal phase shifter.

2.6.1 The UPFC Principle of Operation

To understand the UPFC principle of operation, the generalized series synchronous compensator, implemented by a DC to AC inverter with an energy storage device, must be examined (Figure 2). Assume that the injected voltage (V_{pq}) in series with the line can be controlled without restrictions. This can be achieved if the DC energy storage has an infinite capacity.

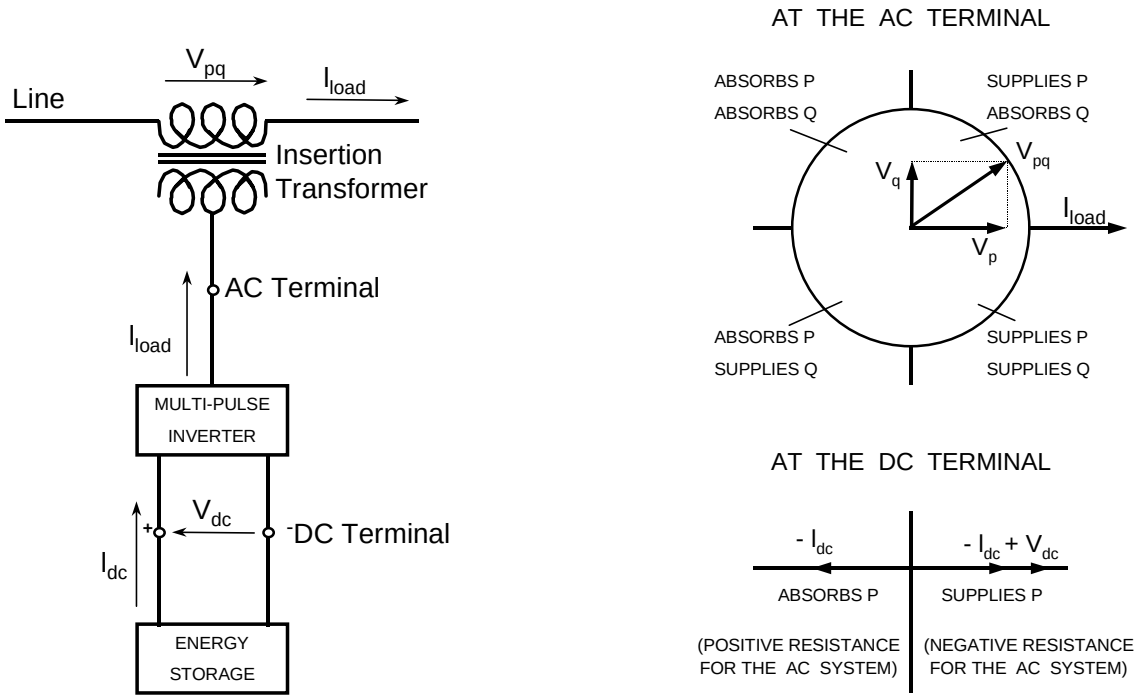


Figure 2. Generalized Series-Connected Synchronous Voltage Source
(a) Employing a multi-pulse inverter with an energy storage device and
(b) Possible operating modes for reactive and real power exchange.

The phase angle of phasor V_{pq} can thus be chosen independently of the line current between 0 and 2π with a magnitude which is variable between zero and a defined maximum value V_{pqmax}. This implies that the synchronous voltage source V_{pq} must be able to generate and absorb both real and reactive power. The reactive power is, therefore, internally generated or absorbed by the inverter. However, the real power is supplied from, or absorbed by, the DC energy storage device.

The generalized series synchronous compensator can achieve all basic power flow control functions by adding an appropriate voltage phasor V_{pq} to the terminal voltage phase V_o (Figure 3). The phasor V_{pq} can be synthesized for V_o the voltage magnitude, V_c the series impedance compensation and V_d the phase shift.

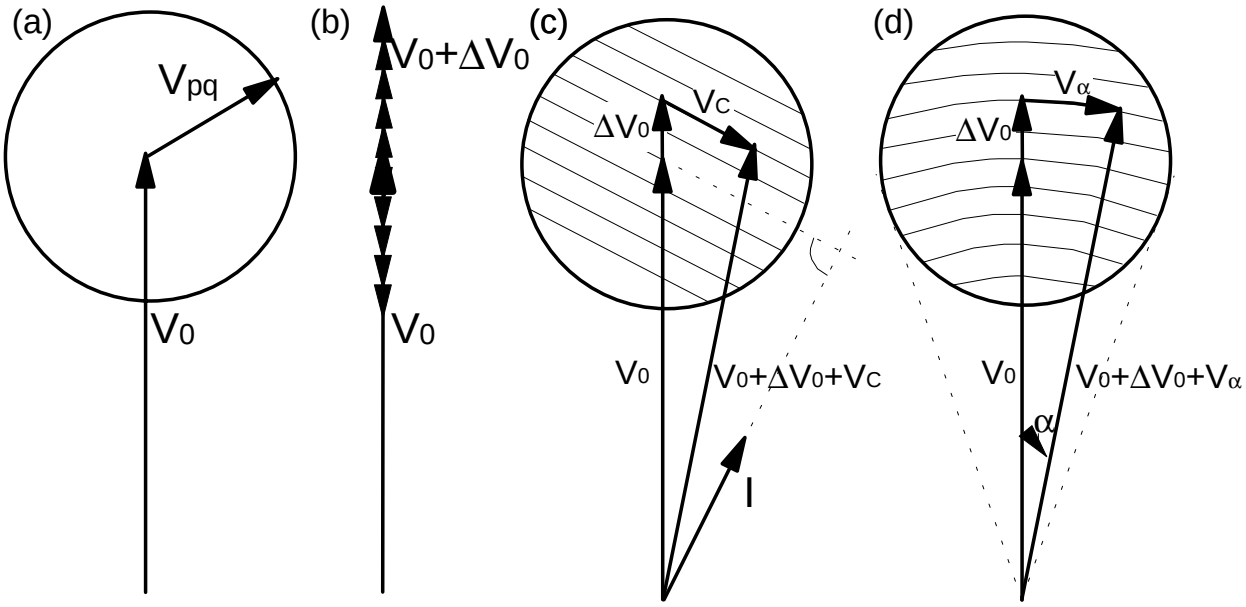


Figure 3. Phasor Diagram Illustrating General Concept of Series Voltage Injection
(a) Attainable power flow control functions, (b) terminal voltage regulation, (c) terminal voltage and line impedance regulation, and (d) terminal voltage and phase-angle regulation.

By appropriate control of V_{pq}, the following basic power flow controls are accomplished.

- Terminal voltage regulation.
- Combined series line compensation and terminal voltage control.
- Combined phase angle regulation and terminal voltage control.
- Combined terminal voltage regulation and series line compensation and phase angle regulation (Figure 4).

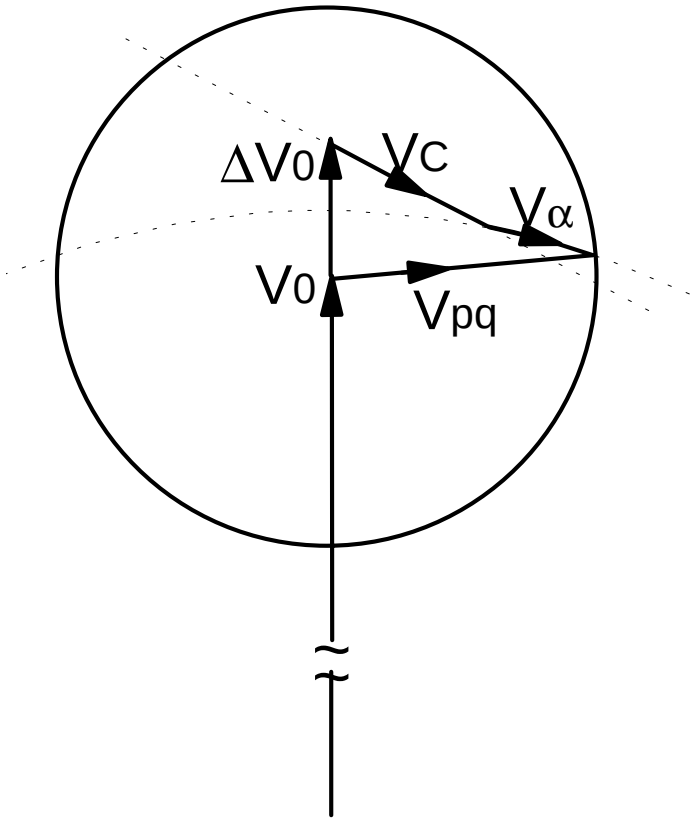


Figure 4. Phasor Diagram
Illustrating the simultaneous regulation of terminal voltage, line impedance, and phase-angle by appropriate series voltage injection.

The concept of unrestricted series voltage injection, via the use of a solid-state synchronous voltage source, opens up new possibilities of power flow control. This approach allows not only the combined application of phase angle control with controllable series reactive compensation and voltage regulation, but real-time mode transition. In this way particular system contingencies can be handled more effectively. For example, series reactive compensation could be replace by phase-angle control or vice versa. Thus the approach provides considerable operating flexibility.

The generalized voltage injection, which allows the variation of the angle of the injected voltage through a full 360 degrees as well as simultaneous control of magnitude, makes it possible to control both the magnitude and the angle of the line current. This makes independent control of the real and reactive power flow in the transmission line possible.

The generalized series compensator with an infinite energy source can be implemented by two AC to DC inverters operated from a common DC link capacitor (Figure 5). This implementation is the UPFC, which in addition to the above power flow control functions also provides controllable reactive shunt compensation.

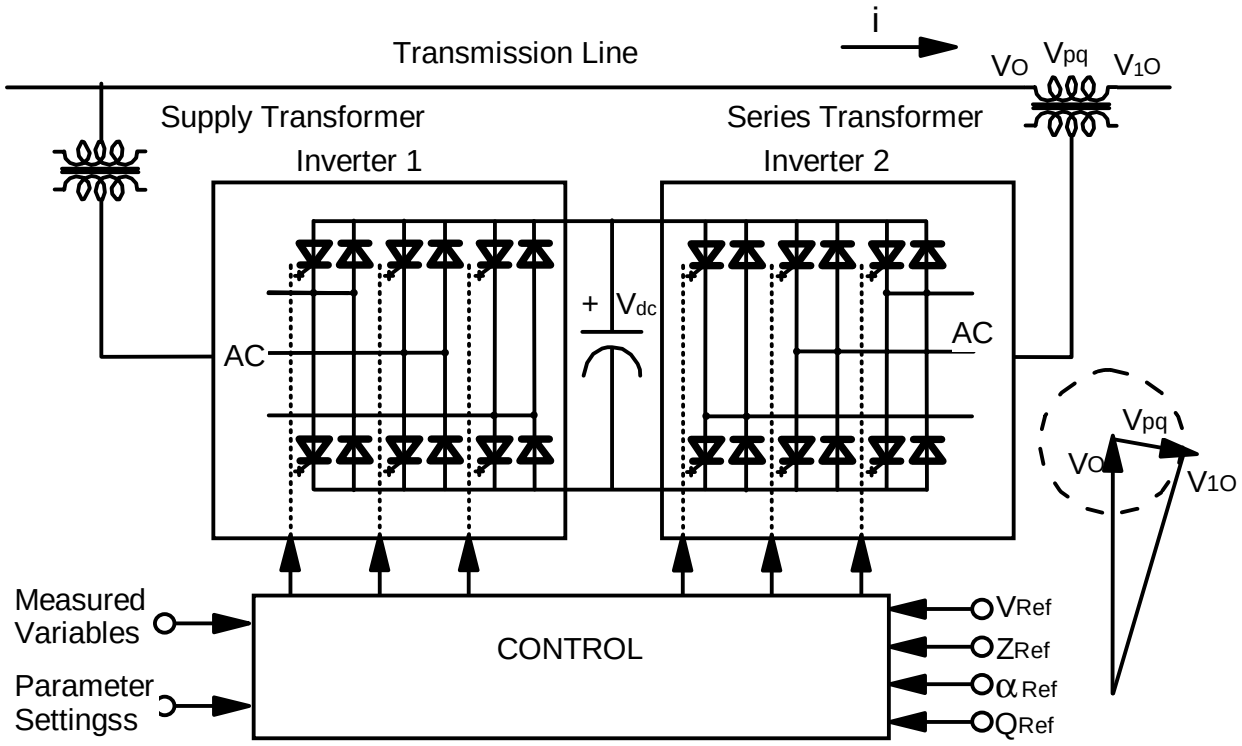


Figure 5. Unified Power Flow Controller

One inverter is in series and the other is in shunt with the transmission line. Inverter 2 in the arrangement shown (Figure 5) is used to generate voltage $v_{pq}(t) = V_{pq}\sin(\omega t-\alpha_{pq})$ at the fundamental frequency (ω) with variable amplitude ($0\leq V_{pq}\leq V_{pqmax}$) and phase angle ($0\leq\alpha_{pq}\leq 2\pi$) which is added to the AC system terminal voltage $v_o(t)$ by the series connected coupling transformer.

The inverter output voltage injected in series with the line acts essentially as an AC voltage source. The current flowing through the injected voltage source is the transmission line current. The VA rating of the injected voltage source Inverter 2 is determined by the product of the maximum injected voltage and the maximum line current at which power flow control is still provided.

Inverter 1, connected in shunt with the AC power system via a coupling transformer, is used primarily to provide the real power demand of Inverter 2 at the common DC link. It is important to note that Inverter 2 itself generates the reactive power demand corresponding to the series voltage injection and, therefore, the transmission system is not burdened by reactive power flow due to the operation of the UPFC.

Inverter 1 can also generate or absorb reactive power at its AC terminal, independently of the real power it transfers to or from the DC terminal. This allows it, with proper controls, to fulfill the function of an independent STATCOM providing reactive power compensation for the transmission line and thus executing an indirect voltage regulation at the input terminal of the UPFC.

The internal control is structured to accept externally derived reference signals, the order of priority of which can be pre-selected for the desired reactive shunt compensation, series compensation, transmission angle and output voltage. These reference signals are used in closed control loops to force the inverters to produce the AC voltages at the input, shunt connected, terminals and output, series-connected, terminals of the power flow controller to establish the desired transmission parameters.

The control also maintains the necessary DC link voltage and ensures smooth real power transfer between the two inverters. If the UPFC is operated only with the phase angle reference input, it automatically becomes a perfect phase shifter. Besides controlling the customary transmission parameters, voltage, impedance, and angle, the UPFC can also be set to independently regulate the real and reactive power flow in the line by directly controlling the magnitude and angle of the line current.

The UPFC is an extremely powerful and versatile device for power flow control. The capability of changing all transmission parameters affecting power flow simultaneously and the rapid, almost instantaneous response, makes it suitable for many applications requiring effective steady state power flow control and transient and dynamic stability improvement.

2.7 The UPFC Model

This project primarily applied the UPFC to control power flow and to provide dynamic reactive power support during steady state normal and contingency conditions. To realistically represent a UPFC in power flow studies, the model needs to have the following settings and characteristics:

- Set desired real and reactive power flows by the series element
- Set desired terminal voltage / reactive power by the shunt element
- Set zero net real power for the whole device
- Impose limits on the magnitude of the AC voltage inserted by the series element
- Impose limit on the angle of the AC voltage inserted by the series element
- Impose limit on the AC current of the series element
- Impose limit on the AC current of the shunt element

SDG&E used the General Electric Power Flow Version 10.1 program to model the UPFC. A phase shifting transformer was used in series with the transmission line under study to control real power flow on the line. The phase shifter would be the equivalent of the series element controlling the phase angle on the line. A STATCON was used to represent the shunt element by controlling the bus voltage to which it is connected.

2.8 Alternative Installation Models

To fully examine the benefits of installing a UPFC in the their system, SDG&E considered five alternative locations to model. A total of 208 contingencies were run for the 2003 case with a load level of 4,209 MW, including transmission system losses, and various SDG&E import levels.

For each alternative, SDG&E examined simultaneous import levels of 2,450 MW, 2,650 MW, and 2,750 MW and non-simultaneous import limits of 1,900 MW, 2,150 MW, and 2,250 MW for overload and voltage problems. Overload and voltage problems were also examined for each alternative with one San Onofre unit out of service.

2.8.1 Alternative 1 – The San Onofre - Talega #1 or #2 230 kV Line

SDG&E installed a UPFC to control either the San Onofre - Talega #1 or #2 230 kV Line at the Talega Substation (Figure 6). We installed the series element of the UPFC in a three breaker ring. It would control the flow on the San Onofre - Talega #1 Line during normal and contingency conditions (Figure 7).

SDG&E connected the shunt element of the UPFC to the Talega 230 kV bus. The shunt element is used to continuously provide the required reactive power support during normal and contingency conditions.

If the San Onofre - Talega #1 Line is out of service for maintenance, the series element of the UPFC can be switched to control the flow on the San Onofre - Talega #2 line. If the San Onofre - Talega Line #1 trips due to a forced outage, the series element of UPFC switches automatically to control the flow on the San Onofre - Talega #2 Line.

The UPFC has approximately 20 percent of short-term overload capability compared to a Static Var Controller (SVC) which does not have any overload capability. The UPFC also absorbs reactive power and, therefore, acts like a generator.

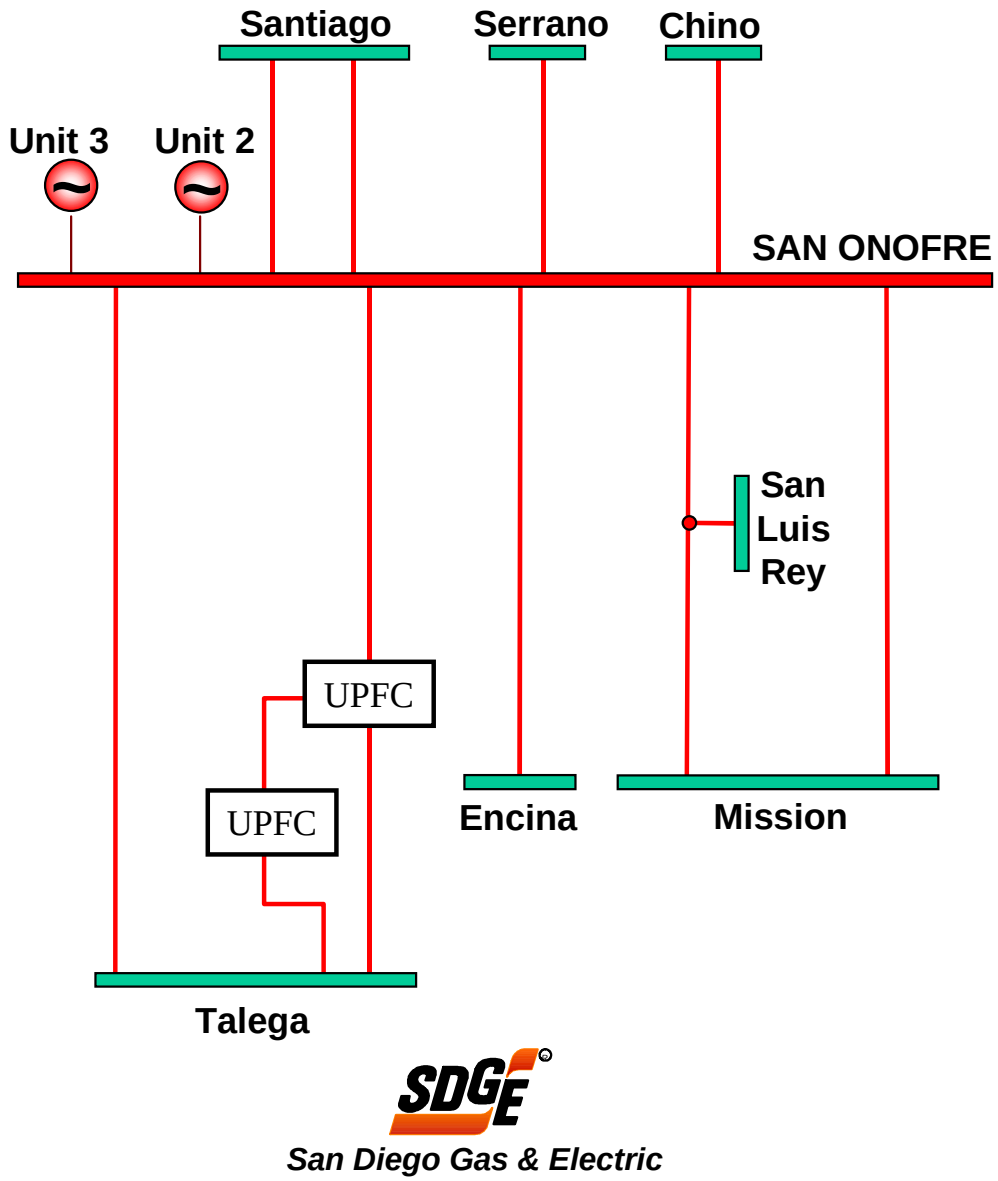
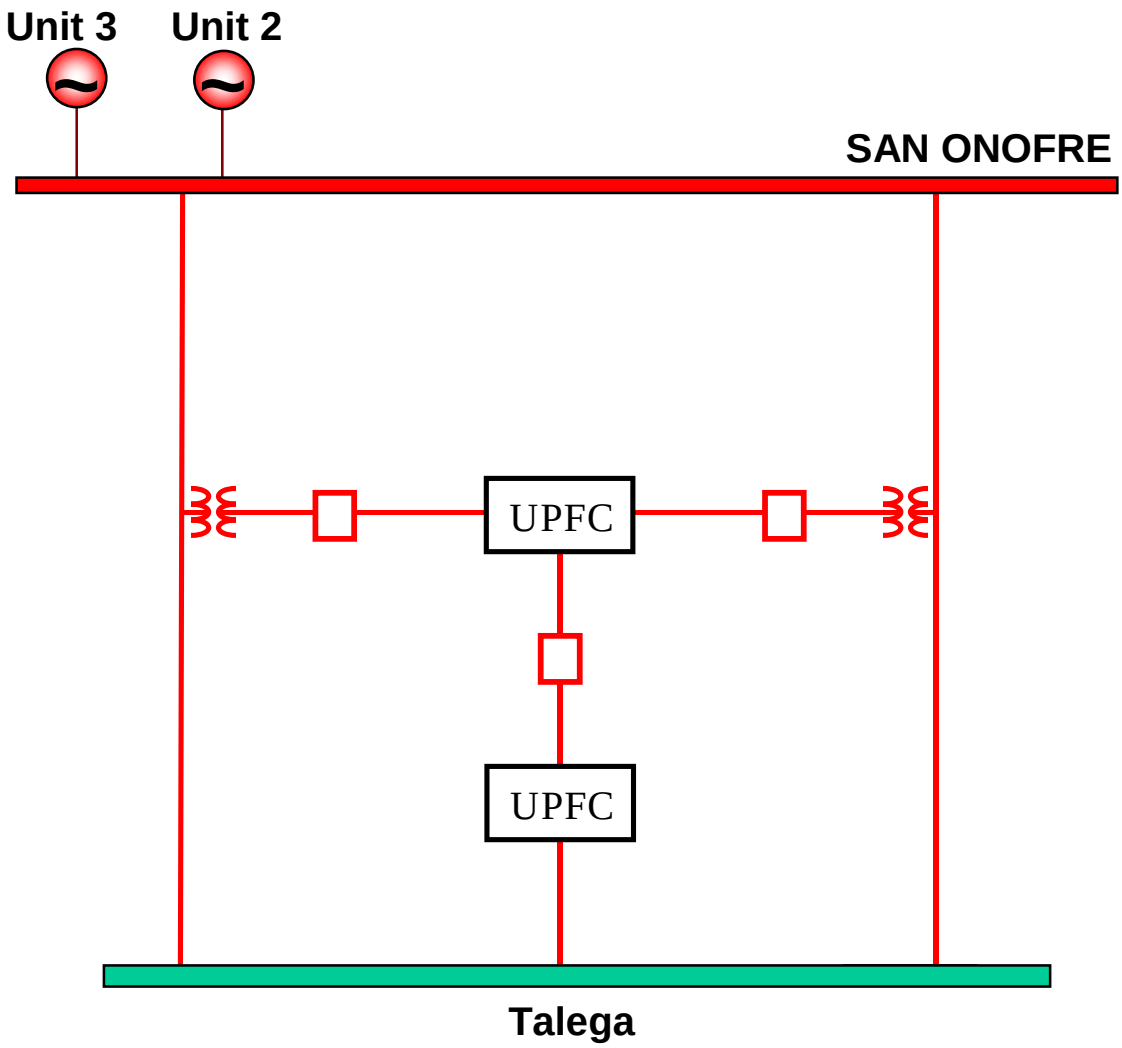


Figure 6. UPFC on the San Onofre - Talega #1 or #2 230 kV Line.



San Diego Gas & Electric

Figure 7. UPFC Arrangement

2.8.2 Alternative 2 – The San Onofre - Encina 230 kV Line

SDG&E installed a UPFC on the San Onofre - Encina 230 kV Line at the Encina Substation (Figure 8). We installed the series element of the UPFC in a three-breaker ring. It would control the flow on the San Onofre - Encina 230 kV Line during normal and contingency conditions. The shunt element of the UPFC, used to continuously provide the required reactive power support during normal and contingency conditions, is connected to the Encina 230 kV bus.

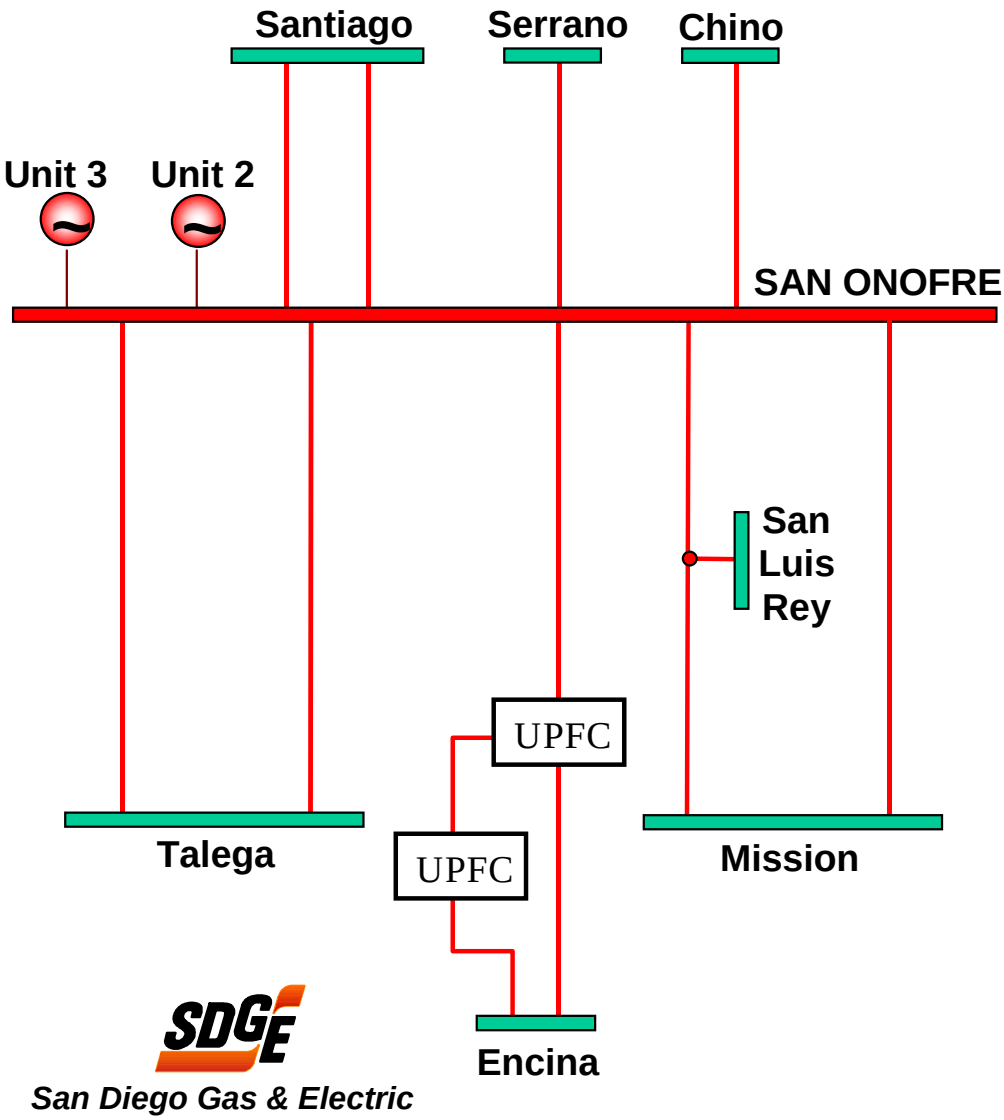


Figure 8. UPFC on the San Onofre - Encina 230 kV Line

2.8.3 Alternative 3 – The San Onofre - Mission 230 kV Line

SDG&E installed a UPFC on the San Onofre - Mission 2 230 kV Line at the Mission Substation (Figure 9). We installed the series element of the UPFC in a three-breaker ring. It would control the flow on the San Onofre - Mission Line during normal and contingency conditions. The shunt element of the UPFC is connected to the Mission 230 kV bus.

The shunt element is used to continuously provide the required reactive power support during normal and contingency conditions. If the San Onofre - Mission Line is out of service then the series element of the UPFC can be switched to control the flow on the San Onofre - San Luis Rey - Mission 230 kV Line and vice versa. If the San Onofre - Mission Line trips, the series element of UPFC is switched to control the flow on the San Onofre - San Luis Rey - Mission 230 kV Line. Whenever either the San Onofre - Mission 230 kV Line or the San Onofre - San Luis Rey - Mission 230 kV Line is out of service for maintenance, the UPFC can be used to control the flow on the other line.

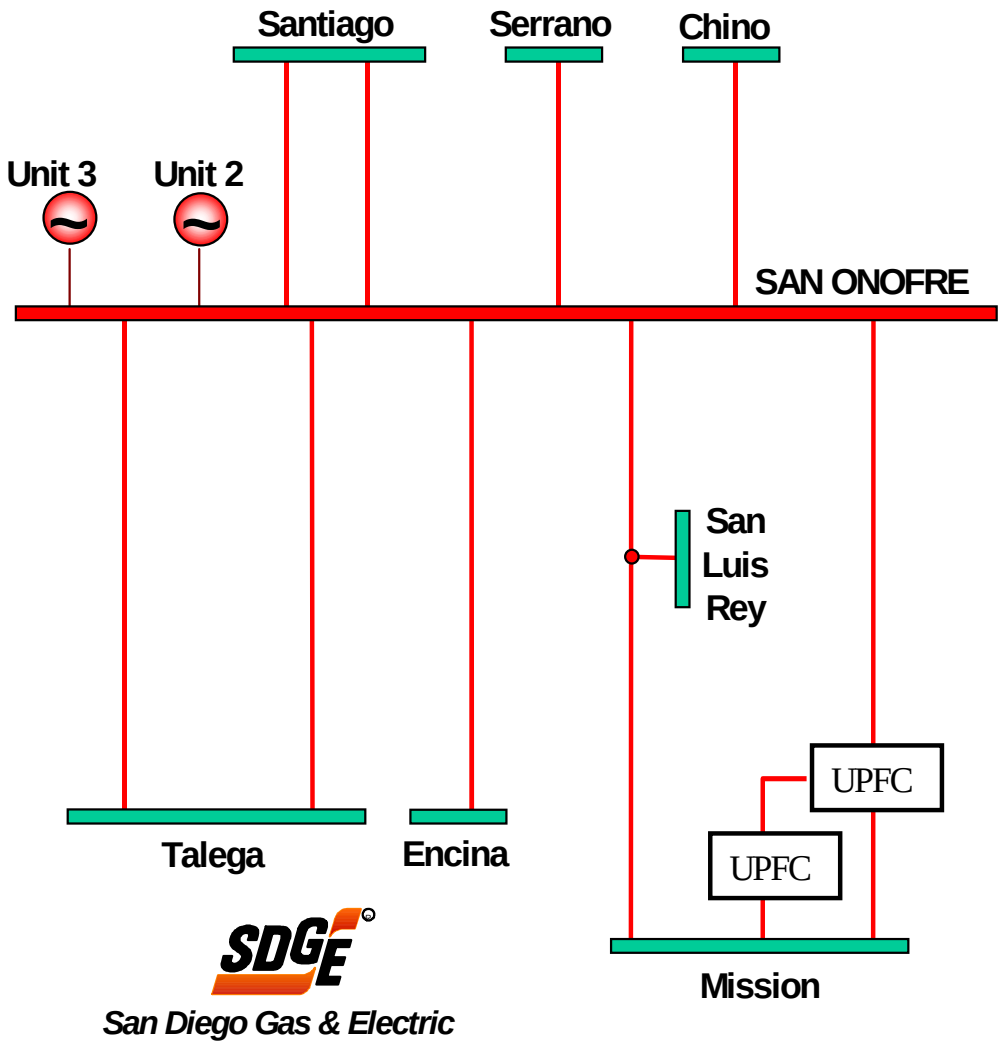


Figure 9. UPFC on the San Onofre - Mission 230 kV Line

2.8.4 Alternative 4 –The San Onofre - San Luis Rey Tap- Mission 230 kV Line

In this alternative, a UPFC is installed on the San Onofre - San Luis Rey Tap -Mission 230 kV Line at the Mission Substation (Figure 10). The series element of the UPFC is installed in a three breaker ring and will control the flow on the San Onofre - San Luis Rey Tap -Mission 230 kV Line during normal and contingency conditions. The shunt element of the UPFC is connected to the Mission 230 kV bus. The shunt element is utilized to continuously provide the required reactive power support during normal and contingency conditions. If the San Onofre - San Luis Rey Tap - Mission Line is out of service, then the series element of the UPFC can be switched to control the flow on the San Onofre - San Luis Rey - Mission 230 kV Line and vice versa. Also, whenever either the San Onofre - Mission 230 kV Line or the San Onofre - San Luis Rey - Mission 230 kV Line is out of service for maintenance, the UPFC can be utilized to control the flow on the other line.

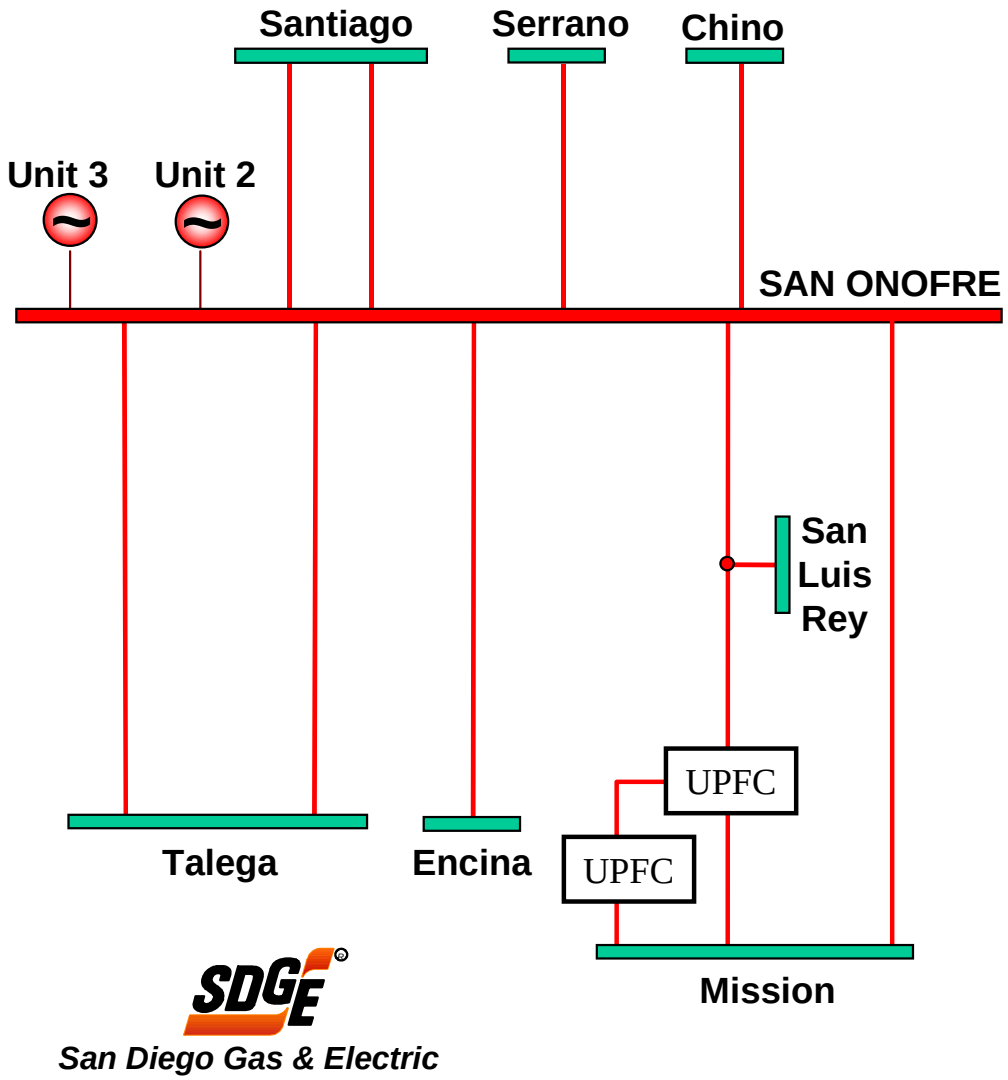


Figure 10. UPFC on the San Onofre - San Luis Rey Tap- Mission 230 kV Line

2.8.5 Alternative 5 – San Onofre - Mission and San Onofre - Talega 230 kV Lines

By conducting power flow studies SDG&E examined the benefits of installing two UPFCs on the San Onofre - Mission and San Onofre - Talega 230 kV Lines (Figure 11) to determine if this alternative would result in the elimination of many overloads.

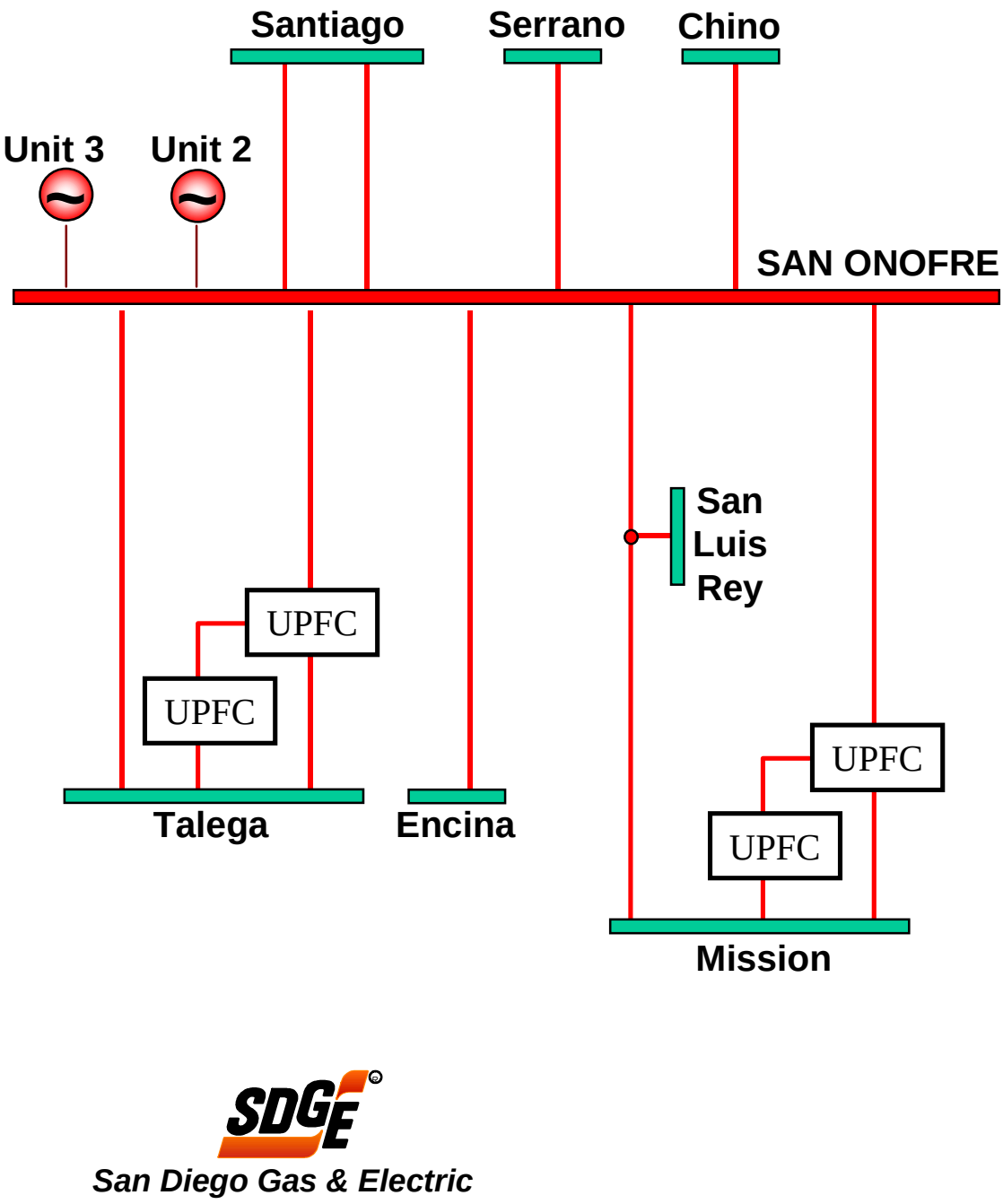


Figure 11. UPFC on the San Onofre - Mission & San Onofre - Talega 230 kV Lines

2.9 Project Outcomes

SDG&E conducted real and reactive power flow studies for steady state and contingency conditions for each of the five alternative installations. We also conducted economic analyses to determine the most economical location for installation of the UPFC.

Power flow runs examined the line overloads and voltage profiles following a contingency. SDG&E simulated all single and credible multiple (i.e. contingencies involving three or more elements) contingencies for the study. The project examined the reactive power requirements and voltage profile following the worst contingency.

The function of the UPFC was to maximize the flow on the line and maintain a 1.0 per unit (pu) voltage at the substation. To examine the benefits of the UPFC, SDG&E increased the import capability by 300 megawatts (MW) from the present value of 2,450 MW to 2,750 MW and the non-simultaneous import capability by 250 MW from the present value of 1,900 MW to 2,150 MW.

SDG&E then ran power flow studies for the cases with the UPFC and compared the overload and reactive power support requirements.

Outcomes

The following general outcomes resulted from this study:

- The most beneficial FACTS technology for increasing import capacity into SDG&E's service area is the UPFC unit
- The UPFC installed anywhere on the South-of-SONGS path can redistribute the power flow and increase import capability into SDG&E
- Of the five locations examined in the South-of-SONGS, the installation of a UPFC on the San Onofre - Talega 230 kilovolt (kV) lines at Talega Substation is the preferred alternative to increase SDG&E's import capacity.
- The installation of a FACTS device would increase the import capacity by 300 MW (i.e. by 12 percent) and delay the construction of additional transmission lines or generating capacity.

Outcomes for each alternative are discussed in the following pages. They are also summarized in various tables in Appendix E. This appendix contains a one line diagram of computer simulations for determining the required reactive power support to maintain the bus voltage to which the UPFC is connected at 1.0 pu.

Table 3 summarizes information contained in Appendix E tables.

Table 3. Appendix E Table Information

Table	Information
Table E.1	Overloads for each alternative for each import level.
Table E.2	Buses with voltage less than 0.90 pu for each alternative
Table E.3	Buses with voltage deviation greater than 5% for each alternative.
Table E.4	Buses with voltage less than 0.90 pu for each alternative for the case with San Onofre unit down
Table E.5	Buses with voltage deviation greater than 5% for each alternative for the case with one San Onofre unit down.
Table E.6	Overloads identified and their cost estimate for all alternatives
Table E.7	The capital cost estimate for each alternative examined

2.9.1 Alternative 1 – The San Onofre - Talega 1 or 2 230 kV Line

SDG&E set the UPFC to control the flow on the San Onofre - Talega #1 230 kilovolt (kV) Line to the maximum emergency limit of 1,450 amps. The required size of the UPFC was 85 MVA. Table 4 shows required system upgrades and their associated costs.

SDG&E conducted contingency runs for the case with one San Onofre unit out of service and loss of the Imperial Valley – Miguel 500 kV and Imperial Valley – La Rosita 230 kV lines. They showed that 625 Millions of Volt Ampere Reactive (Mvars) of reactive power support would be needed to maintain a voltage of 1.0 pu at the Talega 230 kV bus.

Table 4. System Upgrades for Alternative 1

System Upgrades	Estimated Cost ($M)
Install a 85 MVA UPFC at Talega Substation (series element)	$3.4
Install a 85 MVA UPFC at Talega Substation (shunt element)	$3.4
Transmission Reinforcements	$16.6
Substation Costs	$2.0
Total	$25.4

2.9.2 Alternative 2 – The San Onofre - Encina 230 kV Line

SDG&E set the UPFC to control the flow on the San Onofre - Encina 230 kV Line to the maximum emergency limit of 2,290 amps. The required size of the UPFC was 385 MVA. Table 5 shows required system upgrades and their associated costs.

Compared with Alternative 1, Alternative 2 eliminated one overload but produced several new overloads (Appendix E).

SDG&E conducted contingency runs for the case with one San Onofre unit out of service and the loss of the Imperial Valley – Miguel 500 kV and Imperial Valley – La Rosita 230 kV lines. They showed that 542 Mvars of reactive power support would be needed to maintain a voltage of 1.0 pu at the Talega 230 kV bus.

Table 5. System Upgrades for Alternative 2

System Upgrades	Estimated Cost ($M)
Install a 385 MVA UPFC at Encina Substation (series element)	$15.4
Install a 85 Mvar UPFC at Encina Substation (shunt element)	$3.4
Transmission Reinforcements	$36.6
Substation Costs	$2.0
Total	$57.4

2.9.3 Alternative 3 – The San Onofre - Mission 230 kV Line

SDG&E set the UPFC to control the flow on the San Onofre - Mission 230 kV Line to the maximum limit of 1,145 amps. The required size of the UPFC was 174 MVA. Table 6 shows required system upgrades and their associated costs.

Compared with Alternative 1, Alternative 3 eliminated several overloads and created several new overloads (Appendix E).

SDG&E conducted contingency runs for the case with one San Onofre unit out of service and loss of the Imperial Valley – Miguel 500 kV and Imperial Valley – La Rosita 230 kV lines. They showed that 670 Mvars of reactive power support would be needed to maintain a voltage of 1.0 pu at the Talega 230 kV bus.

Table 6. System Upgrades for Alternative 3

System Upgrades	Estimated Cost ($M)
Install a 174 MVA UPFC at Mission Substation (series element)	$6.9
Install a 85 MVAR UPFC at Mission Substation (shunt element)	$3.4
Transmission Reinforcements	$28.6
Substation Costs	$2.0
Total	$40.9

2.9.4 Alternative 4 – The San Onofre - San Luis Rey Tap - Mission 230 kV Line.

SDG&E set the UPFC to control the flow on the San Onofre - Mission 230 kV Line to the maximum limit of 1,145 amps . . The required size of the UPFC was 28 MVA. Table 7 shows required system upgrades and their associated costs.

Compared with Alternative 1, Alternative 4 eliminated several overloads and created several new overloads (Appendix E).

SDG&E conducted contingency runs for the case with one San Onofre unit out of service and loss of the Imperial Valley – Miguel 500 kV and Imperial Valley – La Rosita 230 kV lines. They showed that 528 Mvars of reactive power support would be needed to maintain a voltage of 1.0 pu at the Talega 230 kV bus.

Table 7. System Upgrades for Alternative 4

System Upgrades	Estimated Cost ($M)
Install a 28 MVA UPFC at Mission Substation	$1.1
Install a 85 Mvar UPFC at Mission Substation (shunt element)	$3.4
Transmission Reinforcements	$34.6
Substation Costs	$2.0
Total	$41.1

2.9.5 Alternative 5 – The San Onofre - Mission and San Onofre - Talega 230 kV Lines.

SDG&E examined the benefits of installing two UPFCs on the San Onofre - Mission and San Onofre - Talega 230 kV Lines. We set the UPFC at Mission to control the flow on the San Onofre - Mission 2,30 kV Line to the maximum limit of 1,145 amps and the UPFC at Talega to control the flow on the San Onofre - Talega #1 230 kV Line to the maximum emergency limit of 1,450 amps. The required sizes of the Talega UPFC and Mission were 85 MVA and 174 MVA, respectively. Table 8 shows required system upgrades and their associated costs.

This alternative limited several overloads but also produced new overloads.

SDG&E conducted contingency runs for the case with one San Onofre unit out of service and loss of the Imperial Valley – Miguel 500 kV and Imperial Valley – La Rosita 230 kV lines. They show that 485 Mvars and 503 Mvars of reactive power support would be needed to maintain a voltage of 1.0 pu at the Mission 230 kV bus and Talega 230 kV bus, respectively.

Table 8. System Upgrades for Alternative 5

System Upgrades	Estimated Cost ($M)
Install a 174 MVA UPFC at Mission Substation (series element)	$6.9
Install a 85 MVA UPFC at Talega Substation (series element)	$3.4
Install a 85 Mvar UPFC at Mission Substation (shunt element)	$3.4
Install a 85 Mvar UPFC at Mission Substation (shunt element)	$3.4
Transmission Reinforcements	$17.2
Substation Costs	$4.0
Total	$38.3

2.10 Summary of Alternatives

Table 9 summarizes the information for the five alternatives.

Table 9. Summary of Data for Alternatives

	ALTERNATIVES					
	1	2	3	4	5	
					San Onofre – Mission	San Onofre -- Talega
Max. Import Capability	**2750**	**2750**	**2750**	**2750**	**2750**	**2750**
UPFC Size	85 MVA	385 MVA	174 MVA	28 MVA	85 MVA	174 MVA
Reactive Power	625 MVARS	542 MVARS	670 MVARS	528 MVARS	485 MVARS	503 MVARS
Cost of Upgrades	$25.4 Million	$57.4 Million	$40.9 Million	$41.1 Million	$38.3 Million	

2.11 Economic Analysis

To calculate costs, the reactive power support requirements were compared to Alternative 1 and the reactive power requirements for Alternatives 2 through 5 were assumed to be the same as for Alternative 1.

To compare the costs of the five alternatives, SDG&E assumed the cost for a SVC unit and the series or shunt element of the UPFC to be $40,000 per Million Volt Ampere (MVA). We based this figure on information provided by the Electric Power Research Institute (EPRI) and American Electric Power.

SDG&E conducted Discounted Cash Flow (DCF) analyses for the five alternatives (Appendix F). From discussions of each alternative and comparing Net Present Value for each, it was evident that Alternative 1 was the preferred for increasing the SDG&E import capability. SDG&E assumed that all expenditures would occur in the year 2003. The results of the DCF analyses for each alternative are summarized in Table 8.

Alternative 1, installation of an 85 MVA Unified Power Flow Controller (UPFC) on the San Onofre - Talega 230 kV lines, is the most economic alternative for a demonstration project to test the UPFC's effect on SDG&E's import capability (Table 10). The proposed installation of this UPFC at Talega has a payback period of 13 years.

Table 10. Discounted Cash Flow Analysis Results

Alternative	Net Present Value (NPV)	Payback Period
Alternative 1 - UPFC at Talega	$14.7 million	13 years
Alternative 2 - UPFC at Encina	$10.7 million	No payback
Alternative 3 - UPFC at Mission	$6.9 million	25 years
Alternative 4 - UPFC at Mission	$6.7 million	25 years
Alternative 5 - UPFC at Talega & Mission	$9.6 million	22 years

3.0 Conclusions and Recommendations

This project's objectives were to:

- Investigate the ability of FACTS devices, such as the Static Synchronous Series Compensator (SSSC), Thyristor-Controlled Phase Angle Regulator (TCPAR), and Unified Power Flow Controllers (UPFC), to increase SDG&E's import capability.
- Determine if a FACTS device was capable of increasing the usable capacity of the existing South-of-SONGS transmission system.

Results indicated that among the FACTS devices evaluated, the UPFC was a possible alternative for SDG&E to explore to increase its import capability.

3.1 Conclusions

While FACTS devices could be useful to the SDG&E system, there is no indication that this technology alone could replace future transmission and generation projects needed to meet load growth. The technical and economic benefits of FACTS technology must be compared with those of conventional facilities on a case by case basis to determine if FACTS technology would be a viable alternative.

While this project demonstrated the potential benefits of FACTS technology to enhance power system operation and increase power import capability over existing systems, the results are still preliminary. As further detailed research is performed on the revised SDG&E transmission system, subsequent studies may provide different results.

3.2 Recommendations

Conduct additional research to assess the impact of the UPFC on the SDG&E import capability given the recent changes in the South-of-SONGS transmission system configuration. These changes, made to accommodate the rapid load growth within the SDG&E's system, may alter the findings of this study.

Specific recommendations are to:

- Install a UPFC in the location recommended by the new study as a demonstration and research project.
- Demonstrate the ability of a UPFC unit to be shared by two parallel lines to re-direct flow in order to prevent line overloading.
- Seek co-funding of this project from various entities such as the California Energy Commission, the Department of Energy (DOE), the Electric Power Research Institute (EPRI), UPFC manufacturers, various electric utilities, etc.

4.0 References

1. "FACTS Overview", IEEE & CIGRE Working Groups, IEEE Publication 95 TP 108, April 1995

2. "Controlling the Flow of Real and Reactive Power ", IEEE Computer Applications in Power, A. Edris, A.S. Mehraban, L. Gyugyi, S. Arabi, T. Reitman, pp. 20-25, January 1998

3. "Power Precision With UPFC", T. Moor, EPRI Journal, pp. 18-23, November / December 1998

4. "The Unified Power Flow Controller: A New Approach to Power Transmission Control," L. Gyugyi, C.D. Schauder, S.L. Williams, T.R. Reitman, D. R. Torgerson, A. Edris, IEEE Trans. on Power Delivery, Volume 10, No. 2, pp. 1085-1097, April 1995

5. "A Unified Power Flow Control Concept for Flexible AC Transmission Systems," IEE Proceedings, Volume 139, Number 4, July 1992.

6. "Flexible AC Transmission System Studies: Southern Company Service ", EPRI Report TR-106461, May 1996.

7. "Flexible AC Transmission System (FACTS) Technologies on the TVA Transmission", EPRI Report TR-106462, May 1996.

8. "Flexible AC Transmission System (FACTS): System Studies to Accwss FACTS Device Requirements on the Entergy System", EPRI Report TR-105260, August 1995.

Appendix A

Study Scope

Appendix B

Base Case Load Flow Data

Appendix C

Load and Resource Table

Appendix D

SDG&E Import Capability Nomogram

Appendix E

Tabulated Study Results

Appendix F

Discounted Cash Flow Analysis

APPENDIX A

STUDY SCOPE

SYSTEM STABILITY & RELIABILITY

FACTS BENEFITS STUDY

Study Scope

CEC Project Manager: Linda Davis
SDG&E Project Manager: Abbas M. Abed

OBJECTIVES

The objective of this study is to conduct detailed technical and economical studies to investigate the benefits of Flexible AC Transmission Systems (FACTS) devices located in SDG&E's service territory. The study will particularly focus on the potential benefits of existing and new FACTS devices in improving SDG&E's import capability.

BACKGROUND

SDG&E has conducted a previous study evaluating benefits of FACTS projects under an EPRI contract. The main focus of the study was to evaluate benefits of FACTS projects at several locations in Southern California in increasing the Arizona to California transfer levels. The previous study examined the benefits of FACTS devices on Palo Verde - Miguel 500 kV, Palo Verde - Devers 500 kV, Moenkopi - Eldorado 500 kV, and Navajo - McCullough 500 kV lines and at Devers and San Onofre Substations. The use of Static Condensers (STATCON), Thyristor Controlled Series Capacitors (TCSC), and Static Var Controllers (SVC) were examined in the previous study.

This study will investigate the benefits of the above FACTS devices as well as more recent FACTS devices (depending on availability of simulation models), such as Static Synchronous Series Compensators (SSSC), Thyristor-Controlled Phase Angle Regulator (TCPAR), Universal Power Flow Controllers (UPFCs), etc., as they relate to increasing SDG&E's import capability.

TASK STATEMENT

Tasks 1.0 - 1.1 Revise Work Statement and Task Deliverables, Schedules, and Budgets

Prior to undertaking any work on subsequent tasks, the Work Statement and the Task Deliverables, Schedules, and Budgets (Exhibit B-6) must be reviewed and approved by the Commission Project Manager. If the Commission Project Manager determines that the documents are unsatisfactory, Contractor shall revise them until they meet the Commission Project Manager's requirements. All project tasks must be consistent with the goals and objectives of the project as they appeared in the project proposal to the Commission. No Transition Funding project funds may be expended until acceptable Work Statement and Task Deliverables, Schedules, and Budgets (Exhibit B-6) have been submitted by the Contractor and approved by the Commission Project Manager.

Deliverable: Revised Work Statement and Exhibits B-6 and C-6

Task 2.0 Prepare Quarterly Progress Reports

The Contractor shall provide a written Quarterly Progress Report to the Commission Project Manager. Each quarterly report shall be due to the Commission Project Manager no later than 30 days after the end of the reporting period. Unless otherwise indicated, all quarterly reports shall be submitted to the Commission Project Manager both in hard copy and as computer files in Microsoft Word 6.0 format. Each Quarterly Progress Report shall include:

A narrative of the status of scheduled, on-going, and completed work during the reporting period. Where appropriate, the narrative shall reference Exhibit B-6; A discussion of technical, scheduling, and any other problems encountered during the reporting period, and the activities undertaken by Contractor to resolve these problems; The status of project expenditures, including compensation of Contractor's personnel and identification and quantification of any expenditures which are likely to exceed those indicated in Exhibit B-6. In particular, Contractor shall identify tasks where the contract expenditures are anticipated to exceed the contract budget for those tasks by fifteen (15) percent or more; An updated version of Exhibit B-6, showing the individual contract tasks, schedule for each task, and budget for each task. The schedule shall include planned and actual or anticipated start dates, completion dates, and duration of each task. Estimates of anticipated dates and duration shall be based upon Contractor's estimate of the labor effort remaining for the completion of each task and anticipated delays due to inclement weather or due to problems associated with the receipt of approvals, materials, labor or services, etc.

The Quarterly Progress Report must not contain confidential information. If the Commission Project Manager or Contractor deem it necessary to include confidential information to adequately describe the status and performance of the contract then Contractor shall submit under separate cover marked "Confidential" with an Application for Confidential Designation to be provided by the Commission Project Manager.

The Quarterly Progress Report shall be reviewed by the Commission Project Manager. If the Commission Project Manager determines that the report is unsatisfactory, Contractor shall revise the report until it meets the Commission Project Manager's requirements.

Deliverable: Progress Reports

Task No. 3 - Investigate Availability of FACTS Models

This task involves investigating the availability and capability of various FACTS models such as STATCONs, UPFCs, TCSCs, SVCs, and SSSCs for simulation studies using the General Electric power flow and transient stability program.

Deliverable: List of available FACTS models

Task No. 4 - Develop Base Case (s)

In this task the appropriate power flow and transient stability base cases are developed for the study. The base cases will be developed using the most recent system assumptions utilizing the GE power flow and stability programs.

Deliverable: Base Cases

Task No. 5 - Identify Transmission Limitations

In this task the transmission bottlenecks will be identified by conducting power flow and stability contingency analyses. This will require extensive contingency analysis of the SDG&E system to determine the transmission bottlenecks, such as overloads, voltage problems, shortage of reactive power support, etc., which may be caused as a result of load growth and increased imports.

Deliverable: List of transmission bottlenecks

Task No. 6 - Determine Alternatives Including Appropriate FACTS Devices

This task involves determining various alternatives, such as upgrading existing transmission lines, building new transmission lines, installing appropriate FACTS devices that could be useful in removing transmission bottlenecks, etc. The FACTS devices that will be considered include STATCONs, TCSCs, SVCs, SSSCs, TCPARs, UPFCs, etc., (depending on availability of simulation models).

Deliverable: List of alternatives

Task No. 7 - Conduct Technical Studies

Technical studies are conducted examining the performance of appropriate FACTS devices during steady state and transient conditions at various locations. Only those devices that can be beneficial in removing the system constraints will be pursued further. Operational and control issues associated with FACTS devices will also be examined.

Deliverable: Results of technical studies

Task No. 8 - Conduct Economic Analysis

Economical studies for the selected viable alternatives (including FACTS devices) will be conducted to determine the most optimum solution to alleviate system bottlenecks.

Deliverable: Results of economic analysis

Task No. 9 - Prepare Draft Report for CEC Review

This task involves summarizing study results, preparing presentations, and documenting study assumptions, criteria, and methodology in a detailed draft report.

Deliverable: Draft Report

Task 10 - Prepare Final Report

The Contractor shall provide a written Final Report to the Commission Project Manager. The Final Report shall be reviewed by the Commission Project Manager. If the Commission Project Manager determines that the report is unsatisfactory, Contractor shall revise the report until it meets the Commission Project Manager's requirements. A sample Final Report outline showing a

suggested format and contents is attached (Exhibit E).

Deliverable: Final report

Task 11 - Final Meeting

The Contractor shall meet (in person or by telephone) with the Commission as specified by the Project Manager. The purpose of the final meeting is to present the project's findings, conclusions and recommendations and to discuss contract close out issues. These issues may include disposition of equipment purchased with state funds, feedback on Contractor performance and surviving contract terms (e.g., data preservation and payment).

APPENDIX B

BASE CASE LOAD FLOW DATA

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
30001	BATIQTOS	138.00	1	1.0000	1.0113	-18.97	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30003	CALAVRTP	138.00	1	1.0000	1.0135	-18.34	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30004	CANNON	138.00	1	1.0180	1.0180	-17.85	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30005	CAPSTRNO	138.00	1	1.0000	1.0255	-15.57	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30006	CARLTHTP	138.00	1	1.0000	1.0062	-22.13	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30007	CARLTNHS	138.00	1	1.0000	1.0058	-21.93	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30008	CHCARITA	138.00	1	1.0000	1.0033	-21.48	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30010	CORONADO	12.50	1	1.0000	1.0395	-25.77	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30011	CORONADO	69.00	1	1.0000	1.0175	-25.77	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30014	DIVISION	69.00	2	1.0000	1.0272	-25.20	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30015	DIVISNGT	12.50	1	1.0000	1.0278	-25.20	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30016	DOUBLET	138.00	1	1.0000	1.0048	-21.02	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30017	DOUBLTTP	138.00	1	1.0000	1.0047	-21.02	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30019	ENCINA	138.00	1	1.0180	1.0180	-17.85	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30020	ENCINA	230.00	1	1.0000	1.0000	-14.84	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30021	ENCINA 1	14.40	2	1.0000	1.0029	-13.29	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30022	ENCINA 2	14.40	2	1.0000	1.0066	-9.79	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30023	ENCINA 3	14.40	2	1.0000	1.0024	-12.74	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30024	ENCINA 4	22.00	2	1.0000	0.9907	-12.61	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30025	ENCINA 5	24.00	2	1.0000	0.9656	-11.23	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30028	ESCNDIDO	230.00	1	1.0000	0.9953	-16.85	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30029	ESCND050	138.00	1	1.0000	0.9767	-19.43	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30030	ESCND051	138.00	1	1.0000	0.9908	-19.76	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30032	IMPRLVLY	230.00	1	1.0000	1.0084	-6.71	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30033	IMPRLVLY	500.00	1	1.0000	1.0563	-2.58	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30034	KEARNY	69.00	1	1.0000	1.0156	-25.43	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30035	KEARNYGT	12.50	1	1.0000	1.0056	-22.17	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30036	LAGNA NL	138.00	1	1.0000	1.0238	-15.62	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30037	LOSCOCHS	138.00	1	1.0000	1.0083	-23.72	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30040	MAIN ST	69.00	1	1.0000	1.0257	-25.39	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30042	MAINST50	138.00	1	1.0000	1.0064	-19.86	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30043	MAINST51	138.00	1	1.0000	1.0074	-19.36	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30044	MDWLRKTP	138.00	1	1.0000	1.0076	-19.41	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30045	MIGUEL	69.00	1	1.0000	1.0393	-22.98	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30046	MIGUEL	138.00	1	1.0000	0.9784	-15.92	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30047	MIGUEL	230.00	1	1.0000	1.0055	-13.43	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30048	MIGUEL	500.00	1	1.0000	1.0402	-6.07	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30051	MISSION	69.00	1	1.0000	1.0271	-24.73	30	307	0.0000	0.0000	40	01	1	39	12	31	0

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
30052	MISSION	138.00	1	1.0000	1.0076	-20.76	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30053	MISSION	230.00	1	1.0000	0.9897	-18.82	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30055	OLD TOWN	69.00	1	1.0000	0.9948	-24.10	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30056	OLD TOWN	230.00	1	1.0000	0.9910	-19.14	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30057	PENSQTOS	138.00	1	1.0000	1.0046	-21.03	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30058	PENSQTOS	230.00	1	1.0000	0.9933	-18.77	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30060	PRCTRVLY	138.00	1	1.0000	0.9821	-16.33	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30066	SAMPSON	12.50	2	1.0000	1.0253	-24.91	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30067	SAMPSON	69.00	1	1.0000	1.0254	-25.44	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30069	SANLUSRY	138.00	1	1.0000	1.0176	-18.37	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30070	SANMATEO	138.00	1	1.0000	1.0244	-14.74	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30071	SANMTOTP	138.00	1	1.0000	1.0271	-14.21	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30081	SOUTHBAY	69.00	1	1.0363	1.0363	-24.23	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30082	SOUTHBAY	138.00	1	1.0145	1.0145	-18.35	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30084	SOUTHBY1	15.00	2	1.0000	0.9990	-19.19	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30085	SOUTHBY2	15.00	2	1.0000	0.9870	-13.10	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30086	SOUTHBY3	20.00	2	1.0000	0.9924	-13.46	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30087	SOUTHBY4	20.00	2	1.0000	1.0122	-15.43	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30090	SYCAMORE	230.00	1	1.0000	0.9917	-16.84	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30091	TALEGA	138.00	1	1.0000	1.0275	-14.09	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30092	TALEGA	230.00	1	1.0000	0.9965	-12.07	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30093	TRABUCO	138.00	1	1.0000	1.0233	-15.68	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30094	ALPINE	69.00	1	1.0000	1.0209	-29.71	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30095	ASH	69.00	1	1.0000	1.0014	-25.06	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30096	ASH TP	69.00	1	1.0000	1.0006	-25.28	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30097	AVCADOTP	69.00	1	1.0000	0.9905	-25.76	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30098	AVOCADO	69.00	1	1.0000	0.9851	-26.34	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30099	B	69.00	1	1.0000	1.0173	-25.69	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30103	BERNARDO	69.00	1	1.0000	0.9995	-27.41	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30104	BERNDOTP	69.00	1	1.0000	1.0037	-25.80	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30105	BOLDRCRK	69.00	1	1.0000	1.0035	-31.01	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30106	BOLVRDTP	69.00	1	1.0000	1.0037	-31.82	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30107	BORDER	69.00	1	1.0000	1.0279	-25.17	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30108	BORDERTP	69.00	1	1.0000	1.0279	-25.17	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30109	BORREGO	69.00	1	1.0000	0.9438	-34.88	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30110	BOULEVRD	69.00	2	1.0000	0.9985	-32.08	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30111	CABRILLO	69.00	2	1.0000	0.9877	-25.12	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30112	CAMERON	69.00	1	1.0000	1.0054	-31.72	30	308	0.0000	0.0000	40	01	1	39	12	31	0

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30114	CHOLASTP	69.00	1	1.0000	1.0269	-25.35	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30115	CHOLLAS	69.00	1	1.0000	1.0196	-26.57	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30116	CLAIRMNT	69.00	1	1.0000	1.0085	-26.28	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30117	CLARMTTP	69.00	1	1.0000	1.0091	-26.15	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30118	CREELMAN	69.00	1	1.0000	1.0289	-29.86	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30120	CRSTNTS	69.00	1	1.0000	1.0284	-20.83	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30121	DEL MAR	69.00	1	1.0000	1.0090	-25.76	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30122	DELMARTP	69.00	1	1.0000	1.0166	-24.71	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30123	DESCANSO	69.00	1	1.0000	1.0073	-31.20	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30124	DOUBLTTP	69.00	1	1.0000	1.0154	-24.93	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30125	DUNHILL	69.00	1	1.0000	1.0152	-24.98	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30126	EL CAJON	69.00	1	1.0000	1.0236	-29.34	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30127	ELCAJNGT	12.50	1	1.0000	1.0706	-29.34	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30128	ELLIOTT	69.00	1	1.0000	1.0215	-25.96	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30129	ENCNITAS	69.00	1	1.0000	1.0019	-26.91	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30130	ESCNDIDO	69.00	1	1.0000	1.0121	-23.28	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30131	ESCO	69.00	1	1.0000	1.0099	-23.82	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30133	F	69.00	1	1.0000	1.0246	-25.04	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30134	FASHNVLY	69.00	1	1.0000	1.0210	-25.31	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30135	FELCTATP	69.00	1	1.0000	1.0029	-25.11	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30136	FELICITA	69.00	1	1.0000	1.0028	-25.11	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30137	FENTON	69.00	1	1.0000	1.0059	-26.65	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30138	GEN DYNM	69.00	1	1.0000	1.0163	-25.44	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30139	GENDYNTP	69.00	1	1.0000	1.0163	-25.43	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30140	GENESEE	69.00	1	1.0000	1.0116	-25.56	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30141	GLENCLIF	69.00	1	1.0000	1.0029	-31.77	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30142	GRANITE	69.00	1	1.0000	1.0184	-29.80	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30143	GRANITTP	69.00	1	1.0000	1.0229	-28.65	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30144	HORNO	69.00	1	1.0000	1.0140	-22.03	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30145	HORNO TP	69.00	1	1.0000	1.0148	-21.94	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30146	IMPRLBCH	69.00	1	1.0000	1.0302	-24.94	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30147	JAMACHA	69.00	1	1.0000	1.0231	-26.98	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30148	JAP MESA	69.00	1	1.0000	1.0195	-21.63	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30149	KETTNER	69.00	1	1.0000	1.0107	-25.39	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30150	KYOCERA	69.00	2	1.0000	1.0166	-25.45	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30151	KYOCRATP	69.00	1	1.0000	1.0167	-25.43	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30152	LA JOLLA	69.00	1	1.0000	1.0022	-26.56	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30153	LASPULGS	69.00	1	1.0000	1.0135	-22.03	30	304	0.0000	0.0000	40	01	1	39	12	31	0

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30154	LILAC	69.00	1	1.0000	0.9910	-26.34	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30155	LOSCOCHS	69.00	1	1.0000	1.0333	-28.23	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30156	LOVELAND	69.00	1	1.0000	1.0211	-29.77	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30157	MELROSE	69.00	1	1.0000	1.0007	-24.10	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30158	MELRSETP	69.00	1	1.0000	1.0057	-23.47	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30159	MESA RIM	69.00	1	1.0000	1.0036	-27.44	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30160	MESAHGTS	69.00	1	1.0000	1.0178	-25.39	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30161	MIGUEL	12.00	1	1.0000	0.9831	-10.26	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30162	MIGUELMP	500.00	1	1.0000	1.0323	-10.26	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30163	MIGUELTP	69.00	1	1.0000	1.0312	-24.75	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30164	MIRAMAR	69.00	2	1.0000	1.0051	-27.22	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30165	MIRAMRGT	69.00	1	1.0000	1.0073	-25.84	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30166	MIRAMRTP	69.00	1	1.0000	1.0121	-25.40	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30167	MONSRATE	69.00	1	1.0000	0.9900	-25.86	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30168	MONTGMRY	69.00	1	1.0000	1.0339	-24.51	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30169	MONTGYTP	69.00	1	1.0000	1.0339	-24.50	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30170	MOROHILL	69.00	1	1.0000	1.0032	-23.61	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30171	MURRAY	69.00	2	1.0000	1.0184	-28.36	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30172	N.GILA	500.00	1	1.0000	1.0678	2.04	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30173	NARROWS	69.00	1	1.0000	0.9586	-33.71	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30174	NATLCYTP	69.00	1	1.0000	1.0274	-25.27	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30175	NATNLCTY	69.00	1	1.0000	1.0275	-25.26	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30176	NAVSTMTR	69.00	1	1.0000	1.0270	-25.28	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30177	OCEANSDE	69.00	1	1.0000	1.0118	-22.14	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30178	OCNSDETP	69.00	1	1.0000	1.0129	-22.04	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30179	OLDTWNGT	12.50	1	1.0000	0.9906	-24.10	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30180	OTAY	69.00	2	1.0000	1.0311	-24.80	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30181	OTAY TP	69.00	1	1.0000	1.0308	-24.87	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30182	OTAYLAKE	69.00	1	1.0000	1.0278	-25.18	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30183	OTAYLKTP	69.00	1	1.0000	1.0282	-25.14	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30184	PACFCBCH	69.00	1	1.0000	0.9942	-26.00	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30185	PALA	69.00	1	1.0000	0.9877	-26.41	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30186	PALA TP	69.00	1	1.0000	0.9877	-26.41	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30187	PARADISE	69.00	1	1.0000	1.0259	-25.65	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30188	PENDLETN	69.00	1	1.0000	0.9963	-24.70	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30189	PENSQTOS	69.00	1	1.0000	1.0176	-24.51	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30190	POINTLMA	69.00	2	1.0000	0.9903	-24.88	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30191	POWAY	69.00	1	1.0000	1.0117	-26.84	30	305	0.0000	0.0000	40	01	1	39	12	31	0

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30192	R.CARMEL	69.00	1	1.0000	1.0023	-27.71	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30193	R.SNTAFE	69.00	2	1.0000	0.9972	-26.39	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30194	R.SNTATP	69.00	1	1.0000	1.0096	-25.67	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30195	RINCON	69.00	2	1.0000	0.9889	-27.66	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30196	ROSCYNTP	69.00	1	1.0000	1.0048	-26.33	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30197	ROSE CYN	69.00	1	1.0000	1.0049	-26.33	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30198	SANLUSRY	69.00	1	1.0000	1.0165	-21.58	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30199	SANLUSRY	230.00	1	1.0000	0.9916	-14.19	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30200	SANMRCOS	69.00	2	1.0000	0.9998	-25.00	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30201	SANTEE	69.00	1	1.0000	1.0061	-29.61	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30202	SANTYSBL	69.00	1	1.0000	1.0011	-30.89	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30203	SANYSDRO	69.00	1	1.0000	1.0261	-25.38	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30204	SCRAPDSP	69.00	1	1.0000	1.0273	-25.26	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30205	SCRIPPS	69.00	1	1.0000	1.0075	-27.44	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30207	SPRNGVLY	69.00	1	1.0000	1.0162	-27.34	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30208	STREAMVW	69.00	1	1.0000	1.0181	-26.73	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30209	STUART	69.00	1	1.0000	1.0125	-22.08	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30210	SUNYSIDE	69.00	1	1.0000	1.0307	-24.82	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30211	SWEETWTR	69.00	2	1.0000	1.0294	-25.10	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30212	SWTWTRTP	69.00	1	1.0000	1.0277	-25.24	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30213	SYCAMORE	69.00	2	1.0000	1.0310	-25.22	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30214	TORRYPNS	69.00	1	1.0000	1.0142	-25.16	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30216	URBAN	69.00	1	1.0000	1.0196	-25.75	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30217	WABASH	69.00	1	1.0000	1.0213	-25.95	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30218	WARCYNTP	69.00	1	1.0000	1.0106	-26.18	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30219	WARRENCYN	69.00	1	1.0000	1.0094	-26.26	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30220	WARNERS	69.00	1	1.0000	0.9835	-30.88	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30221	ENCINAGT	12.50	1	1.0000	1.0156	-17.85	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30223	MARGARTA	138.00	1	1.0000	1.0230	-15.57	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30224	MIRAMRGT	12.50	1	1.0000	0.9617	-18.39	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30226	NOISLMTR	69.00	2	1.0000	1.0173	-25.79	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30227	PALOMAR	138.00	1	1.0000	1.0143	-18.48	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30228	POMERADO	69.00	1	1.0000	1.0250	-25.78	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30229	SOUTHBGT	12.50	1	1.0000	1.0104	-24.23	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30233	BARRETT	69.00	1	1.0000	1.0097	-31.18	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30327	NORTHCTY	138.00	1	1.0000	1.0064	-20.53	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30329	PICO	138.00	1	1.0000	1.0271	-14.32	30	306	0.0000	0.0000	97	12	17	39	12	31	0
30330	TELECYN	138.00	1	1.0000	0.9904	-17.03	30	303	0.0000	0.0000	40	01	1	39	12	31	0

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
30344	TALEGA	69.00	1	1.0000	1.0286	-20.80	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30347	GOALLINE	69.00	2	1.0000	1.0111	-23.53	30	305	0.0000	0.0000	40	01	1	39	12	31	0
30349	SHADOWR	138.00	1	1.0000	1.0030	-18.80	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30350	B TP	69.00	1	1.0000	1.0175	-25.77	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30353	NCMETER	138.00	1	1.0000	1.0070	-19.43	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30354	NCMETRTP	138.00	1	1.0000	1.0070	-19.43	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30357	FRIARS	138.00	1	1.0000	1.0072	-20.81	30	301	0.0000	0.0000	97	12	17	39	12	31	0
30358	NAVSTGT	12.50	1	1.0000	1.0278	-25.20	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30359	BATIQTP	138.00	1	1.0000	1.0117	-18.94	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30362	BLDCRKTP	69.00	1	1.0000	1.0035	-31.01	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30365	CABRLNVY	69.00	1	1.0000	0.9877	-25.12	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30367	DOUBLET	69.00	1	1.0000	1.0154	-24.93	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30368	DUNHILTP	69.00	1	1.0000	1.0152	-24.98	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30369	FENTONTP	69.00	1	1.0000	1.0059	-26.65	30	306	0.0000	0.0000	40	01	1	39	12	31	0
30370	FSHNVLTP	69.00	1	1.0000	1.0210	-25.31	30	307	0.0000	0.0000	40	01	1	39	12	31	0
30371	GLNCLFTP	69.00	1	1.0000	1.0029	-31.77	30	308	0.0000	0.0000	40	01	1	39	12	31	0
30374	MNSRATTP	69.00	1	1.0000	0.9899	-25.87	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30375	MORHILTP	69.00	1	1.0000	1.0032	-23.61	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30376	NCFOT2	69.00	1	1.0000	1.0271	-25.28	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30377	NCFOT2TP	69.00	1	1.0000	1.0275	-25.25	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30378	SANYSDTP	69.00	1	1.0000	1.0261	-25.38	30	302	0.0000	0.0000	40	01	1	39	12	31	0
30379	SCRAPTAP	69.00	1	1.0000	1.0273	-25.26	30	301	0.0000	0.0000	40	01	1	39	12	31	0
30380	SNLSRYTP	230.00	1	1.0000	0.9916	-14.19	30	303	0.0000	0.0000	40	01	1	39	12	31	0
30381	STUARTTP	69.00	1	1.0000	1.0125	-22.08	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30382	SUNYSDTP	69.00	1	1.0000	1.0307	-24.82	30	309	0.0000	0.0000	40	01	1	39	12	31	0
30383	TALEGATP	69.00	1	1.0000	1.0286	-20.80	30	304	0.0000	0.0000	40	01	1	39	12	31	0
30384	EASTGATE	69.00	1	1.0000	1.0112	-25.52	30	306	0.0000	0.0000	97	01	17	39	12	31	0
30385	EASTGTP	69.00	1	1.0000	1.0112	-25.52	30	306	0.0000	0.0000	97	01	9	39	12	31	0
30386	UCM	69.00	1	1.0000	1.0119	-25.51	30	306	0.0000	0.0000	97	01	17	39	12	31	0
30387	UCM TAP	69.00	1	1.0000	1.0127	-25.36	30	306	0.0000	0.0000	97	01	17	39	12	31	0
30388	BARRETTP	69.00	1	1.0000	1.0171	-30.59	30	308	0.0000	0.0000	97	01	17	39	12	31	0
30389	GNESEETP	69.00	1	1.0000	1.0120	-25.48	30	306	0.0000	0.0000	40	01	1	39	12	31	0

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2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	2166	PALOVRDE	500.0	30172	N.GILA	500.0	1	1	1	20	303	2	30	0.0000	0.0001	0.0000	0	1212.4	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	2166	PALOVRDE	500.0	30172	N.GILA	500.0	1	2	1	20	303	2	30	0.0012	0.0269	0.0000	0	1212.4	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	2166	PALOVRDE	500.0	30172	N.GILA	500.0	1	3	1	20	303	2	30	0.0000	-0.0135	0.0000	0	1212.4	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	30001	BATIQTOS	138.0	30044	MDWLRKTP	138.0	1	1	1	303	303	30	30	0.0006	0.0074	0.0038	0	478.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30001	BATIQTOS	138.0	30359	BATIQTP	138.0	1	1	1	303	303	30	30	0.0003	0.0013	0.0150	0	195.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30003	CALAVRTP	138.0	30019	ENCINA	138.0	1	1	1	303	303	30	30	0.0018	0.0136	0.0076	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30003	CALAVRTP	138.0	30069	SANLUSRY	138.0	1	1	1	303	303	30	30	0.0021	0.0160	0.0047	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30003	CALAVRTP	138.0	30349	SHADOWR	138.0	1	1	1	303	303	30	30	0.0043	0.0152	0.0034	0	112.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30005	CAPSTRNO	138.0	30036	LAGNA NL	138.0	1	1	1	303	303	30	30	0.0044	0.0115	0.0033	0	136.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30005	CAPSTRNO	138.0	30093	TRABUCO	138.0	1	1	1	303	303	30	30	0.0018	0.0132	0.0045	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30005	CAPSTRNO	138.0	30329	PICO	138.0	1	1	1	303	306	30	30	0.0051	0.0261	0.0069	0	204.1	0.0	0.0	0.0	1.00	0.00	0	97	12	17	39	12	31
30	30007	CARLTNHS	138.0	30006	CARLTHTP	138.0	1	1	1	303	303	30	30	0.0007	0.0059	0.0016	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30008	CHCARITA	138.0	30006	CARLTHTP	138.0	1	1	1	303	303	30	30	0.0085	0.0431	0.0119	0	204.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30008	CHCARITA	138.0	30044	MDWLRKTP	138.0	1	1	1	303	303	30	30	0.0086	0.0473	0.0131	0	204.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30011	CORONADO	69.0	30350	B TP	69.0	1	1	1	301	301	30	30	0.0000	0.0000	0.0003	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30014	DIVISION	69.0	30176	NAVSTMTR	69.0	1	1	1	301	301	30	30	0.0027	0.0079	0.0010	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30016	DOUBLET	138.0	30017	DOUBLTTP	138.0	1	1	1	303	303	30	30	0.0014	0.0050	0.0014	0	136.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30017	DOUBLTTP	138.0	30052	MISSION	138.0	1	1	0	303	303	30	30	0.0097	0.0501	0.0134	0	150.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30017	DOUBLTTP	138.0	30057	PENSQTOS	138.0	1	1	1	303	303	30	30	0.0004	0.0019	0.0030	0	204.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30017	DOUBLTTP	138.0	30357	FRIARS	138.0	1	1	1	303	301	30	30	0.0088	0.0463	0.0125	0	150.8	0.0	0.0	0.0	1.00	0.00	0	97	12	17	39	12	31
30	30019	ENCINA	138.0	30004	CANNON	138.0	1	1	1	303	303	30	30	0.0000	0.0004	0.0002	0	478.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30019	ENCINA	138.0	30227	PALOMAR	138.0	1	1	1	303	303	30	30	0.0007	0.0080	0.0041	0	478.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30019	ENCINA	138.0	30327	NORTHCTY	138.0	1	1	1	303	303	30	30	0.0036	0.0372	0.0226	0	478.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30019	ENCINA	138.0	30359	BATIQTP	138.0	1	1	1	303	303	30	30	0.0019	0.0151	0.0086	0	408.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30020	ENCINA	230.0	34182	S.ONOFRE	230.0	1	1	1	303	340	30	34	0.0022	0.0255	0.1042	0	796.7	912.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30028	ESCNDIDO	230.0	30020	ENCINA	230.0	1	1	1	303	303	30	30	0.0012	0.0156	0.0627	0	796.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30028	ESCNDIDO	230.0	30092	TALEGA	230.0	1	1	1	303	303	30	30	0.0094	0.0729	0.1510	0	456.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30030	ESCNDO51	138.0	30354	NCMETRTP	138.0	1	1	1	303	303	30	30	0.0084	0.0290	0.0068	0	112.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30032	IMPRLVLY	230.0	12063	ROA-230	230.0	1	1	1	303	1	30	12	0.0018	0.0136	0.0258	0	408.3	0.0	0.0	0.0	0.50	0.00	0	40	01	1	39	12	31
30	30033	IMPRLVLY	500.0	30048	MIGUEL	500.0	1	1	1	303	303	30	30	0.0000	-0.0102	0.0000	0	1066.9	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	30033	IMPRLVLY	500.0	30048	MIGUEL	500.0	1	2	1	303	303	30	30	0.0008	0.0201	1.4783	0	1066.9	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	30034	KEARNY	69.0	30051	MISSION	69.0	1	1	1	307	307	30	30	0.0125	0.0563	0.0030	0	136.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30034	KEARNY	69.0	30117	CLARMTTP	69.0	1	1	1	307	306	30	30	0.0084	0.0408	0.0015	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30034	KEARNY	69.0	30139	GENDYNTP	69.0	1	1	1	307	307	30	30	0.0012	0.0081	0.0002	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30037	LOSCOCHS	138.0	30006	CARLTHTP	138.0	1	1	1	303	303	30	30	0.0073	0.0322	0.0132	0	273.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30037	LOSCOCHS	138.0	30082	SOUTHBAY	138.0	1	1	1	303	303	30	30	0.0288	0.0905	0.0300	0	204.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30040	MAIN ST	69.0	30216	URBAN	69.0	1	1	1	301	301	30	30	0.0044	0.0157	0.0028	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30042	MAINST50	138.0	30082	SOUTHBAY	138.0	1	1	1	303	303	30	30	0.0037	0.0274	0.0074	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30043	MAINST51	138.0	30082	SOUTHBAY	138.0	1	1	1	303	303	30	30	0.0027	0.0149	0.0037	0	300.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30044	MDWLRKTP	138.0	30354	NCMETRTP	138.0	1	1	1	303	303	30	30	0.0003	0.0010	0.0002	0	112.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30045	MIGUEL	69.0	30107	BORDER	69.0	1	1	1	309	302	30	30	0.0209	0.1398	0.0035	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30045	MIGUEL	69.0	30143	GRANITTP	69.0	1	1	1	309	308	30	30	0.0342	0.1738	0.0029	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30045	MIGUEL	69.0	30147	JAMACHA	69.0	1	1	1	309	309	30	30	0.0157	0.1053	0.0026	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30045	MIGUEL	69.0	30147	JAMACHA	69.0	2	1	1	309	309	30	30	0.0157	0.1068	0.0026	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30047	MIGUEL	230.0	12023	TJI-230	230.0	1	1	1	303	1	30	12	0.0012	0.0097	0.0770	0	796.7	0.0	0.0	0.0	0.50	0.00	0	40	01	1	39	12	31
30	30047	MIGUEL	230.0	30053	MISSION	230.0	1	1	1	303	303	30	30	0.0029	0.0319	0.1517	0	796.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30047	MIGUEL	230.0	30090	SYCAMORE	230.0	1	1	1	303	303	30	30	0.0024	0.0281	0.1138	0	796.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30048	MIGUEL	500.0	30162	MIGUELMP	500.0	1	1	1	303	303	30	30	0.0000	0.0118	0.0000	0	1066.9	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30051	MISSION	69.0	30128	ELLIOTT	69.0	1	1	1	307	307	30	30	0.0072	0.0301	0.0022	0	136.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30051	MISSION	69.0	30133	F	69.0	1	1	1	307	307	30	30	0.0050	0.0176	0.0012	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30051	MISSION	69.0	30133	F	69.0	2	1	1	307	307	30	30	0.0079	0.0247	0.0014	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30051	MISSION	69.0	30171	MURRAY	69.0	1	1	1	307	307	30	30	0.0149	0.0933	0.0022	0	136.8	0.0	0.0	0.0	1.00	0.00	0	97	01	9	39	12	31
30	30051	MISSION	69.0	30171	MURRAY	69.0	2	1	1	307	307	30	30	0.0149	0.0933	0.0022	0	136.8	0.0	0.0	0.0	1.00	0.00	0	97	01	9	39	12	31
30	30051	MISSION	69.0	30370	FSHNVLTP	69.0	1	1	1	307	307	30	30	0.0110	0.0384	0.0006	0	56.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30052	MISSION	138.0	30007	CARLTNHS	138.0	1	1	1	303	303	30	30	0.0049	0.0239	0.0190	0	273.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30052	MISSION	138.0	30082	SOUTHBAY	138.0	1	1	1	303	303	30	30	0.0046	0.0340	0.0280	0	382.4	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30053	MISSION	230.0	34182	S.ONOFRE	230.0	1	1	1	303	340	30	34	0.0097	0.0754	0.1578	0	456.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30055	OLD TOWN	69.0	30149	KETTNER	69.0	1	1	1	301	301	30	30	0.0032	0.0215	0.0021	0	239.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30055	OLD TOWN	69.0	30190	POINTLMA	69.0	1	1	1	301	301	30	30	0.0070	0.0487	0.0010	0	111.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30055	OLD TOWN	69.0	30190	POINTLMA	69.0	2	1	1	301	301	30	30	0.0085	0.0387	0.0050	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30056	OLD TOWN	230.0	30053	MISSION	230.0	1	1	1	303	303	30	30	0.0007	0.0055	0.0113	0	456.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30056	OLD TOWN	230.0	30053	MISSION	230.0	2	1	1	303	303	30	30	0.0007	0.0055	0.0113	0	456.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30058	PENSQTOS	230.0	30020	ENCINA	230.0	1	1	1	303	303	30	30	0.0016	0.0187	0.0733	0	796.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30058	PENSQTOS	230.0	30056	OLD TOWN	230.0	1	1	1	303	303	30	30	0.0009	0.0081	0.0639	0	796.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30060	PRCTRVLY	138.0	30046	MIGUEL	138.0	1	1	1	303	303	30	30	0.0005	0.0038	0.0012	0	408.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30060	PRCTRVLY	138.0	30330	TELECYN	138.0	1	1	1	303	303	30	30	0.0010	0.0077	0.0037	0	408.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30067	SAMPSON	69.0	30011	CORONADO	69.0	1	1	1	301	301	30	30	0.0077	0.0340	0.0201	0	72.9	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30067	SAMPSON	69.0	30014	DIVISION	69.0	1	1	1	301	301	30	30	0.0053	0.0150	0.0010	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30067	SAMPSON	69.0	30040	MAIN ST	69.0	1	1	1	301	301	30	30	0.0003	0.0020	0.0000	0	239.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30067	SAMPSON	69.0	30040	MAIN ST	69.0	2	1	1	301	301	30	30	0.0002	0.0020	0.0000	0	239.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30067	SAMPSON	69.0	30114	CHOLASTP	69.0	1	1	1	301	301	30	30	0.0095	0.0265	0.0017	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30069	SANLUSRY	138.0	30004	CANNON	138.0	1	1	1	303	303	30	30	0.0032	0.0269	0.0081	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30069	SANLUSRY	138.0	30070	SANMATEO	138.0	1	1	1	303	303	30	30	0.0115	0.0801	0.0261	0	222.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30070	SANMATEO	138.0	30071	SANMTOTP	138.0	1	1	1	303	303	30	30	0.0022	0.0084	0.0055	0	228.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30071	SANMTOTP	138.0	30036	LAGNA NL	138.0	1	1	1	303	303	30	30	0.0055	0.0405	0.0109	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30081	SOUTHBAY	69.0	30146	IMPRLBCH	69.0	1	1	1	302	302	30	30	0.0132	0.0409	0.0008	0	55.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30081	SOUTHBAY	69.0	30168	MONTGMRY	69.0	1	1	1	302	302	30	30	0.0037	0.0158	0.0004	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30081	SOUTHBAY	69.0	30169	MONTGYTP	69.0	1	1	1	302	302	30	30	0.0034	0.0094	0.0006	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30081	SOUTHBAY	69.0	30180	OTAY	69.0	1	1	1	302	302	30	30	0.0114	0.0337	0.0022	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30081	SOUTHBAY	69.0	30180	OTAY	69.0	2	1	1	302	302	30	30	0.0099	0.0284	0.0010	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30081	SOUTHBAY	69.0	30211	SWEETWTR	69.0	1	1	1	302	302	30	30	0.0060	0.0361	0.0061	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30090	SYCAMORE	230.0	30028	ESCNDIDO	230.0	1	1	1	303	303	30	30	0.0021	0.0257	0.1029	0	796.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30091	TALEGA	138.0	30005	CAPSTRNO	138.0	1	1	0	303	303	30	30	0.0059	0.0304	0.0080	0	204.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30091	TALEGA	138.0	30071	SANMTOTP	138.0	1	1	1	303	303	30	30	0.0002	0.0013	0.0005	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30091	TALEGA	138.0	30093	TRABUCO	138.0	1	1	1	303	303	30	30	0.0055	0.0433	0.0128	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30091	TALEGA	138.0	30223	MARGARTA	138.0	1	1	1	303	303	30	30	0.0046	0.0335	0.0113	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30091	TALEGA	138.0	30329	PICO	138.0	1	1	1	303	306	30	30	0.0008	0.0043	0.0011	0	204.1	0.0	0.0	0.0	1.00	0.00	0	97	12	17	39	12	31
30	30092	TALEGA	230.0	34182	S.ONOFRE	230.0	1	1	1	303	340	30	34	0.0012	0.0096	0.0215	0	456.1	577.6	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30092	TALEGA	230.0	34182	S.ONOFRE	230.0	2	1	1	303	340	30	34	0.0012	0.0096	0.0215	0	456.1	577.6	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30095	ASH	69.0	30096	ASH TP	69.0	1	1	1	305	305	30	30	0.0048	0.0207	0.0004	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30097	AVCADOTP	69.0	30098	AVOCADO	69.0	1	1	1	304	304	30	30	0.0306	0.0742	0.0025	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30098	AVOCADO	69.0	30374	MNSRATTP	69.0	1	1	1	304	304	30	30	0.0257	0.0610	0.0048	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30099	B	69.0	30040	MAIN ST	69.0	1	1	1	301	301	30	30	0.0046	0.0202	0.0141	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30099	B	69.0	30040	MAIN ST	69.0	2	1	1	301	301	30	30	0.0030	0.0212	0.0184	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30099	B	69.0	30216	URBAN	69.0	1	1	1	301	301	30	30	0.0024	0.0125	0.0112	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30099	B	69.0	30350	B TP	69.0	1	1	1	301	301	30	30	0.0029	0.0062	0.0206	0	83.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30103	BERNARDO	69.0	30104	BERNDOTP	69.0	1	1	1	305	305	30	30	0.0137	0.0626	0.0015	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30103	BERNARDO	69.0	30135	FELCTATP	69.0	1	1	1	305	305	30	30	0.0154	0.0833	0.0020	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30103	BERNARDO	69.0	30192	R.CARMEL	69.0	1	1	1	305	305	30	30	0.0162	0.0426	0.0050	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30103	BERNARDO	69.0	30213	SYCAMORE	69.0	1	1	1	305	306	30	30	0.0269	0.2131	0.0047	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30105	BOLDRCRK	69.0	30362	BLDCRKTP	69.0	1	1	1	308	308	30	30	0.0010	0.0010	0.0000	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30106	BOLVRDTP	69.0	30110	BOULEVRD	69.0	1	1	1	308	308	30	30	0.2121	0.2197	0.0032	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30106	BOLVRDTP	69.0	30112	CAMERON	69.0	1	1	1	308	308	30	30	0.0797	0.0826	0.0012	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30106	BOLVRDTP	69.0	30371	GLNCLFTP	69.0	1	1	1	308	308	30	30	0.1097	0.1137	0.0164	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30107	BORDER	69.0	30108	BORDERTP	69.0	1	1	1	302	302	30	30	0.0050	0.0329	0.0009	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30109	BORREGO	69.0	30173	NARROWS	69.0	1	1	1	305	305	30	30	0.1085	0.1865	0.0035	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30111	CABRILLO	69.0	30190	POINTLMA	69.0	1	1	1	301	301	30	30	0.0170	0.0395	0.0085	0	54.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30111	CABRILLO	69.0	30190	POINTLMA	69.0	2	1	1	301	301	30	30	0.0150	0.0270	0.0138	0	54.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30111	CABRILLO	69.0	30365	CABRLNVY	69.0	1	1	1	301	301	30	30	0.0000	0.0000	0.0002	0	43.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30115	CHOLLAS	69.0	30114	CHOLASTP	69.0	1	1	1	309	301	30	30	0.0117	0.0825	0.0019	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30115	CHOLLAS	69.0	30207	SPRNGVLY	69.0	1	1	1	309	309	30	30	0.0183	0.0503	0.0008	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30116	CLAIRMNT	69.0	30117	CLARMTTP	69.0	1	1	1	307	306	30	30	0.0045	0.0126	0.0002	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30116	CLAIRMNT	69.0	30370	FSHNVLTP	69.0	1	1	1	307	307	30	30	0.0338	0.0980	0.0016	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30118	CREELMAN	69.0	30155	LOSCOCHS	69.0	1	1	1	308	308	30	30	0.0264	0.1646	0.0038	0	136.8	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30118	CREELMAN	69.0	30213	SYCAMORE	69.0	1	1	1	308	306	30	30	0.0311	0.2119	0.0055	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30120	CRSTNTS	69.0	30383	TALEGATP	69.0	1	1	1	304	304	30	30	0.0040	0.0109	0.0002	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30121	DEL MAR	69.0	30122	DELMARTP	69.0	1	1	1	306	306	30	30	0.0272	0.0888	0.0019	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30121	DEL MAR	69.0	30189	PENSQTOS	69.0	1	1	1	306	306	30	30	0.0194	0.0722	0.0270	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30123	DESCANSO	69.0	30371	GLNCLFTP	69.0	1	1	1	308	308	30	30	0.1987	0.2041	0.0030	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30123	DESCANSO	69.0	30388	BARRETTP	69.0	1	1	1	308	308	30	30	0.1046	0.1505	0.0022	0	32.3	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30124	DOUBLTTP	69.0	30122	DELMARTP	69.0	1	1	1	306	306	30	30	0.0020	0.0126	0.0003	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30126	EL CAJON	69.0	30142	GRANITE	69.0	1	1	1	308	308	30	30	0.0092	0.0633	0.0021	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30126	EL CAJON	69.0	30147	JAMACHA	69.0	1	1	1	308	309	30	30	0.0095	0.0624	0.0016	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30126	EL CAJON	69.0	30155	LOSCOCHS	69.0	1	1	1	308	308	30	30	0.0468	0.1231	0.0066	0	55.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30128	ELLIOTT	69.0	30201	SANTEE	69.0	1	1	1	307	308	30	30	0.0617	0.1709	0.0028	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30129	ENCNITAS	69.0	30121	DEL MAR	69.0	1	1	1	306	306	30	30	0.0210	0.0898	0.0026	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30129	ENCNITAS	69.0	30189	PENSQTOS	69.0	1	1	1	306	306	30	30	0.0360	0.1823	0.0031	0	71.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30095	ASH	69.0	1	1	1	305	305	30	30	0.0108	0.0465	0.0010	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30104	BERNDOTP	69.0	1	1	1	305	305	30	30	0.0223	0.0991	0.0022	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30131	ESCO	69.0	1	1	1	305	305	30	30	0.0064	0.0274	0.0006	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30135	FELCTATP	69.0	1	1	1	305	305	30	30	0.0141	0.0610	0.0015	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30136	FELICITA	69.0	1	1	1	305	305	30	30	0.0154	0.0680	0.0031	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30154	LILAC	69.0	1	1	1	305	305	30	30	0.0451	0.1272	0.0179	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30130	ESCNDIDO	69.0	30200	SANMRCOS	69.0	1	1	1	305	305	30	30	0.0107	0.0707	0.0110	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30131	ESCO	69.0	30218	WARCYNTP	69.0	1	1	1	305	305	30	30	0.0301	0.1285	0.0031	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30131	ESCO	69.0	30347	GOALLINE	69.0	1	1	1	305	305	30	30	0.0024	0.0105	0.0003	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30135	FELCTATP	69.0	30136	FELICITA	69.0	1	1	1	305	305	30	30	0.0003	0.0007	0.0004	0	72.9	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30136	FELICITA	69.0	30096	ASH TP	69.0	1	1	1	305	305	30	30	0.0188	0.0814	0.0035	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30138	GEN DYNM	69.0	30139	GENDYNTP	69.0	1	1	1	307	307	30	30	0.0012	0.0029	0.0000	0	43.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30140	GENESEE	69.0	30386	UCM	69.0	1	1	1	306	306	30	30	0.0008	0.0054	0.0060	0	97.5	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30140	GENESEE	69.0	30387	UCM TAP	69.0	1	1	0	306	306	30	30	0.0046	0.0154	0.0007	0	136.5	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30141	GLENCLIF	69.0	30371	GLNCLFTP	69.0	1	1	1	308	308	30	30	0.0008	0.0009	0.0000	0	32.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30142	GRANITE	69.0	30143	GRANITTP	69.0	1	1	1	308	308	30	30	0.0046	0.0298	0.0013	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30144	HORNO	69.0	30145	HORNO TP	69.0	1	1	1	304	304	30	30	0.0238	0.0574	0.0012	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30145	HORNO TP	69.0	30148	JAP MESA	69.0	1	1	1	304	304	30	30	0.0550	0.0790	0.0012	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30146	IMPRLBCH	69.0	30181	OTAY TP	69.0	1	1	1	302	302	30	30	0.0176	0.0519	0.0010	0	55.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30147	JAMACHA	69.0	30207	SPRNGVLY	69.0	1	1	1	309	309	30	30	0.0175	0.0512	0.0009	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30148	JAP MESA	69.0	30383	TALEGATP	69.0	1	1	1	304	304	30	30	0.0630	0.1312	0.0022	0	24.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30149	KETTNER	69.0	30099	B	69.0	1	1	1	301	301	30	30	0.0012	0.0078	0.0122	0	195.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30151	KYOCRATP	69.0	30139	GENDYNTP	69.0	1	1	1	307	307	30	30	0.0006	0.0038	0.0000	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30151	KYOCRATP	69.0	30150	KYOCERA	69.0	1	1	1	307	307	30	30	0.0017	0.0114	0.0003	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30152	LA JOLLA	69.0	30196	ROSCYNTP	69.0	1	1	1	306	306	30	30	0.0177	0.0351	0.0120	0	54.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30152	LA JOLLA	69.0	30197	ROSE CYN	69.0	1	1	1	306	306	30	30	0.0163	0.0278	0.0141	0	54.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30153	LASPULGS	69.0	30145	HORNO TP	69.0	1	1	1	304	304	30	30	0.0247	0.0356	0.0005	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30154	LILAC	69.0	30186	PALA TP	69.0	1	1	1	305	304	30	30	0.0195	0.1561	0.0027	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30155	LOSCOCHS	69.0	30094	ALPINE	69.0	1	1	1	308	308	30	30	0.0419	0.1058	0.0029	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30155	LOSCOCHS	69.0	30143	GRANITTP	69.0	1	1	1	308	308	30	30	0.0163	0.0838	0.0014	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30155	LOSCOCHS	69.0	30156	LOVELAND	69.0	1	1	1	308	308	30	30	0.0356	0.1441	0.0044	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30155	LOSCOCHS	69.0	30201	SANTEE	69.0	1	1	1	308	308	30	30	0.0454	0.1250	0.0020	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30156	LOVELAND	69.0	30094	ALPINE	69.0	1	1	1	308	308	30	30	0.0280	0.0379	0.0007	0	43.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30156	LOVELAND	69.0	30388	BARRETTP	69.0	1	1	1	308	308	30	30	0.0190	0.0909	0.0017	0	102.1	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30157	MELROSE	69.0	30158	MELRSETP	69.0	1	1	1	304	304	30	30	0.0116	0.0490	0.0012	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30157	MELROSE	69.0	30198	SANLUSRY	69.0	1	1	1	304	304	30	30	0.0161	0.0722	0.0032	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30158	MELRSETP	69.0	30198	SANLUSRY	69.0	1	1	1	304	304	30	30	0.0137	0.0619	0.0022	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30158	MELRSETP	69.0	30200	SANMRCOS	69.0	1	1	1	304	305	30	30	0.0197	0.0842	0.0020	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30159	MESA RIM	69.0	30164	MIRAMAR	69.0	1	1	1	306	306	30	30	0.0066	0.0437	0.0030	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30160	MESAHGTS	69.0	30051	MISSION	69.0	1	1	1	307	307	30	30	0.0119	0.0349	0.0031	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30160	MESAHGTS	69.0	30151	KYOCRATP	69.0	1	1	1	307	307	30	30	0.0016	0.0108	0.0009	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30163	MIGUELTP	69.0	30045	MIGUEL	69.0	1	1	1	309	309	30	30	0.0088	0.0571	0.0016	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30164	MIRAMAR	69.0	30189	PENSQTOS	69.0	1	1	1	306	306	30	30	0.0173	0.1274	0.0053	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30164	MIRAMAR	69.0	30205	SCRIPPS	69.0	1	1	1	306	306	30	30	0.0132	0.0323	0.0009	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30164	MIRAMAR	69.0	30369	PENTONTP	69.0	1	1	1	306	306	30	30	0.0030	0.0200	0.0005	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30165	MIRAMRGT	69.0	30166	MIRAMRTP	69.0	1	1	1	306	306	30	30	0.0217	0.0573	0.0012	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30165	MIRAMRGT	69.0	30369	PENTONTP	69.0	1	1	1	306	306	30	30	0.0040	0.0265	0.0007	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30167	MONSRATE	69.0	30097	AVCADOTP	69.0	1	1	1	304	304	30	30	0.0034	0.0147	0.0004	0	71.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30167	MONSRATE	69.0	30374	MNSRATTP	69.0	1	1	1	304	304	30	30	0.0003	0.0012	0.0000	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30167	MONSRATE	69.0	30375	MORHILTP	69.0	1	1	1	304	304	30	30	0.0243	0.1099	0.0024	0	102.0	0.0	0.0	0.0	1.00	0.00	0	97	01	9	39	12	31
30	30168	MONTGMRY	69.0	30169	MONTGYTP	69.0	1	1	1	302	302	30	30	0.0000	0.0012	0.0000	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30171	MURRAY	69.0	30126	EL CAJON	69.0	1	1	1	307	308	30	30	0.0101	0.0427	0.0010	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30172	N.GILA	500.0	30033	IMPRLVLY	500.0	1	1	1	303	303	30	30	0.0008	0.0193	1.4381	0	1212.4	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	30172	N.GILA	500.0	30033	IMPRLVLY	500.0	1	2	1	303	303	30	30	0.0000	-0.0099	0.0000	0	1212.4	0.0	0.0	0.0	0.86	0.00	0	40	01	1	39	12	31
30	30173	NARROWS	69.0	30220	WARNERS	69.0	1	1	1	305	305	30	30	0.2440	0.4135	0.0063	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30174	NATLCYTP	69.0	30114	CHOLASTP	69.0	1	1	1	301	301	30	30	0.0006	0.0039	0.0004	0	273.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30175	NATNLCTY	69.0	30174	NATLCYTP	69.0	1	1	1	301	301	30	30	0.0019	0.0085	0.0002	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30175	NATNLCTY	69.0	30212	SWTWTRTP	69.0	1	1	1	301	301	30	30	0.0014	0.0062	0.0085	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30178	OCNSDETP	69.0	30177	OCEANSDE	69.0	1	1	1	304	304	30	30	0.0082	0.0161	0.0055	0	54.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30178	OCNSDETP	69.0	30198	SANLUSRY	69.0	1	1	1	304	304	30	30	0.0256	0.0711	0.0015	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30178	OCNSDETP	69.0	30381	STUARTTP	69.0	1	1	1	304	304	30	30	0.0429	0.0616	0.0009	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30180	OTAY	69.0	30181	OTAY TP	69.0	1	1	1	302	302	30	30	0.0010	0.0064	0.0002	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30180	OTAY	69.0	30183	OTAYLKTP	69.0	1	1	1	302	302	30	30	0.0127	0.0371	0.0006	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30182	OTAYLAKE	69.0	30108	BORDERTP	69.0	1	1	1	302	302	30	30	0.0043	0.0111	0.0002	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30183	OTAYLKTP	69.0	30108	BORDERTP	69.0	1	1	1	302	302	30	30	0.0317	0.0818	0.0015	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30184	PACFCBCH	69.0	30055	OLD TOWN	69.0	1	1	1	301	301	30	30	0.0088	0.0612	0.0137	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30185	PALA	69.0	30186	PALA TP	69.0	1	1	1	304	304	30	30	0.0000	0.0000	0.0002	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30186	PALA TP	69.0	30374	MNSRATTP	69.0	1	1	1	304	304	30	30	0.0473	0.1172	0.0024	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30187	PARADISE	69.0	30045	MIGUEL	69.0	1	1	1	309	309	30	30	0.0124	0.0806	0.0021	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30187	PARADISE	69.0	30115	CHOLLAS	69.0	1	1	1	309	309	30	30	0.0093	0.0289	0.0015	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30187	PARADISE	69.0	30382	SUNYSDTP	69.0	1	1	1	309	309	30	30	0.0090	0.0374	0.0020	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30188	PENDLETN	69.0	30097	AVCADOTP	69.0	1	1	1	304	304	30	30	0.0166	0.0712	0.0017	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30188	PENDLETN	69.0	30198	SANLUSRY	69.0	1	1	1	304	304	30	30	0.0236	0.1037	0.0024	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30189	PENSQTOS	69.0	30122	DELMARTP	69.0	1	1	1	306	306	30	30	0.0012	0.0068	0.0051	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30189	PENSQTOS	69.0	30140	GENESEE	69.0	1	1	1	306	306	30	30	0.0081	0.0434	0.0027	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30189	PENSQTOS	69.0	30159	MESA RIM	69.0	1	1	1	306	306	30	30	0.0112	0.0845	0.0060	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30189	PENSQTOS	69.0	30166	MIRAMRTP	69.0	1	1	1	306	306	30	30	0.0071	0.0327	0.0032	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30189	PENSQTOS	69.0	30214	TORREYPNS	69.0	1	1	1	306	306	30	30	0.0057	0.0354	0.0008	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30189	PENSQTOS	69.0	30387	UCM TAP	69.0	1	1	1	306	306	30	30	0.0058	0.0321	0.0027	0	97.5	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30189	PENSQTOS	69.0	30389	GNESEETP	69.0	1	1	1	306	306	30	30	0.0048	0.0322	0.0015	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30191	POWAY	69.0	30192	R.CARMEL	69.0	1	1	1	305	305	30	30	0.0072	0.0392	0.0019	0	137.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30191	POWAY	69.0	30218	WARCYNTP	69.0	1	1	1	305	305	30	30	0.0096	0.0409	0.0010	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30191	POWAY	69.0	30228	POMERADO	69.0	1	1	1	305	305	30	30	0.0049	0.0322	0.0011	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30193	R.SNTAFE	69.0	30194	R.SNTATP	69.0	1	1	1	306	306	30	30	0.0500	0.0662	0.0009	0	27.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30194	R.SNTATP	69.0	30121	DEL MAR	69.0	1	1	1	306	306	30	30	0.0030	0.0137	0.0006	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30194	R.SNTATP	69.0	30189	PENSQTOS	69.0	1	1	1	306	306	30	30	0.0149	0.0643	0.0014	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30195	RINCON	69.0	30096	ASH TP	69.0	1	1	1	305	305	30	30	0.0424	0.1875	0.0042	0	71.7	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30195	RINCON	69.0	30154	LILAC	69.0	1	1	1	305	305	30	30	0.0555	0.1430	0.0030	0	55.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30196	ROSCYNTP	69.0	30184	PACFCBCH	69.0	1	1	1	306	301	30	30	0.0129	0.0877	0.0021	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30196	ROSCYNTP	69.0	30197	ROSE CYN	69.0	1	1	1	306	306	30	30	0.0001	0.0007	0.0002	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30197	ROSE CYN	69.0	30117	CLARMTTP	69.0	1	1	1	306	306	30	30	0.0097	0.0273	0.0018	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30197	ROSE CYN	69.0	30189	PENSQTOS	69.0	1	1	0	306	306	30	30	0.0147	0.0990	0.0047	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30198	SANLUSRY	69.0	30177	OCEANSDE	69.0	1	1	1	304	304	30	30	0.0312	0.0881	0.0027	0	54.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30202	SANTYSBL	69.0	30118	CREELMAN	69.0	1	1	1	308	308	30	30	0.1580	0.2386	0.0036	0	43.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30203	SANYSDRO	69.0	30181	OTAY TP	69.0	1	1	1	302	302	30	30	0.0201	0.0561	0.0018	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30208	STREAMVW	69.0	30115	CHOLLAS	69.0	1	1	1	309	309	30	30	0.0042	0.0275	0.0007	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30209	STUART	69.0	30381	STUARTTP	69.0	1	1	1	304	304	30	30	0.0000	0.0000	0.0000	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30210	SUNYSIDE	69.0	30382	SUNYSDTP	69.0	1	1	1	309	309	30	30	0.0002	0.0004	0.0000	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30211	SWEETWTR	69.0	30163	MIGUELTP	69.0	1	1	1	302	309	30	30	0.0113	0.0681	0.0161	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30211	SWEETWTR	69.0	30169	MONTGYTP	69.0	1	1	1	302	302	30	30	0.0068	0.0262	0.0010	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30211	SWEETWTR	69.0	30174	NATLCYTP	69.0	1	1	1	302	301	30	30	0.0038	0.0110	0.0007	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30212	SWTWTRTP	69.0	30211	SWEETWTR	69.0	1	1	1	301	302	30	30	0.0039	0.0126	0.0007	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30213	SYCAMORE	69.0	30128	ELLIOTT	69.0	1	1	1	306	307	30	30	0.0476	0.1154	0.0035	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30213	SYCAMORE	69.0	30205	SCRIPPS	69.0	1	1	1	306	306	30	30	0.0145	0.0906	0.0021	0	136.8	0.0	0.0	0.0	1.00	0.00	0	97	01	22	39	12	31
30	30214	TORREYPNS	69.0	30368	DUNHILTP	69.0	1	1	1	306	306	30	30	0.0018	0.0111	0.0003	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30217	WABASH	69.0	30040	MAIN ST	69.0	1	1	1	301	301	30	30	0.0192	0.0558	0.0035	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30217	WABASH	69.0	30067	SAMPSON	69.0	1	1	1	301	301	30	30	0.0116	0.0314	0.0097	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30217	WABASH	69.0	30208	STREAMVW	69.0	1	1	1	301	309	30	30	0.0052	0.0355	0.0008	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30219	WARENCYN	69.0	30218	WARCYNTP	69.0	1	1	1	305	305	30	30	0.0249	0.0365	0.0006	0	43.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30220	WARNERS	69.0	30195	RINCON	69.0	1	1	1	305	305	30	30	0.2188	0.3350	0.0052	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30220	WARNERS	69.0	30202	SANTYSBL	69.0	1	1	1	305	308	30	30	0.1307	0.1855	0.0029	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30223	MARGARTA	138.0	30093	TRABUCO	138.0	1	1	1	303	303	30	30	0.0018	0.0129	0.0350	0	195.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30226	NOISLMTR	69.0	30011	CORONADO	69.0	1	1	1	301	301	30	30	0.0007	0.0050	0.0057	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30226	NOISLMTR	69.0	30350	B TP	69.0	1	1	1	301	301	30	30	0.0007	0.0052	0.0059	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30227	PALOMAR	138.0	30001	BATIQTOS	138.0	1	1	1	303	303	30	30	0.0006	0.0079	0.0042	0	478.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30228	POMERADO	69.0	30213	SYCAMORE	69.0	1	1	1	305	306	30	30	0.0036	0.0236	0.0022	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30228	POMERADO	69.0	30213	SYCAMORE	69.0	2	1	1	305	306	30	30	0.0036	0.0236	0.0022	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30233	BARRETT	69.0	30112	CAMERON	69.0	1	1	1	308	308	30	30	0.0882	0.1957	0.0047	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30233	BARRETT	69.0	30388	BARRETTP	69.0	1	1	1	308	308	30	30	0.0859	0.1289	0.0018	0	32.3	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30327	NORTHCTY	138.0	30057	PENSQTOS	138.0	1	1	1	303	303	30	30	0.0007	0.0084	0.0042	0	382.4	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30330	TELECYN	138.0	30082	SOUTHBAY	138.0	1	1	1	303	303	30	30	0.0026	0.0200	0.0097	0	382.4	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30344	TALEGA	69.0	30383	TALEGATP	69.0	1	1	1	304	304	30	30	0.0001	0.0009	0.0000	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30349	SHADOWR	138.0	30029	ESCNDO50	138.0	1	1	1	303	303	30	30	0.0133	0.0464	0.0106	0	112.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30353	NCMETER	138.0	30354	NCMETRTP	138.0	1	1	1	303	303	30	30	0.0006	0.0015	0.0004	0	112.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30357	FRIARS	138.0	30052	MISSION	138.0	1	1	1	301	303	30	30	0.0009	0.0038	0.0009	0	150.8	0.0	0.0	0.0	1.00	0.00	0	97	12	17	39	12	31
30	30359	BATIQTP	138.0	30057	PENSQTOS	138.0	1	1	1	303	303	30	30	0.0062	0.0456	0.0268	0	382.4	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30362	BLDCRKTP	69.0	30123	DESCANSO	69.0	1	1	1	308	308	30	30	0.1403	0.2017	0.0031	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30362	BLDCRKTP	69.0	30202	SANTYSBL	69.0	1	1	1	308	308	30	30	0.0809	0.1147	0.0018	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30367	DOUBLET	69.0	30124	DOUBLTTP	69.0	1	1	1	306	306	30	30	0.0000	0.0000	0.0000	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30368	DUNHILTP	69.0	30124	DOUBLTTP	69.0	1	1	1	306	306	30	30	0.0004	0.0025	0.0001	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30368	DUNHILTP	69.0	30125	DUNHILL	69.0	1	1	1	306	306	30	30	0.0000	0.0000	0.0000	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30369	FENTONTP	69.0	30137	FENTON	69.0	1	1	1	306	306	30	30	0.0000	0.0000	0.0000	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30370	FSHNVLTP	69.0	30134	FASHNVLY	69.0	1	1	1	307	307	30	30	0.0000	0.0000	0.0000	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30375	MORHILTP	69.0	30170	MOROHILL	69.0	1	1	1	304	304	30	30	0.0000	0.0006	0.0000	0	68.2	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30375	MORHILTP	69.0	30198	SANLUSRY	69.0	1	1	1	304	304	30	30	0.0163	0.0747	0.0032	0	102.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30377	NCFOT2TP	69.0	30212	SWTWTRTP	69.0	1	1	1	301	301	30	30	0.0012	0.0032	0.0000	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30377	NCFOT2TP	69.0	30376	NCFOT2	69.0	1	1	1	301	301	30	30	0.0137	0.0193	0.0003	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30378	SANYSDTP	69.0	30183	OTAYLKTP	69.0	1	1	1	302	302	30	30	0.0100	0.0273	0.0005	0	50.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30378	SANYSDTP	69.0	30203	SANYSDRO	69.0	1	1	1	302	302	30	30	0.0001	0.0004	0.0004	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	ZNFR	ZNTO	AFR	ATO	(-R-PU-	---X-PU)	--B-PU-	OWN	-MVA1-	-MVA2-	-MVA3-	-MVA4-	ALOSS	LENGTH	TP	YI	MI	DI	YO	MO	DO
30	30379	SCRAPTAP	69.0	30176	NAVSTMTR	69.0	1	1	1	301	301	30	30	0.0009	0.0028	0.0016	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30379	SCRAPTAP	69.0	30204	SCRAPDSP	69.0	1	1	1	301	301	30	30	0.0000	0.0000	0.0000	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30379	SCRAPTAP	69.0	30212	SWTWTRTP	69.0	1	1	1	301	301	30	30	0.0015	0.0042	0.0001	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30379	SCRAPTAP	69.0	30377	NCFOT2TP	69.0	1	1	1	301	301	30	30	0.0023	0.0064	0.0001	0	100.6	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30380	SNLSRYTP	230.0	30053	MISSION	230.0	1	1	1	303	303	30	30	0.0065	0.0499	0.1044	0	456.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30380	SNLSRYTP	230.0	30199	SANLUSRY	230.0	1	1	1	303	303	30	30	0.0000	0.0000	0.0003	0	456.1	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30380	SNLSRYTP	230.0	34182	S.ONOFRE	230.0	1	1	1	303	340	30	34	0.0016	0.0180	0.0734	0	796.7	912.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30381	STUARTTP	69.0	30153	LASPULGS	69.0	1	1	1	304	304	30	30	0.0608	0.0874	0.0013	0	32.3	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30382	SUNYSDTP	69.0	30163	MIGUELTP	69.0	1	1	1	309	309	30	30	0.0007	0.0027	0.0001	0	137.0	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30384	EASTGATE	69.0	30385	EASTGTP	69.0	1	1	1	306	306	30	30	0.0000	0.0002	0.0000	0	136.0	0.0	0.0	0.0	1.00	0.00	0	97	11	7	39	12	31
30	30385	EASTGTP	69.0	30166	MIRAMRTP	69.0	1	1	1	306	306	30	30	0.0022	0.0062	0.0001	0	50.3	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30385	EASTGTP	69.0	30197	ROSE CYN	69.0	1	1	1	306	306	30	30	0.0270	0.0728	0.0014	0	50.3	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30386	UCM	69.0	30387	UCM TAP	69.0	1	1	1	306	306	30	30	0.0009	0.0057	0.0108	0	97.5	0.0	0.0	0.0	1.00	0.00	0	97	01	17	39	12	31
30	30389	GNESEETP	69.0	30140	GENESEE	69.0	1	1	1	306	306	30	30	0.0010	0.0048	0.0052	0	97.5	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31
30	30389	GNESEETP	69.0	30197	ROSE CYN	69.0	1	1	1	306	306	30	30	0.0099	0.0668	0.0031	0	136.8	0.0	0.0	0.0	1.00	0.00	0	40	01	1	39	12	31

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2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	S	AFR	ATO	ZONE	ZFR	ZTO	MVA-	VnomF	VnomT	(--R--- | --X---)	--Bmag-	Tz	OWN	MVA1	MVA2	MVA3	MVA4	aloss	--TERT-	--------	-BKV
30	30011	CORONADO	69	30010	CORONADO	13	1	1	30	30	301	301	301	100	69.0	12.5	0.0007	0.1675	0.0000	0	0	84	0	0	0	1	0		0
30	30014	DIVISION	69	30015	DIVISNGT	13	1	1	30	30	301	301	301	100	69.0	12.5	0.0000	0.3074	0.0000	0	0	53	0	0	0	1	0		0
30	30014	DIVISION	69	30358	NAVSTGT	13	1	1	30	30	301	301	301	100	69.0	12.5	0.0000	0.3074	0.0000	0	0	53	0	0	0	1	0		0
30	30019	ENCINA	138	30221	ENCINAGT	13	1	1	30	30	303	303	303	100	138.0	12.5	0.0043	0.6783	0.0000	0	0	20	0	0	0	1	0		0
30	30021	ENCINA 1	14	30019	ENCINA	138	1	1	30	30	303	303	303	100	14.4	138.0	0.0030	0.0902	0.0000	0	0	125	0	0	0	1	0		0
30	30022	ENCINA 2	14	30019	ENCINA	138	1	1	30	30	303	303	303	100	14.4	138.0	0.0064	0.1515	0.0000	0	0	134	0	0	0	1	0		0
30	30023	ENCINA 3	14	30019	ENCINA	138	1	1	30	30	303	303	303	100	14.4	138.0	0.0030	0.0903	0.0000	0	0	125	0	0	0	1	0		0
30	30024	ENCINA 4	22	30019	ENCINA	138	1	1	30	30	303	303	303	100	22.0	138.0	0.0009	0.0368	0.0000	0	0	310	0	0	0	1	0		0
30	30025	ENCINA 5	24	30020	ENCINA	230	1	1	30	30	303	303	303	100	24.0	230.0	0.0006	0.0215	0.0000	0	0	355	0	0	0	1	0		0
30	30029	ESCNDO50	138	30130	ESCNDIDO	69	2	1	30	30	305	303	305	63	132.0	69.0	0.0061	0.1390	0.0000	0	0	63	82	0	0	1	0		0
30	30030	ESCNDO51	138	30130	ESCNDIDO	69	1	1	30	30	305	303	305	63	132.0	69.0	0.0060	0.1390	0.0000	0	0	63	82	0	0	1	0		0
30	30032	IMPRLVLY	230	30033	IMPRLVLY	500		1	30	30	303	303	303	107	230.0	525.0	0.0003	0.0258	0.0000	0	0	600	732	0	0	1	0		0
30	30034	KEARNY	69	30035	KEARNYGT	13	1	1	30	30	307	307	307	100	69.0	12.5	0.0010	0.0679	0.0000	0	0	164	0	0	0	1	0		0
30	30037	LOSCOCHS	138	30155	LOSCOCHS	69	1	1	30	30	308	303	308	150	132.0	69.0	0.0045	0.1374	0.0000	0	0	150	180	0	0	1	0		0
30	30040	MAIN ST	69	30042	MAINST50	138	1	1	30	30	301	301	303	150	69.0	132.0	0.0048	0.1507	0.0000	0	0	150	200	0	0	1	0		0
30	30043	MAINST51	138	30040	MAIN ST	69	1	1	30	30	301	303	301	150	132.0	69.0	0.0047	0.1361	0.0000	0	0	150	199	0	0	1	0		0
30	30045	MIGUEL	69	30047	MIGUEL	230	1	1	30	30	303	309	303	120	67.0	220.0	0.0013	0.1261	0.0000	0	0	224	305	0	0	1	0		0
30	30045	MIGUEL	69	30047	MIGUEL	230	2	1	30	30	303	309	303	120	67.0	220.0	0.0013	0.1261	0.0000	0	0	224	305	0	0	1	0		0
30	30047	MIGUEL	230	30046	MIGUEL	138	1	1	30	30	303	303	303	350	220.0	138.0	0.0084	0.0799	0.0000	0	0	392	468	0	0	1	0		0
30	30047	MIGUEL	230	30162	MIGUELMP	500	1	1	30	30	303	303	303	600	230.0	525.0	0.0000	0.0480	0.0000	0	0	1120	1329	0	0	1	0		0
30	30052	MISSION	138	30051	MISSION	69	1	1	30	30	307	303	307	100	138.0	69.0	0.0016	0.0584	0.0000	0	0	224	134	0	0	1	0		0
30	30052	MISSION	138	30051	MISSION	69	2	1	30	30	307	303	307	100	138.0	69.0	0.0052	0.1133	0.0000	0	0	100	134	0	0	1	0		0
30	30052	MISSION	138	30051	MISSION	69	3	1	30	30	307	303	307	100	138.0	69.0	0.0016	0.0584	0.0000	0	0	224	277	0	0	1	0		0
30	30053	MISSION	230	30051	MISSION	69	1	1	30	30	307	303	307	120	220.0	67.0	0.0016	0.0851	0.0000	0	0	224	307	0	0	1	0		0
30	30053	MISSION	230	30052	MISSION	138	1	1	30	30	303	303	303	210	220.0	138.0	0.0013	0.0482	0.0000	0	0	392	502	0	0	1	0		0
30	30053	MISSION	230	30052	MISSION	138	2	1	30	30	303	303	303	210	220.0	138.0	0.0013	0.0482	0.0000	0	0	392	525	0	0	1	0		0
30	30055	OLD TOWN	69	30056	OLD TOWN	230	1	1	30	30	303	301	303	120	67.0	220.0	0.0017	0.0835	0.0000	0	0	224	269	0	0	1	0		0
30	30055	OLD TOWN	69	30056	OLD TOWN	230	2	1	30	30	303	301	303	120	67.0	220.0	0.0017	0.0835	0.0000	0	0	224	269	0	0	1	0		0
30	30055	OLD TOWN	69	30179	OLDTWNGT	13	1	1	30	30	301	301	301	100	69.0	12.5	0.0012	0.1155	0.0000	0	0	99	0	0	0	1	0		0
30	30057	PENSQTOS	138	30189	PENSQTOS	69	1	1	30	30	303	303	306	125	132.0	69.0	0.0022	0.1248	0.0000	0	0	140	159	0	0	1	0		0
30	30058	PENSQTOS	230	30189	PENSQTOS	69	1	1	30	30	306	303	306	120	220.0	70.3	0.0012	0.0850	0.0000	0	0	224	285	0	0	1	0		0
30	30058	PENSQTOS	230	30189	PENSQTOS	69	2	1	30	30	306	303	306	120	220.0	70.3	0.0014	0.0832	0.0000	0	0	224	269	0	0	1	0		0
30	30067	SAMPSON	69	30066	SAMPSON	13	1	1	30	30	301	301	301	100	69.0	12.5	0.0000	0.0880	0.0000	0	0	132	0	0	0	1	0		0
30	30069	SANLUSRY	138	30198	SANLUSRY	69	2	1	30	30	304	303	304	45	132.0	69.0	0.0055	0.1100	0.0000	0	0	60	77	0	0	1	0		0
30	30069	SANLUSRY	138	30198	SANLUSRY	69	3	1	30	30	304	303	304	75	132.0	69.0	0.0092	0.0734	0.0000	0	0	140	160	0	0	1	0		0
30	30069	SANLUSRY	138	30198	SANLUSRY	69	4	1	30	30	304	303	304	63	132.0	69.0	0.0060	0.1390	0.0000	0	0	63	87	0	0	1	0		0
30	30081	SOUTHBAY	69	30082	SOUTHBAY	138	1	1	30	30	303	302	303	75	69.0	132.0	0.0020	0.0743	0.0000	0	0	140	164	0	0	1	0		0
30	30081	SOUTHBAY	69	30229	SOUTHBGT	13	1	1	30	30	302	302	302	100	69.0	12.5	0.0000	0.6600	0.0000	0	0	25	0	0	0	1	0		0

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	S	AFR	ATO	ZONE	ZFR	ZTO	MVA-	VnomF	VnomT	(--R--- | --X---)	--Bmag-	Tz	OWN	MVA1	MVA2	MVA3	MVA4	aloss	--TERT-	--------	-BKV
30	30084	SOUTHBY1	15	30081	SOUTHBAY	69	1	1	30	30	302	303	302	100	15.0	69.0	0.0024	0.0697	0.0000	0	0	150	0	0	0	1	0		0
30	30085	SOUTHBY2	15	30082	SOUTHBAY	138	1	1	30	30	303	303	303	100	15.0	138.0	0.0026	0.0707	0.0000	0	0	150	0	0	0	1	0		0
30	30086	SOUTHBY3	20	30082	SOUTHBAY	138	1	1	30	30	303	303	303	100	20.0	138.0	0.0013	0.0536	0.0000	0	0	212	0	0	0	1	0		0
30	30087	SOUTHBY4	20	30082	SOUTHBAY	138	1	1	30	30	303	303	303	100	20.0	138.0	0.0011	0.0364	0.0000	0	0	240	0	0	0	1	0		0
30	30090	SYCAMORE	230	30213	SYCAMORE	69	1	1	30	30	306	303	306	120	220.0	70.3	0.0012	0.0860	0.0000	0	0	224	285	0	0	1	0		0
30	30092	TALEGA	230	30091	TALEGA	138	1	1	30	30	303	303	303	150	220.0	138.0	0.0018	0.0889	0.0000	0	0	168	195	0	0	1	0		0
30	30092	TALEGA	230	30091	TALEGA	138	2	1	30	30	303	303	303	150	220.0	138.0	0.0018	0.0920	0.0000	0	0	150	192	0	0	1	0		0
30	30092	TALEGA	230	30091	TALEGA	138	3	1	30	30	303	303	303	350	220.0	138.0	0.0012	0.0816	0.0000	0	0	392	492	0	0	1	0		0
30	30092	TALEGA	230	30091	TALEGA	138	4	1	30	30	303	303	303	350	220.0	138.0	0.0012	0.0816	0.0000	0	0	392	492	0	0	1	0		0
30	30126	EL CAJON	69	30127	ELCAJNGT	13	1	1	30	30	308	308	308	100	69.0	12.5	0.0052	0.1400	0.0000	0	0	112	0	0	0	1	0		0
30	30130	ESCNDIDO	69	30028	ESCNDIDO	230	1	1	30	30	303	305	303	120	67.0	220.0	0.0012	0.0873	0.0000	0	0	224	239	0	0	1	0		0
30	30130	ESCNDIDO	69	30028	ESCNDIDO	230	2	1	30	30	303	305	303	120	67.0	220.0	0.0019	0.0869	0.0000	0	0	224	239	0	0	1	0		0
30	30155	LOSCOCHS	69	30037	LOSCOCHS	138	2	1	30	30	308	308	303	75	69.0	132.0	0.0024	0.0754	0.0000	0	0	140	155	0	0	1	0		0
30	30161	MIGUEL	12	30162	MIGUELMP	500	1	1	30	30	303	309	303	100	12.0	500.0	0.0000	0.0494	0.0000	0	0	180	0	0	0	1	0		0
30	30165	MIRAMRGT	69	30224	MIRAMRGT	13	1	1	30	30	306	306	306	100	69.0	12.5	0.0030	0.3096	0.0000	0	0	50	0	0	0	1	0		0
30	30189	PENSQTOS	69	30057	PENSQTOS	138	2	1	30	30	303	306	303	75	69.0	132.0	0.0022	0.0757	0.0000	0	0	140	156	0	0	1	0		0
30	30189	PENSQTOS	69	30057	PENSQTOS	138	3	1	30	30	303	306	303	75	69.0	132.0	0.0022	0.0757	0.0000	0	0	140	164	0	0	1	0		0
30	30198	SANLUSRY	69	30199	SANLUSRY	230	1	1	30	30	303	304	303	120	67.0	220.0	0.0016	0.0848	0.0000	0	0	224	301	0	0	1	0		0
30	30344	TALEGA	69	30091	TALEGA	138	1	1	30	30	303	304	303	15	69.0	138.0	0.0037	0.1102	0.0000	0	0	25	37	0	0	1	0		0

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2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	BUS-NO-	--NAME--	--KV--	ID	ST	-PGEN-	-PMAX-	-QGEN-	-QMAX-	-QMIN-	--IREG-	--NAME--	--KV--	-QRF	-VSCHED	-V-ACT-	ZON	-MBASE	-PMIN-	-GTAP--	-R_TR---	-X_TR--	YI	MI	DI	YO	MO
30	30110	BOULEVRD	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30110	BOULEVRD	69.00	1.00	1.0000	0.9985	308	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30111	CABRILLO	69.00	1	1	1.0	1.0	0.0	0.0	0.0	30111	CABRILLO	69.00	1.00	1.0000	0.9877	301	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30014	DIVISION	69.00	1	1	47.0	47.0	0.0	0.0	0.0	30014	DIVISION	69.00	1.00	1.0000	1.0272	301	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30021	ENCINA 1	14.40	1	1	95.0	100.0	33.6	70.0	-20.0	30019	ENCINA	138.00	0.20	1.0180	1.0180	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30022	ENCINA 2	14.40	1	1	100.0	104.0	25.2	69.0	-20.0	30019	ENCINA	138.00	0.15	1.0180	1.0180	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30023	ENCINA 3	14.40	1	1	106.0	110.0	33.6	71.0	-20.0	30019	ENCINA	138.00	0.20	1.0180	1.0180	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30024	ENCINA 4	22.00	1	1	265.0	300.0	75.7	130.0	-40.0	30019	ENCINA	138.00	0.45	1.0180	1.0180	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30025	ENCINA 5	24.00	1	1	300.0	330.0	78.4	173.0	-40.0	30020	ENCINA	230.00	1.00	1.0000	1.0000	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30347	GOALLINE	69.00	1	1	49.0	49.0	0.0	0.0	0.0	30347	GOALLINE	69.00	1.00	1.0000	1.0111	305	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30150	KYOCERA	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30150	KYOCERA	69.00	1.00	1.0000	1.0166	307	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30164	MIRAMAR	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30164	MIRAMAR	69.00	1.00	1.0000	1.0051	306	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30171	MURRAY	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30171	MURRAY	69.00	1.00	1.0000	1.0184	307	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30226	NOISLMTR	69.00	1	1	33.0	33.0	0.0	0.0	0.0	30226	NOISLMTR	69.00	1.00	1.0000	1.0173	301	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30180	OTAY	69.00	1	1	3.5	3.5	0.0	0.0	0.0	30180	OTAY	69.00	1.00	1.0000	1.0311	302	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30190	POINTLMA	69.00	1	1	22.0	22.0	0.0	0.0	0.0	30190	POINTLMA	69.00	1.00	1.0000	0.9903	301	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30193	R.SNTAFE	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30193	R.SNTAFE	69.00	1.00	1.0000	0.9972	306	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30195	RINCON	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30195	RINCON	69.00	1.00	1.0000	0.9889	305	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30066	SAMPSON	12.50	1	1	11.0	11.0	0.0	0.0	0.0	30066	SAMPSON	12.50	1.00	1.0000	1.0253	301	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30200	SANMRCOS	69.00	1	1	1.5	1.5	0.0	0.0	0.0	30200	SANMRCOS	69.00	1.00	1.0000	0.9998	305	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30084	SOUTHBY1	15.00	1	1	138.0	143.0	24.3	58.0	-30.0	30081	SOUTHBAY	69.00	1.00	1.0363	1.0363	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30085	SOUTHBY2	15.00	1	1	138.0	150.0	37.1	71.0	-30.0	30082	SOUTHBAY	138.00	0.15	1.0145	1.0145	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30086	SOUTHBY3	20.00	1	1	170.0	175.0	61.9	120.0	-30.0	30082	SOUTHBAY	138.00	0.25	1.0145	1.0145	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30087	SOUTHBY4	20.00	1	1	155.9	220.0	148.5	164.0	-30.0	30082	SOUTHBAY	138.00	0.60	1.0145	1.0145	303	100.0	0.0	1.000	0.0000	0.0000	97	01	8	39	12
30	30211	SWEETWTR	69.00	1	1	0.5	0.5	0.0	0.0	0.0	30211	SWEETWTR	69.00	1.00	1.0000	1.0294	302	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30213	SYCAMORE	69.00	1	1	1.5	1.5	0.0	0.0	0.0	30213	SYCAMORE	69.00	1.00	1.0000	1.0310	306	100.0	0.0	1.000	0.0000	0.0000	40	01	1	39	12
30	30224	MIRAMRGT	12.50	1	1	39.0	39.0	0.0	0.0	0.0	30224	MIRAMRGT	12.50	1.00	1.0000	0.9617	301	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30358	NAVSTGT	12.50	1	0	23.0	23.0	0.0	0.0	0.0	30358	NAVSTGT	12.50	1.00	1.0000	1.0278	301	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30127	ELCAJNGT	12.50	1	0	16.0	16.0	0.0	0.0	0.0	30127	ELCAJNGT	12.50	1.00	1.0000	1.0706	301	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30035	KEARNYGT	12.50	1	1	83.0	148.0	0.0	0.0	0.0	30035	KEARNYGT	12.50	1.00	1.0000	1.0056	307	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30179	OLDTWNGT	12.50	1	0	16.0	16.0	0.0	0.0	0.0	30179	OLDTWNGT	12.50	1.00	1.0000	0.9906	307	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30221	ENCINAGT	12.50	1	0	16.0	16.0	0.0	0.0	0.0	30221	ENCINAGT	12.50	1.00	1.0000	1.0156	307	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30015	DIVISNGT	12.50	1	0	16.0	16.0	0.0	0.0	0.0	30015	DIVISNGT	12.50	1.00	1.0000	1.0278	307	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30229	SOUTHBGT	12.50	1	0	19.0	19.0	0.0	0.0	0.0	30229	SOUTHBGT	12.50	1.00	1.0000	1.0104	307	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12
30	30010	CORONADO	12.50	1	0	38.0	38.0	0.0	0.0	0.0	30010	CORONADO	12.50	1.00	1.0000	1.0395	307	100.0	0.0	1.000	0.0000	0.0000	97	10	20	39	12

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2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	BUS-NO-	--NAME--	--KV--	ID	ST	-PLOAD-	-QLOAD-	-IPLOD-	-IQLOD-	-GLOAD-	-BLOAD-	ZON	-PMOTR-	-QMOTR-	YI	MI	DI	YO	MO	DO	OWN
30	30094	ALPINE	69.00	1	1	24.51	3.12	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30095	ASH	69.00	1	1	50.53	6.43	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30098	AVOCADO	69.00	1	1	27.88	3.55	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30099	B	69.00	1	1	94.52	12.03	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30233	BARRETT	69.00	1	1	3.45	0.44	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30001	BATIQTOS	138.00	1	1	53.10	6.76	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30103	BERNARDO	69.00	1	1	102.93	13.10	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30107	BORDER	69.00	1	1	29.29	3.73	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30109	BORREGO	69.00	1	1	10.62	1.35	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30110	BOULEVRD	69.00	1	1	2.74	0.35	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30111	CABRILLO	69.00	1	1	6.55	0.83	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30365	CABRLNVY	69.00	1	1	21.86	2.78	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30112	CAMERON	69.00	1	1	2.74	0.35	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30004	CANNON	138.00	1	1	49.47	6.30	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30005	CAPSTRNO	138.00	1	1	54.43	6.93	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30007	CARLTNHS	138.00	1	1	26.82	3.41	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30008	CHCARITA	138.00	1	1	51.77	6.59	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30115	CHOLLAS	69.00	1	1	48.76	6.21	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30116	CLAIRMNT	69.00	1	1	38.06	4.84	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30011	CORONADO	69.00	1	1	26.37	3.36	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30118	CREELMAN	69.00	1	1	46.73	5.95	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30120	CRSTNTS	69.00	1	1	4.25	0.54	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30121	DEL MAR	69.00	1	1	42.04	5.35	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30123	DESCANSO	69.00	1	1	4.60	0.59	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30014	DIVISION	69.00	1	1	1.15	0.15	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30125	DUNHILL	69.00	1	1	1.77	0.22	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30384	EASTGATE	69.00	1	1	14.96	1.90	0.00	0.00	0.00	0.00	301	0.00	0.00	97	01	9	97	01	9	0
30	30126	EL CAJON	69.00	1	1	106.64	13.57	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30128	ELLIOTT	69.00	1	1	51.24	6.52	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30129	ENCNITAS	69.00	1	1	47.08	5.99	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30130	ESCNDIDO	69.00	1	1	64.07	8.15	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30131	ESCO	69.00	1	1	53.01	6.75	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30133	F	69.00	1	1	57.70	7.34	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30134	FASHNVLY	69.00	1	1	9.91	1.26	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30136	FELICITA	69.00	1	1	50.00	6.36	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30137	FENTON	69.00	1	1	3.45	0.44	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30357	FRIARS	138.00	1	1	14.16	1.80	0.00	0.00	0.00	0.00	301	0.00	0.00	97	12	17	39	12	31	0
30	30138	GEN DYNM	69.00	1	1	2.83	0.36	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	BUS-NO-	--NAME--	--KV--	ID	ST	-PLOAD-	-QLOAD-	-IPLOD-	-IQLOD-	-GLOAD-	-BLOAD-	ZON	-PMOTR-	-QMOTR-	YI	MI	DI	YO	MO	DO	OWN
30	30140	GENESEE	69.00	1	1	92.48	11.77	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30141	GLENCLIF	69.00	1	1	3.45	0.44	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30142	GRANITE	69.00	1	1	84.52	10.76	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30144	HORNO	69.00	1	1	2.83	0.36	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30146	IMPRLBCH	69.00	1	1	36.64	4.66	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30147	JAMACHA	69.00	1	1	57.70	7.34	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30148	JAP MESA	69.00	1	1	4.51	0.57	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30034	KEARNY	69.00	1	1	76.55	9.74	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30149	KETTNER	69.00	1	1	38.94	4.95	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30150	KYOCERA	69.00	1	1	3.89	0.50	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30152	LA JOLLA	69.00	1	1	27.70	3.52	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30036	LAGNA NL	138.00	1	1	76.02	9.67	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30153	LASPULGS	69.00	1	1	3.45	0.44	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30154	LILAC	69.00	1	1	26.82	3.41	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30155	LOSCOCHS	69.00	1	1	59.03	7.51	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30156	LOVELAND	69.00	1	1	5.58	0.71	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30223	MARGARTA	138.00	1	1	65.84	8.38	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30157	MELROSE	69.00	1	1	86.82	11.05	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30159	MESA RIM	69.00	1	1	71.51	9.10	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30160	MESAHGTS	69.00	1	1	32.13	4.09	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30164	MIRAMAR	69.00	1	1	72.22	9.19	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30051	MISSION	69.00	1	1	91.51	11.64	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30167	MONSRATE	69.00	1	1	26.82	3.41	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30168	MONTGMRY	69.00	1	1	47.08	5.99	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30170	MOROHILL	69.00	1	1	13.10	1.67	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30171	MURRAY	69.00	1	1	104.25	13.27	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30175	NATNLCTY	69.00	1	1	3.01	0.38	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30176	NAVSTMTR	69.00	1	1	30.09	3.83	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30376	NCFOT2	69.00	1	1	2.74	0.35	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30226	NOISLMTR	69.00	1	1	46.73	5.95	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30327	NORTHCTY	138.00	1	1	25.31	3.22	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30177	OCEANSDE	69.00	1	1	22.57	2.87	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30055	OLD TOWN	69.00	1	1	61.86	7.87	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30180	OTAY	69.00	1	1	37.88	4.82	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30182	OTAYLAKE	69.00	1	1	1.15	0.15	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30184	PACFCBCH	69.00	1	1	47.61	6.06	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30185	PALA	69.00	1	1	8.32	1.06	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30227	PALOMAR	138.00	1	1	34.07	4.34	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	BUS-NO-	--NAME--	--KV--	ID	ST	-PLOAD-	-QLOAD-	-IPLOD-	-IQLOD-	-GLOAD-	-BLOAD-	ZON	-PMOTR-	-QMOTR-	YI	MI	DI	YO	MO	DO	OWN
30	30187	PARADISE	69.00	1	1	44.60	5.68	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30188	PENDLETN	69.00	1	1	28.23	3.59	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30329	PICO	138.00	1	1	12.39	1.58	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30190	POINTLMA	69.00	1	1	57.79	7.35	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30228	POMERADO	69.00	1	1	29.47	3.75	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30191	POWAY	69.00	1	1	48.23	6.14	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30060	PRCTRVLY	138.00	1	1	28.05	3.57	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30192	R.CARMEL	69.00	1	1	50.89	6.48	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30193	R.SNTAFE	69.00	1	1	21.59	2.75	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30195	RINCON	69.00	1	1	24.51	3.12	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30197	ROSE CYN	69.00	1	1	35.93	4.57	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30067	SAMPSON	69.00	1	1	86.82	11.05	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30198	SANLUSRY	69.00	1	1	60.71	7.73	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30070	SANMATEO	138.00	1	1	31.95	4.07	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30200	SANMRCOS	69.00	1	1	77.44	9.85	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30201	SANTEE	69.00	1	1	60.89	7.75	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30202	SANTYSBL	69.00	1	1	6.20	0.79	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30203	SANYSDRO	69.00	1	1	34.34	4.37	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30204	SCRAPDSP	69.00	1	1	0.00	0.00	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30205	SCRIPPS	69.00	1	1	54.96	6.99	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30349	SHADOWR	138.00	1	1	31.95	4.07	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30207	SPRNGVLY	69.00	1	1	42.30	5.38	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30208	STREAMVW	69.00	1	1	51.86	6.60	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30209	STUART	69.00	1	1	2.30	0.29	0.00	0.00	0.00	0.00	304	0.00	0.00	40	01	1	39	12	31	0
30	30210	SUNYSIDE	69.00	1	1	7.43	0.95	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30211	SWEETWTR	69.00	1	1	46.11	5.87	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30330	TELECYN	138.00	1	1	38.14	4.85	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30214	TOREYPNS	69.00	1	1	63.99	8.14	0.00	0.00	0.00	0.00	301	0.00	0.00	40	01	1	39	12	31	0
30	30093	TRABUCO	138.00	1	1	101.95	12.97	0.00	0.00	0.00	0.00	306	0.00	0.00	40	01	1	39	12	31	0
30	30386	UCM	69.00	1	1	31.68	4.03	0.00	0.00	0.00	0.00	301	0.00	0.00	97	01	17	39	12	31	0
30	30216	URBAN	69.00	1	1	54.07	6.88	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0
30	30217	WABASH	69.00	1	1	8.41	1.07	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30219	WARENCYN	69.00	1	1	4.25	0.54	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30220	WARNERS	69.00	1	1	5.13	0.65	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30094	ALPINE	69.00	pk	0	27.70	3.53	0.00	0.00	0.00	0.00	303	0.00	0.00	40	01	1	39	12	31	0
30	30095	ASH	69.00	pk	0	57.10	7.27	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30098	AVOCADO	69.00	pk	0	31.50	4.01	0.00	0.00	0.00	0.00	305	0.00	0.00	40	01	1	39	12	31	0
30	30099	B	69.00	pk	0	106.80	13.59	0.00	0.00	0.00	0.00	302	0.00	0.00	40	01	1	39	12	31	0

2450NONE.sav /1.43pu caps add to CFE to sol. case
SDG&E Load 4119 MW, Import 2450 MW; CFE Import 0 MW.

AREA	--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	ID	CK	SE	ST	--G-PU--	--B-PU--	-VSCHED	-V-ACT-	ZON	YI	MI	DI	YO	MO	DO	OWN
30	30005	CAPSTRNO	138.0	0		0.0	b		0	1	0.0000	0.4000	1.0000	1.0255	303	40	01	1	39	12	31	0
30	30118	CREELMAN	69.0	0		0.0	b		0	1	0.0000	0.1600	1.0000	1.0289	308	40	01	1	39	12	31	0
30	30126	EL CAJON	69.0	0		0.0	b		0	1	0.0000	0.5000	1.0000	1.0236	308	40	01	1	39	12	31	0
30	30155	LOSCOCHS	69.0	0		0.0	b		0	1	0.0000	1.0000	1.0000	1.0333	308	40	01	1	39	12	31	0
30	30040	MAIN ST	69.0	0		0.0	b		0	1	0.0000	1.0000	1.0000	1.0257	301	40	01	1	39	12	31	0
30	30045	MIGUEL	69.0	0		0.0	b		0	1	0.0000	1.0000	1.0000	1.0393	309	40	01	1	39	12	31	0
30	30051	MISSION	69.0	0		0.0	b		0	1	0.0000	0.5000	1.0000	1.0271	307	40	01	1	39	12	31	0
30	30173	NARROWS	69.0	0		0.0	b		0	1	0.0000	0.0200	1.0000	0.9586	305	40	01	1	39	12	31	0
30	30189	PENSQTOS	69.0	0		0.0	b		0	1	0.0000	1.0000	1.0000	1.0176	306	40	01	1	39	12	31	0
30	30069	SANLUSRY	138.0	0		0.0	b		0	1	0.0000	0.8000	1.0000	1.0176	303	40	01	1	39	12	31	0
30	30213	SYCAMORE	69.0	0		0.0	b		0	1	0.0000	0.5000	1.0000	1.0310	306	40	01	1	39	12	31	0
30	2166	PALOVRDE	500.0	30172	N.GILA	500.0	t	1	2	1	0.0002	1.0517	1.0700	1.0700	20	40	01	1	39	12	31	0
30	2166	PALOVRDE	500.0	30172	N.GILA	500.0	t	1	3	0	0.0000	-1.1400	1.0700	1.0700	303	40	01	1	39	12	31	0
30	30172	N.GILA	500.0	30033	IMPRLVLY	500.0	t	1	2	1	0.0000	-1.1400	1.0000	1.0678	303	40	01	1	39	12	31	0

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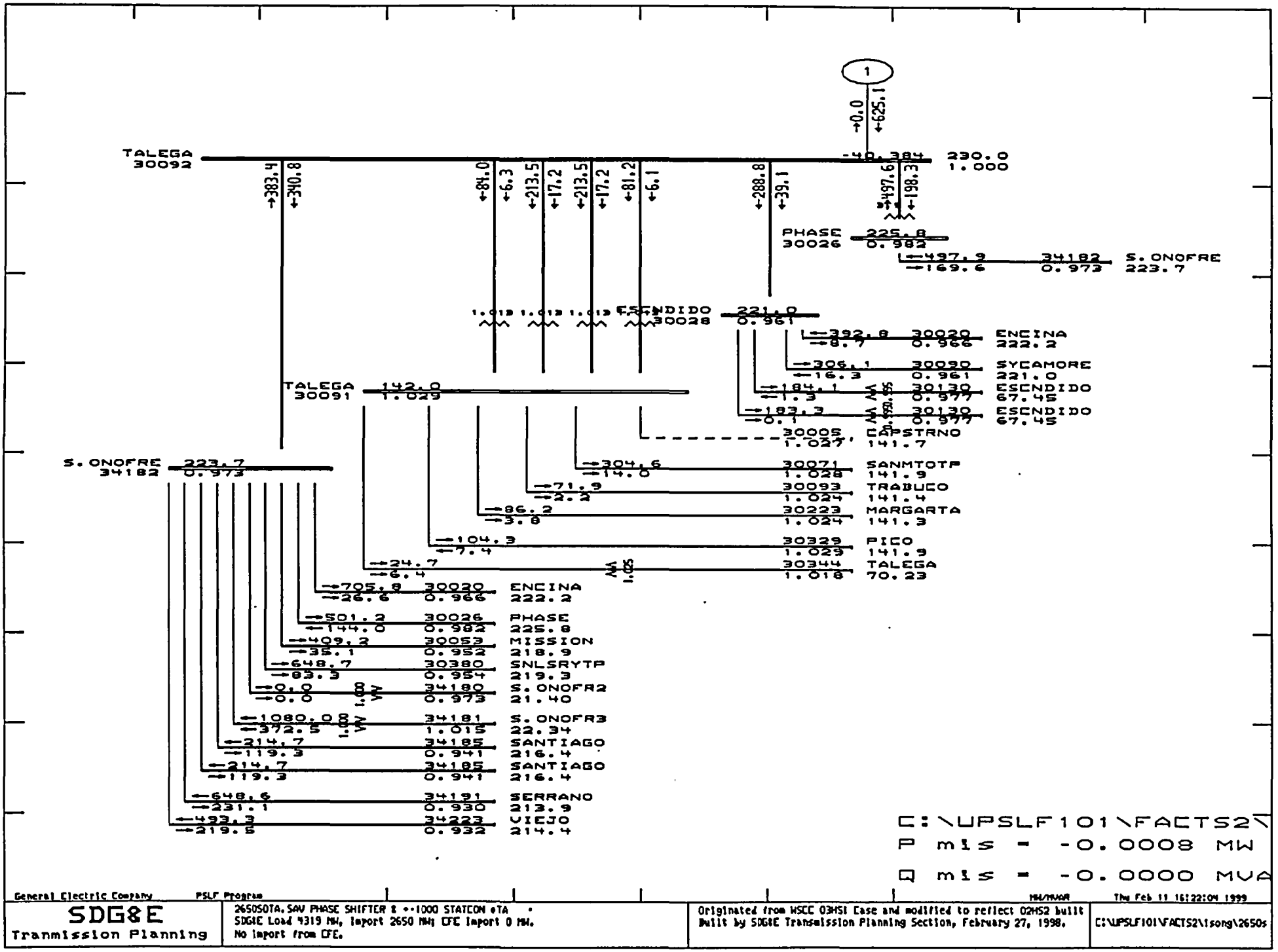
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ENCINA 30020 222.2
SYCAMORE 30090 221.0
ESCNDIDO 30130 67.45
CAPSTRNO 30005 141.7
SANMTOTP 30071 141.9
TRABUCO 30093 141.4
MARGARTA 30223 141.3
PICO 30329 141.9
TALEGA 30344 70.23
PHASE 30026 225.8
MISSION 30053 218.9
SNLSRYTP 30380 219.3
S.ONOFR2 34180 21.40
S.ONOFR3 34181 22.34
SANTIAGO 34185 216.4
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SERRANO 34191 213.9
VIEJO 34223 214.4
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SDG&E
Tranmission Planning
2650SOTA. SAV PHASE SHIFTER & +-1000 STATCON @TA
SDG&E Load 4319 MW, Import 2650 MW; CFE Import 0 MW.
No Import from CFE.
Originated from WSCC 03HS1 Case and modified to reflect 02HS2 built
Built by SDG&E Transmission Planning Section, February 27, 1998.
C:\UPSLF101\FACTS2\1song\2650s

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1.004
ESCNDIDO
30028
222.5
0.967
TALEGA
30091
142.6
1.033
S. ONOFRE
34182
225.4
0.980
ENCINA
SYCAMORE
ESCNDIDO
ESCNDIDO
CAPSTRNO
SANMTOTP
TRABUCO
MARGARTA
PICO
TALEGA
ENCINA
MISSION
SNLSRYTP
S. ONOFR2
S. ONOFR3
SANTIAGO
SANTIAGO
SERRANO
VIEJO
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General Electric Company
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MW/MVAR
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GENERAL ELECTRIC COMPANY
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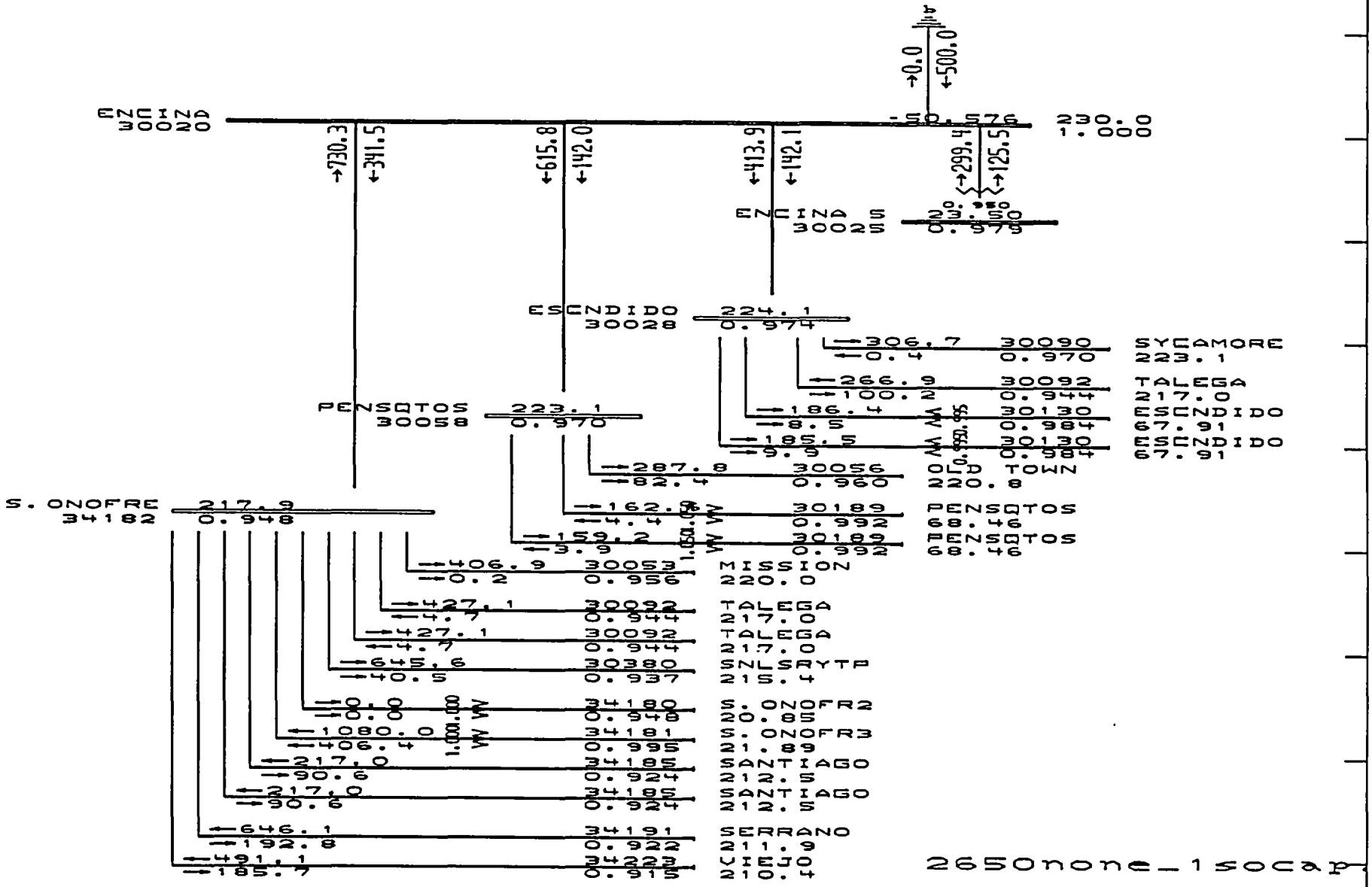

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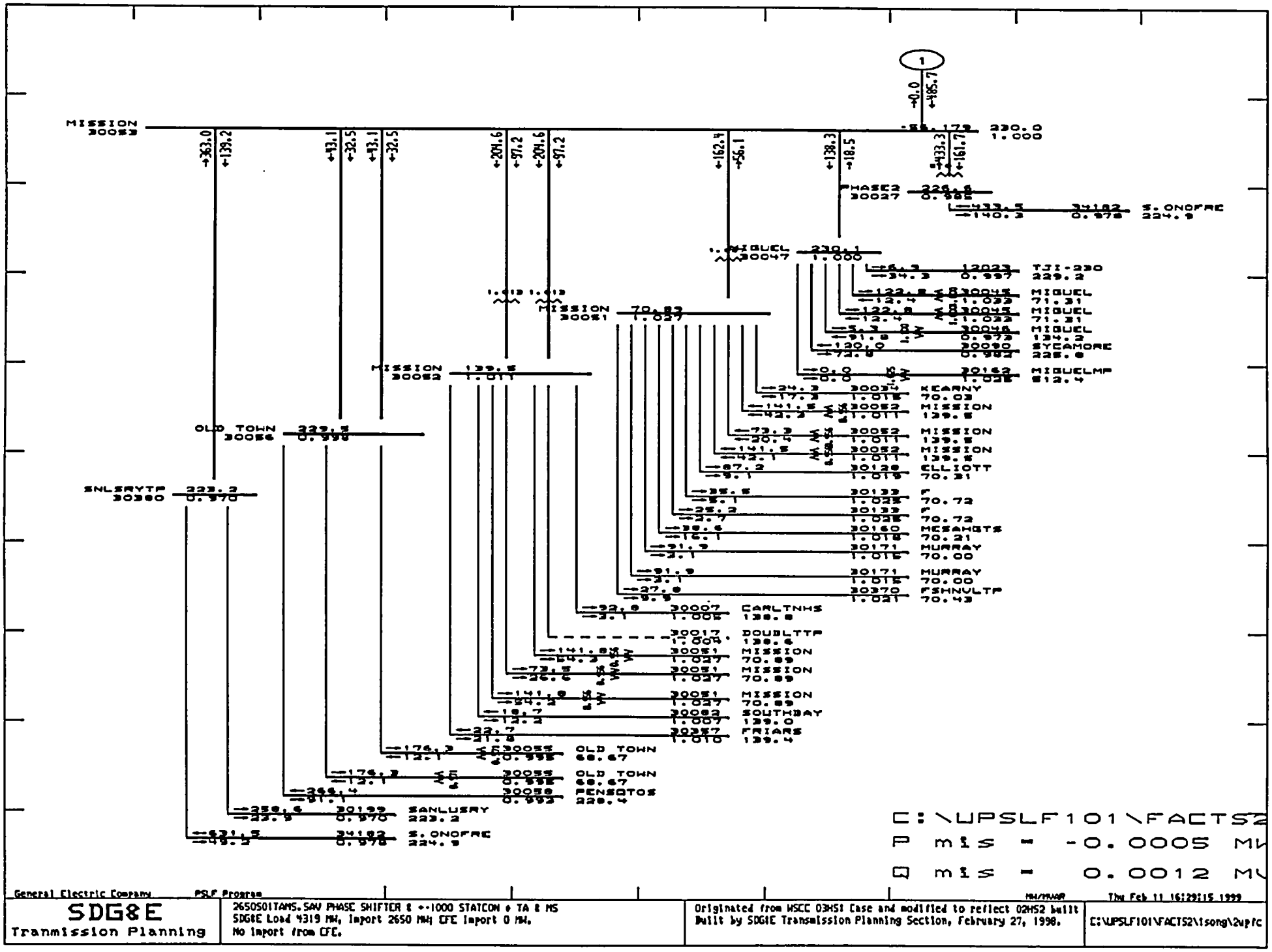
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OLD TOWN 30055 68.67 0.998
PENSQTOS 30058 220.4 0.992
MISSION 30052 139.5 1.011
MISSION 30051 70.89 1.027
CARLTNHS 30007 139.8 1.005
DOUBLTTP 30017 139.6 1.004
SOUTHBAY 30082 139.0 1.007
FRIARS 30257 139.4 1.010
MISSION 70.83 1.027
MIGUEL 230.1 1.000
TJI-230 12023 229.2 0.997
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MIGUEL 134.2 0.972
SYCAMORE 228.8 0.982
MIGUELMP 512.4 1.028
KEARNY 70.03 1.018
ELLIOTT 70.21 1.019
MESAHGTS 70.21 1.018
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MW/MVAR
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SDG&E
Tranmission Planning
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No Import from CFE.
Originated from WSCC 03HS1 Case and modified to reflect 02HS2 built
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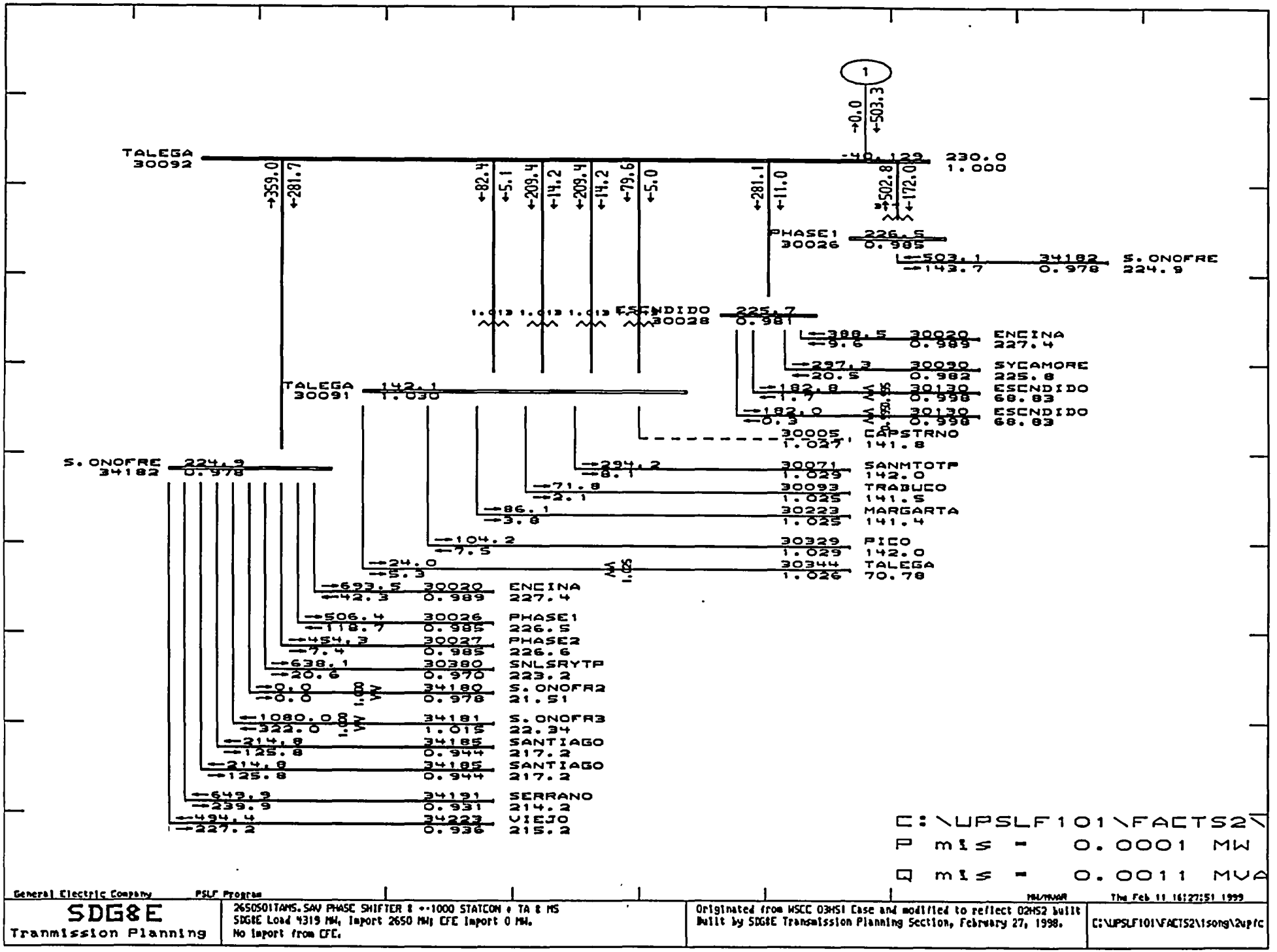
C:\UPSLF101\FACTS2\tsong\2up\c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PHASE1 30026 226.5 0.985
ESCNDIDO 30028 225.7 0.981
TALEGA 30091 142.1 1.030
30005 CAPSTRNO 1.027 141.8
30071 SANMTOTP 1.029 142.0
30093 TRABUCO 1.025 141.5
30223 MARGARTA 1.025 141.4
30329 PICO 1.029 142.0
30344 TALEGA 1.026 70.78
30020 ENCINA 0.989 227.4
30026 PHASE1 0.985 226.5
30027 PHASE2 0.985 226.6
30380 SNLSRYTP 0.970 223.2
34180 S. ONOFR2 0.978 21.51
34181 S. ONOFR3 1.015 22.34
34185 SANTIAGO 0.944 217.2
34185 SANTIAGO 0.944 217.2
34191 SERRANO 0.931 214.2
34223 VIEJO 0.936 215.2
30020 ENCINA 227.4
30090 SYCAMORE 225.8
30130 ESCNDIDO 68.83
30130 ESCNDIDO 68.83
34182 S. ONOFRE 224.9
230.0 1.000
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Q mis = 0.0011 MVA
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SDG&E
Tranmission Planning
26SOSOITAMS.SAV PHASE SHIFTER & +-1000 STATCON @ TA & MS
SDG&E Load 4319 MW, Import 2650 MW; CFE Import 0 MW.
No import from CFE.
Originated from WSCC 03HS1 Case and modified to reflect 02HS2 built
Built by SDG&E Transmission Planning Section, February 27, 1998.
C:\UPSLF101\FACTS2\isong\2upfc

APPENDIX C

LOAD AND RESOURCE TABLE

1998 TRANSMISSION CAPITAL BUDGET STUDY

SDG&E Load & Resources

YEAR - 2003

Load & Resources	System Load (90/10) (includes losses)	4204	100%
	Interchange	2450	58%
	Generation	1754	42%
		Firm MW*	Transmission Capacity
Area Interchange	*Scheduled at San Onofre*		
	SONGS	430	430
	Pacific AC/DC Intertie (Northwest)	266	266
	Approximate Losses	-15	-15
	Scheduled to SONGS	749	
	Total schedule at San Onofre	1430	
	Transmission Capacity South of San Onofre		1800
	Scheduled at Palo Verde		
	PNM	100	
	From Southwest	870	
	SDG&E's Total at P.V.	970	970
	Scheduled at North Gila		
	Yuma QF	50	
	SDG&E's Total at Imperial Valley	1020	1087
	Scheduled at Tijuana/La Rosita		
	Mexico	0	
	Total from Mexico	0	408
	Total Import	2450	2450
		Units Output	Generation Capacity
Generation Schedule	*Generating Units*		
	Encina 1	95	100
	Encina 2	100	104
	Encina 3	106	110
	Encina 4	265	300
	Encina 5	300	330
	South Bay 1	138	146
	South Bay 2	138	150
	South Bay 3	170	175
	South Bay 4 (swing)	147	222
	Suppliers' QFs (including EFI)	124	124
	SDG&E GTs	122	*332
	Goal Line QF	49	49
	Total Generation	1754	1810
	Operating Reserve (should be >300.0 MW)		388 MW
	Spinning Reserve (should be >150.0 MW)		**178 MW

* 332 MW available towards Operating Reserve but not included in the total generation capacity

** All imports assumed firm, and ramping rates are included for Spinning Reserve calculation
Operating GTs are Miramar, and Kearny

APPENDIX D

SDG&E IMPORT NOMOGRAM

Nomograms

A nomogram is a graph that simultaneously compares two or more variables and establishes operating constraints. It establishes limits such that the system can still withstand the worst single contingency and not suffer overloads. On the attached nomograms shown in Appendix ____, the worst case contingency is identified as an OTG ("outage") with the corresponding OL ("overload") facility identified. Operating on the line would result in the indicated facility being loaded to its maximum rating should the contingency occur.

On the following pages, several terms are mentioned that the reader should understand:

San Onofre Imports/Exports - summation of the actual powerflow on the four 230 kV lines which connect the SDG&E service area with SCE at San Onofre. (Actual power flows include: SDG&E's share of SONGS units 2 & 3, which is 430 MW; firm and economy energy purchases flowing on the Pacific Intertie; emergency capacity purchases and loop flow.)

To accommodate additional imports the transmission facilities South of San Onofre have been uprated to increase the simultaneous import capability from 1800 MW to 2150 MW. In addition the transmission lines South of San Onofre are planned to be upgraded to further increase the simultaneous import capability to 2450 MW by 1998. See Figure No. 2 which shows the planned increase in Simultaneous Import Capability.

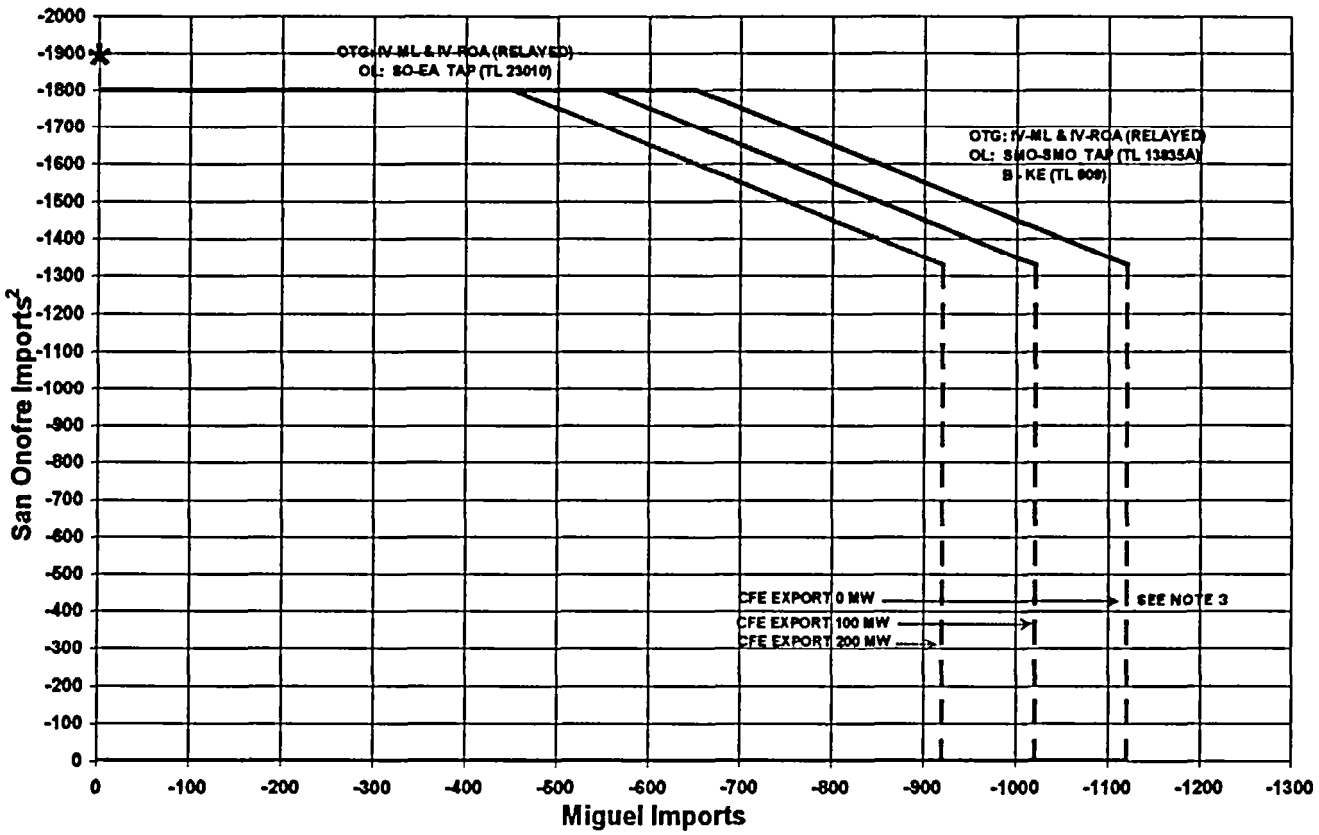
Miguel Imports - summation of the actual power flow into Miguel from TL 50001 (Imperial Valley to Miguel) and TL 23040 (Tijuana-CFE to Miguel).

Flow to/from CFE - summation of the actual power flow on TL 23040 (Tijuana-CFE to Miguel) and TL 23050 (La Rosita-CFE to Imperial Valley). This total represents the net export/import of power from CFE.

Imperial Valley to Miguel 500 kV Flow - the actual power flow on TL 50001.

BASE - the projected operating point considering all planned resources are available.

Operation is always within the nomogram envelopes. Any point on the nomogram boundaries gives the maximum "simultaneous" impact for that point of operation. Each point has corresponding allowable 'San Onofre Import' and 'Miguel Import' value.



Note 1 - Assumes all lines in service and all internal generation available. Import boundaries subject to change due to daily operating conditions, such as planned or forced facility outages.

Note 2 - If emergency conditions require exporting to SCE, real time security analysis should be conducted.

Note 3 - The dashed vertical "soft" limits show the expected flow into the Miguel 230kV bus when the East-of-the-River system reaches a transfer limit. The range of flow into the Miguel 230kV bus can vary between 1050-1200 MW dependent on the EOR limitation reached and external system conditions.

* Asterisk indicates South-of SONGS import limit of 1900 MW with any segment of SWPL open.

Figure D.1 – SDG&E Import Nomogram

APPENDIX E

TABULTED STUDY RESULTS

Appendix E
List of Overloads
Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
1900	45	ENCINA	BATIQTOS	138	BATIQTP	138	103.82	195	195	0
1900	45	MISSION	BATIQTOS	138	BATIQTP	138	108.12	195	195	0
1900	45	NONE	BATIQTOS	138	BATIQTP	138	111.67	195	195	0
1900	45	SNL REY	BATIQTOS	138	BATIQTP	138	111.55	195	195	0
1900	45	TALEGA	BATIQTOS	138	BATIQTP	138	112.28	195	195	0
1900	46	SNL REY	MISSION	230	S.ONOFRE	230	100.29	456	456	0
1900	46	SNL REY	SANMATEO	138	SANMTOTP	138	100.33	228	228	0
1900	46	SNL REY	TALEGA	138	SANMTOTP	138	104.07	274	274	0
1900	54	ENCINA	PENSQTOS	230	ENCINA	230	148.51	797	797	0
1900	58	ENCINA	EASTGTP	69	MIRAMRTP	69	103.26	50	50	0
1900	82	MISSION	MELRSETP	69	SANLUSRY	69	108.38	102	102	0
1900	82	NONE	MELRSETP	69	SANLUSRY	69	110.49	102	102	0
1900	82	SNL REY	MELRSETP	69	SANLUSRY	69	112.37	102	102	0
1900	82	TALEGA	MELRSETP	69	SANLUSRY	69	110.38	102	102	0
1900	117	ENCINA	EASTGTP	69	MIRAMRTP	69	101.59	50	50	0
1900	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	111.30	224	239	1
1900	125	ENCINA	ESCNDIDO	230	ENCINA	230	150.21	797	797	0
1900	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	110.88	224	239	1
1900	126	ENCINA	EASTGTP	69	ROSE CYN	69	101.35	50	50	0
1900	126	ENCINA	EASTGTP	69	MIRAMRTP	69	128.60	50	50	0
1900	144	MISSION	TALEGA	138	SANMTOTP	138	101.54	274	274	0
1900	144	MISSION	JAP MESA	69	TALEGATP	69	103.58	24	24	0
1900	144	NONE	JAP MESA	69	TALEGATP	69	107.07	24	24	0
1900	144	NONE	TALEGA	138	SANMTOTP	138	105.47	274	274	0
1900	144	NONE	SANMATEO	138	SANMTOTP	138	102.01	228	228	0
1900	144	TALEGA	TALEGA	138	SANMTOTP	138	105.91	274	274	0
1900	144	TALEGA	JAP MESA	69	TALEGATP	69	108.06	24	24	0
1900	144	TALEGA	SANMATEO	138	SANMTOTP	138	102.85	228	228	0
1900	158	NONE	TALEGA	230	S.ONOFRE	230	105.66	456	578	0
1900	158	SNL REY	TALEGA	230	S.ONOFRE	230	103.87	456	578	0
1900	159	NONE	TALEGA	230	S.ONOFRE	230	105.66	456	578	0
1900	159	SNL REY	TALEGA	230	S.ONOFRE	230	103.87	456	578	0
1900	171	ENCINA	ESCNDIDO	69	ESCNDIDO	230	110.04	224	239	1
1900	172	ENCINA	ESCNDIDO	69	ESCNDIDO	230	109.62	224	239	1
1900	201	SNL REY	SNLSRYTP	230	MISSION	230	105.54	456	456	0
2150	45	MS+TA	BATIQTOS	138	BATIQTP	138	113.26	195	195	0
2150	45	ENCINA	BATIQTOS	138	BATIQTP	138	110.32	195	195	0
2150	45	MISSION	BATIQTOS	138	BATIQTP	138	112.65	195	195	0
2150	45	NONE	BATIQTOS	138	BATIQTP	138	116.45	195	195	0
2150	45	SNL REY	BATIQTOS	138	BATIQTP	138	115.84	195	195	0
2150	45	TALEGA	BATIQTOS	138	BATIQTP	138	116.70	195	195	0
2150	46	MS+TA	TALEGA	138	SANMTOTP	138	107.48	274	274	0
2150	46	MS+TA	SANMATEO	138	SANMTOTP	138	103.06	228	228	0
2150	46	MS+TA	SNLSRYTP	230	MISSION	230	100.03	456	456	0
2150	46	ENCINA	TALEGA	138	SANMTOTP	138	108.61	274	274	0
2150	46	ENCINA	MISSION	230	S.ONOFRE	230	102.83	456	456	0
2150	46	ENCINA	SANMATEO	138	SANMTOTP	138	103.89	228	228	0
2150	46	MISSION	SNLSRYTP	230	MISSION	230	101.43	456	456	0

Appendix E

List of Overloads

Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2150	46	MISSION	SANMATEO	138	SANMTOTP	138	104.00	228	228	0
2150	46	MISSION	TALEGA	138	SANMTOTP	138	108.70	274	274	0
2150	46	NONE	SANMATEO	138	SANMTOTP	138	104.00	228	228	0
2150	46	NONE	MISSION	230	S.ONOFRE	230	102.83	456	456	0
2150	46	NONE	TALEGA	138	SANMTOTP	138	108.70	274	274	0
2150	46	SNL REY	JAP MESA	69	TALEGATP	69	107.07	24	24	0
2150	46	SNL REY	TALEGA	138	SANMTOTP	138	129.11	274	274	0
2150	46	SNL REY	SANMATEO	138	SANMTOTP	138	128.95	228	228	0
2150	46	SNL REY	ESCNDIDO	230	TALEGA	230	100.91	456	456	0
2150	46	SNL REY	MISSION	230	S.ONOFRE	230	121.70	456	456	0
2150	46	SNL REY	SANLUSRY	138	SANMATEO	138	118.12	222	222	0
2150	46	TALEGA	MISSION	230	S.ONOFRE	230	101.87	456	456	0
2150	46	TALEGA	SANMATEO	138	SANMTOTP	138	102.95	228	228	0
2150	46	TALEGA	TALEGA	138	SANMTOTP	138	107.39	274	274	0
2150	54	ENCINA	ESCNDO51	138	ESCNDIDO	69	101.22	63	82	1
2150	54	ENCINA	PENSQTOS	230	ENCINA	230	150.41	797	797	0
2150	58	ENCINA	EASTGTP	69	MIRAMRTP	69	101.35	50	50	0
2150	82	MS+TA	MELRSETP	69	SANLUSRY	69	117.17	102	102	0
2150	82	ENCINA	MELRSETP	69	SANLUSRY	69	107.09	102	102	0
2150	82	MISSION	MELRSETP	69	SANLUSRY	69	117.29	102	102	0
2150	82	NONE	MELRSETP	69	SANLUSRY	69	119.75	102	102	0
2150	82	SNL REY	MELRSETP	69	SANLUSRY	69	118.46	102	102	0
2150	82	TALEGA	MELRSETP	69	SANLUSRY	69	119.40	102	102	0
2150	102	SNL REY	TALEGA	138	SANMTOTP	138	108.78	274	274	0
2150	102	SNL REY	SANMATEO	138	SANMTOTP	138	104.21	228	228	0
2150	118	NONE	BATIQTOS	138	BATIQTP	138	100.64	195	195	0
2150	118	TALEGA	BATIQTOS	138	BATIQTP	138	100.88	195	195	0
2150	125	ENCINA	ESCNDIDO	230	ENCINA	230	150.11	797	797	0
2150	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	114.64	224	239	1
2150	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	115.06	224	239	1
2150	125	SNL REY	MISSION	230	S.ONOFRE	230	107.72	456	456	0
2150	125	SNL REY	TALEGA	138	SANMTOTP	138	110.53	274	274	0
2150	125	SNL REY	SANMATEO	138	SANMTOTP	138	106.41	228	228	0
2150	125	TALEGA	TALEGA	138	SANMTOTP	138	100.67	274	274	0
2150	126	ENCINA	EASTGTP	69	MIRAMRTP	69	125.25	50	50	0
2150	126	NONE	EASTGTP	69	MIRAMRTP	69	100.87	50	50	0
2150	126	SNL REY	EASTGTP	69	MIRAMRTP	69	103.02	50	50	0
2150	126	TALEGA	EASTGTP	69	MIRAMRTP	69	101.35	50	50	0
2150	144	MS+TA	SANLUSRY	138	SANMATEO	138	108.53	222	222	0
2150	144	MS+TA	SANMATEO	138	SANMTOTP	138	119.51	228	228	0
2150	144	MS+TA	TALEGA	138	SANMTOTP	138	121.00	274	274	0
2150	144	MS+TA	JAP MESA	69	TALEGATP	69	121.01	24	24	0
2150	144	ENCINA	JAP MESA	69	TALEGATP	69	113.54	24	24	0
2150	144	ENCINA	TALEGA	138	SANMTOTP	138	113.76	274	274	0
2150	144	ENCINA	SANMATEO	138	SANMTOTP	138	110.18	228	228	0
2150	144	MISSION	TALEGA	138	SANMTOTP	138	121.70	274	274	0
2150	144	MISSION	JAP MESA	69	TALEGATP	69	120.51	24	24	0
2150	144	MISSION	SANMATEO	138	SANMTOTP	138	119.93	228	228	0

Appendix E

List of Overloads

Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2150	144	MISSION	SANLUSRY	138	SANMATEO	138	108.86	222	222	0
2150	144	NONE	MISSION	230	S.ONOFRE	230	102.30	456	456	0
2150	144	NONE	JAP MESA	69	TALEGATP	69	121.51	24	24	0
2150	144	NONE	TALEGA	138	SANMTOTP	138	122.83	274	274	0
2150	144	NONE	SANLUSRY	138	SANMATEO	138	110.04	222	222	0
2150	144	NONE	SANMATEO	138	SANMTOTP	138	121.19	228	228	0
2150	144	TALEGA	JAP MESA	69	TALEGATP	69	122.00	24	24	0
2150	144	TALEGA	SANLUSRY	138	SANMATEO	138	109.50	222	222	0
2150	144	TALEGA	SANMATEO	138	SANMTOTP	138	120.46	228	228	0
2150	144	TALEGA	TALEGA	138	SANMTOTP	138	121.78	274	274	0
2150	144	TALEGA	MISSION	230	S.ONOFRE	230	101.08	456	456	0
2150	153	ENCINA	PENSQTOS	230	ENCINA	230	100.87	797	797	0
2150	158	MISSION	TALEGA	230	S.ONOFRE	230	113.31	456	578	0
2150	158	NONE	TALEGA	230	S.ONOFRE	230	118.83	456	578	0
2150	158	SNL REY	TALEGA	230	S.ONOFRE	230	120.69	456	578	0
2150	159	MISSION	TALEGA	230	S.ONOFRE	230	113.31	456	578	0
2150	159	NONE	TALEGA	230	S.ONOFRE	230	118.83	456	578	0
2150	159	SNL REY	TALEGA	230	S.ONOFRE	230	120.69	456	578	0
2150	171	MS+TA	ESCNDIDO	69	ESCNDIDO	230	103.35	224	239	1
2150	171	ENCINA	ESCNDIDO	69	ESCNDIDO	230	115.90	224	239	1
2150	171	MISSION	ESCNDIDO	69	ESCNDIDO	230	103.35	224	239	1
2150	171	NONE	ESCNDIDO	69	ESCNDIDO	230	104 60	224	239	1
2150	171	SNL REY	ESCNDIDO	69	ESCNDIDO	230	106.28	224	239	1
2150	171	TALEGA	ESCNDIDO	69	ESCNDIDO	230	104 60	224	239	1
2150	172	MS+TA	ESCNDIDO	69	ESCNDIDO	230	103 35	224	239	1
2150	172	ENCINA	ESCNDIDO	69	ESCNDIDO	230	115.48	224	239	1
2150	172	MISSION	ESCNDIDO	69	ESCNDIDO	230	103.35	224	239	1
2150	172	NONE	ESCNDIDO	69	ESCNDIDO	230	104.60	224	239	1
2150	172	SNL REY	ESCNDIDO	69	ESCNDIDO	230	106.28	224	239	1
2150	172	TALEGA	ESCNDIDO	69	ESCNDIDO	230	104.60	224	239	1
2150	177	MS+TA	LOSCOCHS	69	LOSCOCHS	138	100.65	140	155	1
2150	177	MISSION	LOSCOCHS	69	LOSCOCHS	138	100.65	140	155	1
2150	201	MS+TA	JAP MESA	69	TALEGATP	69	104.08	24	24	0
2150	201	MS+TA	TALEGA	138	SANMTOTP	138	100.15	274	274	0
2150	201	MISSION	JAP MESA	69	TALEGATP	69	102.09	24	24	0
2150	201	NONE	TALEGA	138	SANMTOTP	138	105.03	274	274	0
2150	201	NONE	JAP MESA	69	TALEGATP	69	107.56	24	24	0
2150	201	SNL REY	SNLSRYTP	230	MISSION	230	107.20	456	456	0
2150	201	SNL REY	TALEGA	138	SANMTOTP	138	100.24	274	274	0
2150	201	SNL REY	JAP MESA	69	TALEGATP	69	103.58	24	24	0
2150	201	TALEGA	SANMATEO	138	SANMTOTP	138	100.64	228	228	0
2150	201	TALEGA	TALEGA	138	SANMTOTP	138	105.56	274	274	0
2150	201	TALEGA	JAP MESA	69	TALEGATP	69	109.06	24	24	0
2450	54	ENCINA	PENSQTOS	230	ENCINA	230	146.61	797	797	0
2450	58	ENCINA	EASTGTP	69	MIRAMRTP	69	101.59	50	50	0
2450	66	SNL REY	TALEGA	138	SANMTOTP	138	103.81	274	274	0
2450	82	MISSION	MELRSETP	69	SANLUSRY	69	101.70	102	102	0
2450	82	NONE	MELRSETP	69	SANLUSRY	69	103.81	102	102	0

Appendix E

List of Overloads

Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2450	82	SNL REY	MELRSETP	69	SANLUSRY	69	112.37	102	102	0
2450	82	TALEGA	MELRSETP	69	SANLUSRY	69	103.93	102	102	0
2450	91	ENCINA	IMPRLVLY	230	ROA-230	230	148.61	408	408	0
2450	91	MISSION	IMPRLVLY	230	ROA-230	230	154.76	408	408	0
2450	91	NONE	IMPRLVLY	230	ROA-230	230	159.84	408	408	0
2450	91	SNL REY	IMPRLVLY	230	ROA-230	230	158.86	408	408	0
2450	91	TALEGA	IMPRLVLY	230	ROA-230	230	159.74	408	408	0
2450	106	ENCINA	IMPRLVLY	230	ELCENTRO	230	101.60	258	258	0
2450	106	MISSION	IMPRLVLY	230	ELCENTRO	230	106.08	258	258	0
2450	106	NONE	IMPRLVLY	230	ELCENTRO	230	109.48	258	258	0
2450	106	SNL REY	IMPRLVLY	230	ELCENTRO	230	110.10	258	258	0
2450	106	TALEGA	IMPRLVLY	230	ELCENTRO	230	108.55	258	258	0
2450	117	ENCINA	EASTGTP	69	MIRAMRTP	69	102.30	50	50	0
2450	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	120.50	224	239	1
2450	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	120.08	224	239	1
2450	125	ENCINA	ESCNDIDO	230	ENCINA	230	146.56	797	797	0
2450	126	ENCINA	EASTGTP	69	MIRAMRTP	69	121.91	50	50	0
2450	171	ENCINA	ESCNDIDO	69	ESCNDIDO	230	124.69	224	239	1
2450	171	MISSION	ESCNDIDO	69	ESCNDIDO	230	103.35	224	239	1
2450	171	NONE	ESCNDIDO	69	ESCNDIDO	230	105.44	224	239	1
2450	171	SNL REY	ESCNDIDO	69	ESCNDIDO	230	100.84	224	239	1
2450	171	TALEGA	ESCNDIDO	69	ESCNDIDO	230	105.86	224	239	1
2450	172	ENCINA	ESCNDIDO	69	ESCNDIDO	230	124.69	224	239	1
2450	172	MISSION	ESCNDIDO	69	ESCNDIDO	230	103.35	224	239	1
2450	172	NONE	ESCNDIDO	69	ESCNDIDO	230	105.44	224	239	1
2450	172	SNL REY	ESCNDIDO	69	ESCNDIDO	230	100.84	224	239	1
2450	172	TALEGA	ESCNDIDO	69	ESCNDIDO	230	105.86	224	239	1
2450	201	SNL REY	SNLSRYTP	230	MISSION	230	102.22	456	456	0
2450	212	ENCINA	JAP MESA	69	TALEGATP	69	112.05	24	24	0
2450	212	ENCINA	TALEGA	138	SANMTOTP	138	110.97	274	274	0
2450	212	ENCINA	SANMATEO	138	SANMTOTP	138	106.93	228	228	0
2450	212	ENCINA	IMPRLVLY	230	ROA-230	230	100.47	408	408	0
2450	212	MISSION	JAP MESA	69	TALEGATP	69	105.57	24	24	0
2450	212	MISSION	TALEGA	138	SANMTOTP	138	103.11	274	274	0
2450	212	NONE	TALEGA	138	SANMTOTP	138	110.27	274	274	0
2450	212	NONE	JAP MESA	69	TALEGATP	69	111.55	24	24	0
2450	212	NONE	SANMATEO	138	SANMTOTP	138	106.10	228	228	0
2450	212	NONE	IMPRLVLY	230	ROA-230	230	100.28	408	408	0
2450	212	TALEGA	JAP MESA	69	TALEGATP	69	113.04	24	24	0
2450	212	TALEGA	TALEGA	138	SANMTOTP	138	110.70	274	274	0
2450	212	TALEGA	SANMATEO	138	SANMTOTP	138	106.93	228	228	0
2450	213	MISSION	JAP MESA	69	TALEGATP	69	101.59	24	24	0
2450	213	MISSION	TALEGA	138	SANMTOTP	138	100.15	274	274	0
2450	213	NONE	JAP MESA	69	TALEGATP	69	102.09	24	24	0
2450	213	NONE	TALEGA	138	SANMTOTP	138	100.85	274	274	0
2450	213	TALEGA	TALEGA	138	SANMTOTP	138	102.15	274	274	0
2450	213	TALEGA	JAP MESA	69	TALEGATP	69	103.58	24	24	0
2450	216	ENCINA	PENSQTOS	230	ENCINA	230	144.71	797	797	0

Appendix E

List of Overloads

Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2450	216	ENCINA	ESCNDO51	138	ESCNDIDO	69	101.22	63	82	1
2450	219	MISSION	ESCNDO51	138	ESCNDIDO	69	102.44	63	82	1
2450	230	ENCINA	SOUTHBAY	69	SOUTHBAY	138	115.85	140	164	1
2450	230	MISSION	SOUTHBAY	69	SOUTHBAY	138	106.10	140	164	1
2450	230	NONE	SOUTHBAY	69	SOUTHBAY	138	106.71	140	164	1
2450	230	SNL REY	SOUTHBAY	69	SOUTHBAY	138	106.10	140	164	1
2450	230	TALEGA	SOUTHBAY	69	SOUTHBAY	138	106.10	140	164	1
2450	231	ENCINA	SOUTHBAY	69	SOUTHBAY	138	107.32	140	164	1
2450	232	ENCINA	SOUTHBAY	69	SOUTHBAY	138	112.20	140	164	1
2450	234	ENCINA	CALAVRTP	138	SHADOWR	138	100.95	112	112	0
2450	234	ENCINA	PENSQTOS	230	ENCINA	230	146.76	797	797	0
2450	234	ENCINA	ESCNDO50	138	ESCNDIDO	69	101.22	63	82	1
2450	236	ENCINA	ESCNDIDO	69	ESCNDIDO	230	118.83	224	239	1
2450	236	ENCINA	ESCNDIDO	69	ESCNDIDO	230	118.41	224	239	1
2450	236	ENCINA	ESCNDIDO	230	ENCINA	230	146.61	797	797	0
2450	237	ENCINA	ESCNDIDO	69	ESCNDIDO	230	119.25	224	239	1
2450	237	ENCINA	ESCNDIDO	230	ENCINA	230	146.61	797	797	0
2450	237	ENCINA	ESCNDIDO	69	ESCNDIDO	230	118.41	224	239	1
2450	247	ENCINA	EASTGTP	69	MIRAMRTP	69	103.74	50	50	0
2650	45	NONE	BATIQTOS	138	BATIQTP	138	101.13	195	195	0
2650	45	SNL REY	BATIQTOS	138	BATIQTP	138	101.99	195	195	0
2650	45	TALEGA	BATIQTOS	138	BATIQTP	138	101.86	195	195	0
2650	54	ENCINA	PENSQTOS	230	ENCINA	230	144.81	797	797	0
2650	58	ENCINA	EASTGTP	69	MIRAMRTP	69	105.17	50	50	0
2650	66	MS+TA	TALEGA	138	SANMTOTP	138	103.64	274	274	0
2650	66	MISSION	TALEGA	138	SANMTOTP	138	103.38	274	274	0
2650	66	NONE	SANMATEO	138	SANMTOTP	138	100.54	228	228	0
2650	66	NONE	TALEGA	138	SANMTOTP	138	107.30	274	274	0
2650	66	SNL REY	SANMATEO	138	SANMTOTP	138	114.17	228	228	0
2650	66	SNL REY	MISSION	230	S.ONOFRE	230	102.74	456	456	0
2650	66	SNL REY	TALEGA	138	SANMTOTP	138	118.56	274	274	0
2650	66	SNL REY	SANLUSRY	138	SANMATEO	138	102.07	222	222	0
2650	66	TALEGA	TALEGA	138	SANMTOTP	138	106.60	274	274	0
2650	66	TALEGA	SANMATEO	138	SANMTOTP	138	100.54	228	228	0
2650	74	ENCINA	ELLIOTT	69	SANTEE	69	100.53	68	68	0
2650	74	NONE	ELLIOTT	69	SANTEE	69	100.53	68	68	0
2650	74	SNL REY	ELLIOTT	69	SANTEE	69	100.71	68	68	0
2650	74	TALEGA	ELLIOTT	69	SANTEE	69	100.53	68	68	0
2650	82	MS+TA	MELRSETP	69	SANLUSRY	69	107.91	102	102	0
2650	82	MISSION	MELRSETP	69	SANLUSRY	69	108.03	102	102	0
2650	82	NONE	MELRSETP	69	SANLUSRY	69	110.26	102	102	0
2650	82	SNL REY	MELRSETP	69	SANLUSRY	69	116.47	102	102	0
2650	82	TALEGA	MELRSETP	69	SANLUSRY	69	110.14	102	102	0
2650	91	MS+TA	IMPRLVLY	230	ROA-230	230	164.24	408	408	0
2650	91	ENCINA	IMPRLVLY	230	ROA-230	230	158.57	408	408	0
2650	91	MISSION	IMPRLVLY	230	ROA-230	230	165.11	408	408	0
2650	91	NONE	IMPRLVLY	230	ROA-230	230	169.12	408	408	0
2650	91	SNL REY	IMPRLVLY	230	ROA-230	230	168.82	408	408	0

Appendix E

List of Overloads

Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2650	91	TALEGA	IMPRLVLY	230	ROA-230	230	168.63	408	408	0
2650	95	ENCINA	SYCAMORE	69	ELLIOTT	69	104.22	68	68	0
2650	95	NONE	SYCAMORE	69	ELLIOTT	69	101.06	68	68	0
2650	95	SNL REY	SYCAMORE	69	ELLIOTT	69	100.53	68	68	0
2650	95	TALEGA	SYCAMORE	69	ELLIOTT	69	101.24	68	68	0
2650	106	MS+TA	IMPRLVLY	230	ELCENTRO	230	113.96	258	258	0
2650	106	ENCINA	IMPRLVLY	230	ELCENTRO	230	110.87	258	258	0
2650	106	MISSION	IMPRLVLY	230	ELCENTRO	230	114.57	258	258	0
2650	106	NONE	IMPRLVLY	230	ELCENTRO	230	117.51	258	258	0
2650	106	SNL REY	IMPRLVLY	230	ELCENTRO	230	119.36	258	258	0
2650	106	SNL REY	TALEGA	138	SANMTOTP	138	101.37	274	274	0
2650	106	TALEGA	IMPRLVLY	230	ELCENTRO	230	116.74	258	258	0
2650	117	ENCINA	EASTGTP	69	MIRAMRTP	69	107.09	50	50	0
2650	117	NONE	EASTGTP	69	MIRAMRTP	69	102.07	50	50	0
2650	117	SNL REY	EASTGTP	69	MIRAMRTP	69	101.83	50	50	0
2650	117	TALEGA	EASTGTP	69	MIRAMRTP	69	102.54	50	50	0
2650	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	123.85	224	239	1
2650	125	ENCINA	SYCAMORE	230	SYCAMORE	69	101.75	224	285	1
2650	125	ENCINA	ESCNDIDO	230	ENCINA	230	146.71	797	797	0
2650	125	ENCINA	ESCNDIDO	69	ESCNDIDO	230	124.27	224	239	1
2650	126	ENCINA	EASTGTP	69	MIRAMRTP	69	124 06	50	50	0
2650	144	NONE	JAP MESA	69	TALEGATP	69	100.59	24	24	0
2650	144	TALEGA	JAP MESA	69	TALEGATP	69	102.58	24	24	0
2650	171	MS+TA	ESCNDIDO	69	ESCNDIDO	230	110.04	224	239	1
2650	171	ENCINA	ESCNDIDO	69	ESCNDIDO	230	129.29	224	239	1
2650	171	MISSION	ESCNDIDO	69	ESCNDIDO	230	110.04	224	239	1
2650	171	NONE	ESCNDIDO	69	ESCNDIDO	230	112.55	224	239	1
2650	171	SNL REY	ESCNDIDO	69	ESCNDIDO	230	108.79	224	239	1
2650	171	TALEGA	ESCNDIDO	69	ESCNDIDO	230	112.55	224	239	1
2650	172	MS+TA	ESCNDIDO	69	ESCNDIDO	230	110.04	224	239	1
2650	172	ENCINA	ESCNDIDO	69	ESCNDIDO	230	129.29	224	239	1
2650	172	MISSION	ESCNDIDO	69	ESCNDIDO	230	110.04	224	239	1
2650	172	NONE	ESCNDIDO	69	ESCNDIDO	230	112.13	224	239	1
2650	172	SNL REY	ESCNDIDO	69	ESCNDIDO	230	108.79	224	239	1
2650	172	TALEGA	ESCNDIDO	69	ESCNDIDO	230	112.55	224	239	1
2650	201	SNL REY	SNLSRYTP	230	MISSION	230	106.32	456	456	0
2650	207	MS+TA	MISSION	69	ELLIOTT	69	102.07	137	137	0
2650	207	ENCINA	ESCNDIDO	69	ESCNDIDO	230	102.51	224	239	1
2650	207	ENCINA	ESCNDIDO	69	ESCNDIDO	230	102.09	224	239	1
2650	207	MISSION	MISSION	69	ELLIOTT	69	102.42	137	137	0
2650	212	MS+TA	IMPRLVLY	230	ROA-230	230	103.89	408	408	0
2650	212	MS+TA	SANLUSRY	138	SANMATEO	138	102.40	222	222	0
2650	212	MS+TA	SANMATEO	138	SANMTOTP	138	114.17	228	228	0
2650	212	MS+TA	TALEGA	138	SANMTOTP	138	117.77	274	274	0
2650	212	MS+TA	JAP MESA	69	TALEGATP	69	119.51	24	24	0
2650	212	ENCINA	IMPRLVLY	230	ROA-230	230	105.45	408	408	0
2650	212	ENCINA	SANLUSRY	138	SANMATEO	138	107.99	222	222	0
2650	212	ENCINA	SANMATEO	138	SANMTOTP	138	119.83	228	228	0

Appendix E

List of Overloads

Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2650	212	ENCINA	TALEGA	138	SANMTOTP	138	122.74	274	274	0
2650	212	ENCINA	JAP MESA	69	TALEGATP	69	122.50	24	24	0
2650	212	MISSION	IMPRLVLY	230	ROA-230	230	103.99	408	408	0
2650	212	MISSION	JAP MESA	69	TALEGATP	69	119.02	24	24	0
2650	212	MISSION	SANMATEO	138	SANMTOTP	138	114.48	228	228	0
2650	212	MISSION	SANLUSRY	138	SANMATEO	138	102.50	222	222	0
2650	212	MISSION	TALEGA	138	SANMTOTP	138	118.29	274	274	0
2650	212	NONE	IMPRLVLY	230	ROA-230	230	105.36	408	408	0
2650	212	NONE	SANLUSRY	138	SANMATEO	138	108.10	222	222	0
2650	212	NONE	JAP MESA	69	TALEGATP	69	122.50	24	24	0
2650	212	NONE	TALEGA	138	SANMTOTP	138	122.74	274	274	0
2650	212	NONE	SANMATEO	138	SANMTOTP	138	119.83	228	228	0
2650	212	TALEGA	TALEGA	138	SANMTOTP	138	122.04	274	274	0
2650	212	TALEGA	SANMATEO	138	SANMTOTP	138	119.41	228	228	0
2650	212	TALEGA	SANLUSRY	138	SANMATEO	138	107.78	222	222	0
2650	212	TALEGA	JAP MESA	69	TALEGATP	69	123.00	24	24	0
2650	212	TALEGA	IMPRLVLY	230	ROA-230	230	105.26	408	408	0
2650	213	MS+TA	SANMATEO	138	SANMTOTP	138	106.31	228	228	0
2650	213	MS+TA	TALEGA	138	SANMTOTP	138	111.31	274	274	0
2650	213	MS+TA	IMPRLVLY	230	ROA-230	230	102.04	408	408	0
2650	213	MS+TA	JAP MESA	69	TALEGATP	69	112.05	24	24	0
2650	213	MISSION	JAP MESA	69	TALEGATP	69	110.55	24	24	0
2650	213	MISSION	IMPRLVLY	230	ROA-230	230	102.13	408	408	0
2650	213	MISSION	SANMATEO	138	SANMTOTP	138	104.84	228	228	0
2650	213	MISSION	TALEGA	138	SANMTOTP	138	110.35	274	274	0
2650	213	NONE	JAP MESA	69	TALEGATP	69	111.55	24	24	0
2650	213	NONE	TALEGA	138	SANMTOTP	138	111.75	274	274	0
2650	213	NONE	SANMATEO	138	SANMTOTP	138	106.52	228	228	0
2650	213	NONE	IMPRLVLY	230	ROA-230	230	102.53	408	408	0
2650	213	TALEGA	TALEGA	138	SANMTOTP	138	112.45	274	274	0
2650	213	TALEGA	SANMATEO	138	SANMTOTP	138	107.67	228	228	0
2650	213	TALEGA	IMPRLVLY	230	ROA-230	230	102.43	408	408	0
2650	213	TALEGA	JAP MESA	69	TALEGATP	69	113.04	24	24	0
2650	214	MS+TA	IMPRLVLY	230	ROA-230	230	102.23	408	408	0
2650	214	ENCINA	IMPRLVLY	230	ROA-230	230	102.82	408	408	0
2650	214	MISSION	IMPRLVLY	230	ROA-230	230	102.33	408	408	0
2650	214	NONE	IMPRLVLY	230	ROA-230	230	102.62	408	408	0
2650	214	SNL REY	IMPRLVLY	230	ROA-230	230	104.58	408	408	0
2650	214	SNL REY	TALEGA	138	SANMTOTP	138	103.03	274	274	0
2650	214	TALEGA	IMPRLVLY	230	ROA-230	230	102.53	408	408	0
2650	215	MISSION	SANLUSRY	69	SANLUSRY	230	100.33	224	301	1
2650	215	NONE	IMPRLVLY	230	ROA-230	230	100.38	408	408	0
2650	215	NONE	SANLUSRY	69	SANLUSRY	230	104.98	224	301	1
2650	215	SNL REY	IMPRLVLY	230	ROA-230	230	101.16	408	408	0
2650	215	SNL REY	SANLUSRY	69	SANLUSRY	230	100.33	224	301	1
2650	216	ENCINA	PENSQTOS	230	ENCINA	230	145.51	797	797	0
2650	216	ENCINA	ESCNDO51	138	ESCNDIDO	69	103.66	63	82	1
2650	219	MS+TA	ESCNDO51	138	ESCNDIDO	69	101.22	63	82	1

Appendix E
List of Overloads
Table E.1

IMPORT (MW)	OUTAGE CASE	UPFC LOCATION	FROM BUS	FROM KV	TO BUS	TO KV	LOADING (%EMER)	N_RATING (MVA)	E_RATING (MVA)	XFMR
2650	219	MISSION	ESCNDO51	138	ESCNDIDO	69	102.44	63	82	1
2650	224	NONE	CALAVRTP	138	SHADOWR	138	101.16	112	112	0
2650	224	SNL REY	CALAVRTP	138	SHADOWR	138	102.65	112	112	0
2650	224	SNL REY	ESCNDO50	138	ESCNDIDO	69	100.00	63	82	1
2650	224	TALEGA	ESCNDO50	138	ESCNDIDO	69	100.00	63	82	1
2650	224	TALEGA	CALAVRTP	138	SHADOWR	138	101.59	112	112	0
2650	230	MS+TA	SOUTHBAY	69	SOUTHBAY	138	112.20	140	164	1
2650	230	ENCINA	SOUTHBAY	69	SOUTHBAY	138	112.20	140	164	1
2650	230	MISSION	SOUTHBAY	69	SOUTHBAY	138	111.59	140	164	1
2650	230	NONE	SOUTHBAY	69	SOUTHBAY	138	112.20	140	164	1
2650	230	SNL REY	SOUTHBAY	69	SOUTHBAY	138	112.80	140	164	1
2650	230	TALEGA	SOUTHBAY	69	SOUTHBAY	138	112.20	140	164	1
2650	232	MS+TA	SOUTHBAY	69	SOUTHBAY	138	102.44	140	164	1
2650	232	ENCINA	SOUTHBAY	69	SOUTHBAY	138	103.05	140	164	1
2650	232	MISSION	SOUTHBAY	69	SOUTHBAY	138	101.83	140	164	1
2650	232	NONE	SOUTHBAY	69	SOUTHBAY	138	103.66	140	164	1
2650	232	SNL REY	SOUTHBAY	69	SOUTHBAY	138	103 05	140	164	1
2650	232	TALEGA	SOUTHBAY	69	SOUTHBAY	138	103.66	140	164	1
2650	234	ENCINA	ESCNDO50	138	ESCNDIDO	69	102.44	63	82	1
2650	234	ENCINA	PENSQTOS	230	ENCINA	230	145.01	797	797	0
2650	234	ENCINA	CALAVRTP	138	SHADOWR	138	103.94	112	112	0
2650	234	MISSION	CALAVRTP	138	SHADOWR	138	100.31	112	112	0
2650	234	NONE	CALAVRTP	138	SHADOWR	138	101.80	112	112	0
2650	234	NONE	ESCNDO50	138	ESCNDIDO	69	101.22	63	82	1
2650	234	SNL REY	CALAVRTP	138	SHADOWR	138	102.87	112	112	0
2650	234	SNL REY	ESCNDO50	138	ESCNDIDO	69	101.22	63	82	1
2650	234	TALEGA	ESCNDO50	138	ESCNDIDO	69	100 00	63	82	1
2650	234	TALEGA	CALAVRTP	138	SHADOWR	138	101.37	112	112	0
2650	236	ENCINA	ESCNDIDO	69	ESCNDIDO	230	121.76	224	239	1
2650	236	ENCINA	ESCNDIDO	69	ESCNDIDO	230	122.59	224	239	1
2650	236	ENCINA	ESCNDIDO	230	ENCINA	230	146.76	797	797	0
2650	236	ENCINA	SYCAMORE	230	SYCAMORE	69	102.46	224	285	1
2650	237	ENCINA	ESCNDIDO	69	ESCNDIDO	230	122.18	224	239	1
2650	237	ENCINA	SYCAMORE	230	SYCAMORE	69	102.46	224	285	1
2650	237	ENCINA	ESCNDIDO	230	ENCINA	230	146.76	797	797	0
2650	237	ENCINA	ESCNDIDO	69	ESCNDIDO	230	122.59	224	239	1
2650	247	ENCINA	EASTGTP	69	MIRAMRTP	69	107.09	50	50	0

Appendix E

List of Undervoltage Buses

Table E.2

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	9	TA+MS	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	TA+MS	30110	BOULEVRD	69	0.99	0.87	0.13
2650	9	TA+MS	30112	CAMERON	69	1.00	0.87	0.13
2650	9	TA+MS	30141	GLENCLIF	69	1.00	0.88	0.11
2650	9	TA+MS	30233	BARRETT	69	1.00	0.86	0.14
2650	9	TA+MS	30371	GLNCLFTP	69	1.00	0.88	0.11
2650	9	ENCINA	30371	GLNCLFTP	69	0.99	0.88	0.11
2650	9	ENCINA	30233	BARRETT	69	1.00	0.85	0.14
2650	9	ENCINA	30141	GLENCLIF	69	0.99	0.88	0.11
2650	9	ENCINA	30112	CAMERON	69	0.99	0.86	0.14
2650	9	ENCINA	30109	BORREGO	69	0.93	0.90	0.03
2650	9	ENCINA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	ENCINA	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	MISSION	30112	CAMERON	69	1.00	0.87	0.13
2650	9	MISSION	30110	BOULEVRD	69	0.99	0.87	0.13
2650	9	MISSION	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	MISSION	30233	BARRETT	69	1.00	0.86	0.14
2650	9	MISSION	30371	GLNCLFTP	69	1.00	0.88	0.11
2650	9	MISSION	30141	GLENCLIF	69	1.00	0.88	0.11
2650	9	NONE	30141	GLENCLIF	69	0.99	0.88	0.11
2650	9	NONE	30110	BOULEVRD	69	0.98	0.86	0.13
2650	9	NONE	30112	CAMERON	69	0.99	0.86	0.14
2650	9	NONE	30109	BORREGO	69	0.93	0.90	0.03
2650	9	NONE	30233	BARRETT	69	1.00	0.85	0.14
2650	9	NONE	30371	GLNCLFTP	69	0.99	0.88	0.11
2650	9	NONE	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30233	BARRETT	69	1.00	0.85	0.14
2650	9	SNL REY	30112	CAMERON	69	0.99	0.86	0.14
2650	9	SNL REY	30371	GLNCLFTP	69	0.99	0.87	0.11
2650	9	SNL REY	30110	BOULEVRD	69	0.98	0.86	0.13
2650	9	SNL REY	30109	BORREGO	69	0.93	0.90	0.03
2650	9	SNL REY	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30141	GLENCLIF	69	0.99	0.87	0.11
2650	9	TALEGA	30109	BORREGO	69	0.93	0.90	0.03
2650	9	TALEGA	30141	GLENCLIF	69	0.99	0.88	0.11
2650	9	TALEGA	30371	GLNCLFTP	69	0.99	0.88	0.11
2650	9	TALEGA	30233	BARRETT	69	1.00	0.85	0.14
2650	9	TALEGA	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	TALEGA	30112	CAMERON	69	0.99	0.86	0.13
2650	9	TALEGA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	12	TA+MS	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	ENCINA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	MISSION	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	NONE	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	SNL REY	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	TALEGA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	24	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	24	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14

Appendix E

List of Undervoltage Buses

Table E.2

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	24	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	24	MISSION	30029	ESCNDO50	138	0.98	0.87	0.11
2650	24	MISSION	30349	SHADOWR	138	1.00	0.86	0.14
2650	24	NONE	30029	ESCNDO50	138	0.98	0.86	0.11
2650	24	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	SNL REY	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.11
2650	24	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	24	TALEGA	30349	SHADOWR	138	1.00	0.86	0.15
2650	66	NONE	30109	BORREGO	69	0.93	0.89	0.03
2650	66	SNL REY	30173	NARROWS	69	0.94	0.90	0.04
2650	66	SNL REY	30109	BORREGO	69	0.93	0.88	0.04
2650	142	ENCINA	30109	BORREGO	69	0.93	0.90	0.03
2650	142	NONE	30109	BORREGO	69	0.93	0.90	0.03
2650	142	SNL REY	30109	BORREGO	69	0.93	0.90	0.03
2650	142	TALEGA	30109	BORREGO	69	0.93	0.90	0.03
2650	143	TA+MS	30029	ESCNDO50	138	0.98	0.88	0.09
2650	143	ENCINA	30029	ESCNDO50	138	0.98	0.88	0.10
2650	143	MISSION	30029	ESCNDO50	138	0.98	0.88	0.09
2650	143	NONE	30029	ESCNDO50	138	0.98	0.88	0.10
2650	143	SNL REY	30029	ESCNDO50	138	0.97	0.88	0.10
2650	143	TALEGA	30029	ESCNDO50	138	0.98	0.88	0.09
2650	165	TA+MS	30109	BORREGO	69	0.94	0.88	0.05
2650	165	TA+MS	30173	NARROWS	69	0.95	0.90	0.05
2650	165	ENCINA	30109	BORREGO	69	0.93	0.88	0.05
2650	165	ENCINA	30173	NARROWS	69	0.94	0.89	0.05
2650	165	MISSION	30173	NARROWS	69	0.95	0.90	0.05
2650	165	MISSION	30109	BORREGO	69	0.93	0.88	0.05
2650	165	NONE	30173	NARROWS	69	0.94	0.89	0.05
2650	165	NONE	30109	BORREGO	69	0.93	0.88	0.05
2650	165	SNL REY	30173	NARROWS	69	0.94	0.89	0.05
2650	165	SNL REY	30109	BORREGO	69	0.93	0.88	0.05
2650	165	TALEGA	30173	NARROWS	69	0.94	0.89	0.05
2650	165	TALEGA	30109	BORREGO	69	0.93	0.88	0.05
2650	219	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	219	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14
2650	219	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	219	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	MISSION	30349	SHADOWR	138	1.00	0.86	0.15
2650	219	MISSION	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	NONE	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	SNL REY	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.12
2650	219	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14

Appendix E

List of Undervoltage Buses

Table E.2

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	220	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	220	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	220	MISSION	30029	ESCNDO50	138	0.98	0.87	0.11
2650	220	MISSION	30349	SHADOWR	138	1.00	0.86	0.14
2650	220	NONE	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	SNL REY	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.11
2650	220	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	TALEGA	30349	SHADOWR	138	1.00	0.86	0.15
2650	223	TA+MS	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	TA+MS	30030	ESCNDO51	138	0.99	0.88	0.11
2650	223	TA+MS	30029	ESCNDO50	138	0.98	0.85	0.13
2650	223	ENCINA	30029	ESCNDO50	138	0.98	0.85	0.13
2650	223	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	ENCINA	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	MISSION	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	MISSION	30030	ESCNDO51	138	0.99	0.88	0.12
2650	223	MISSION	30029	ESCNDO50	138	0.98	0.85	0.13
2650	223	NONE	30029	ESCNDO50	138	0.98	0.84	0.13
2650	223	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	NONE	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	SNL REY	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	SNL REY	30029	ESCNDO50	138	0.97	0.84	0.13
2650	223	TALEGA	30349	SHADOWR	138	1.00	0.84	0.17
2650	223	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TALEGA	30029	ESCNDO50	138	0.98	0.84	0.13
2650	234	TA+MS	30030	ESCNDO51	138	0.99	0.88	0.11
2650	234	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	MISSION	30030	ESCNDO51	138	0.99	0.88	0.11
2650	234	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.11

Appendix E

List of buses with more than 5% Voltage Deviation

Table E.3

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	9	TA+MS	30233	BARRETT	69	1.00	0.86	0.14
2650	9	TA+MS	30371	GLNCLFTP	69	1.00	0.88	0.11
2650	9	TA+MS	30112	CAMERON	69	1.00	0.87	0.13
2650	9	TA+MS	30110	BOULEVRD	69	0.99	0.87	0.13
2650	9	TA+MS	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	TA+MS	30141	GLENCLIF	69	1.00	0.88	0.11
2650	9	ENCINA	30141	GLENCLIF	69	0.99	0.88	0.11
2650	9	ENCINA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	ENCINA	30112	CAMERON	69	0.99	0.86	0.14
2650	9	ENCINA	30233	BARRETT	69	1.00	0.85	0.14
2650	9	ENCINA	30371	GLNCLFTP	69	0.99	0.88	0.11
2650	9	ENCINA	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	MISSION	30141	GLENCLIF	69	1.00	0.88	0.11
2650	9	MISSION	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	MISSION	30110	BOULEVRD	69	0.99	0.87	0.13
2650	9	MISSION	30112	CAMERON	69	1.00	0.87	0.13
2650	9	MISSION	30233	BARRETT	69	1.00	0.86	0.14
2650	9	MISSION	30371	GLNCLFTP	69	1.00	0.88	0.11
2650	9	NONE	30112	CAMERON	69	0.99	0.86	0.14
2650	9	NONE	30110	BOULEVRD	69	0.98	0.86	0.13
2650	9	NONE	30141	GLENCLIF	69	0.99	0.88	0.11
2650	9	NONE	30233	BARRETT	69	1.00	0.85	0.14
2650	9	NONE	30371	GLNCLFTP	69	0.99	0.88	0.11
2650	9	NONE	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30110	BOULEVRD	69	0.98	0.86	0.13
2650	9	SNL REY	30371	GLNCLFTP	69	0.99	0.87	0.11
2650	9	SNL REY	30233	BARRETT	69	1.00	0.85	0.14
2650	9	SNL REY	30141	GLENCLIF	69	0.99	0.87	0.11
2650	9	SNL REY	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30112	CAMERON	69	0.99	0.86	0.14
2650	9	TALEGA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	TALEGA	30141	GLENCLIF	69	0.99	0.88	0.11
2650	9	TALEGA	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	TALEGA	30112	CAMERON	69	0.99	0.86	0.13
2650	9	TALEGA	30233	BARRETT	69	1.00	0.85	0.14
2650	9	TALEGA	30371	GLNCLFTP	69	0.99	0.88	0.11
2650	12	TA+MS	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	ENCINA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	MISSION	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	NONE	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	SNL REY	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	TALEGA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	24	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	24	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14
2650	24	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	24	MISSION	30029	ESCNDO50	138	0.98	0.87	0.11
2650	24	MISSION	30349	SHADOWR	138	1.00	0.86	0.14

Appendix E

List of buses with more than 5% Voltage Deviation

Table E.3

2650	24	NONE	30029	ESCNDO50	138	0.98	0.86	0.11
2650	24	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	SNL REY	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.11
2650	24	TALEGA	30349	SHADOWR	138	1.00	0.86	0.15
2650	24	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	143	TA+MS	30029	ESCNDO50	138	0.98	0.88	0.09
2650	143	ENCINA	30029	ESCNDO50	138	0.98	0.88	0.10
2650	143	MISSION	30029	ESCNDO50	138	0.98	0.88	0.09
2650	143	NONE	30029	ESCNDO50	138	0.98	0.88	0.10
2650	143	SNL REY	30029	ESCNDO50	138	0.97	0.88	0.10
2650	143	TALEGA	30029	ESCNDO50	138	0.98	0.88	0.09
2650	165	TA+MS	30173	NARROWS	69	0.95	0.90	0.05
2650	165	TA+MS	30109	BORREGO	69	0.94	0.88	0.05
2650	165	ENCINA	30109	BORREGO	69	0.93	0.88	0.05
2650	165	ENCINA	30173	NARROWS	69	0.94	0.89	0.05
2650	165	MISSION	30109	BORREGO	69	0.93	0.88	0.05
2650	165	MISSION	30173	NARROWS	69	0.95	0.90	0.05
2650	165	NONE	30173	NARROWS	69	0.94	0.89	0.05
2650	165	NONE	30109	BORREGO	69	0.93	0.88	0.05
2650	165	SNL REY	30173	NARROWS	69	0.94	0.89	0.05
2650	165	SNL REY	30109	BORREGO	69	0.93	0.88	0.05
2650	165	TALEGA	30173	NARROWS	69	0.94	0.89	0.05
2650	165	TALEGA	30109	BORREGO	69	0.93	0.88	0.05
2650	219	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	219	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14
2650	219	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	219	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	MISSION	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	MISSION	30349	SHADOWR	138	1.00	0.86	0.15
2650	219	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	NONE	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	SNL REY	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.12
2650	219	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	220	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14
2650	220	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	220	MISSION	30349	SHADOWR	138	1.00	0.86	0.14
2650	220	MISSION	30029	ESCNDO50	138	0.98	0.87	0.11
2650	220	NONE	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.11
2650	220	SNL REY	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	TALEGA	30349	SHADOWR	138	1.00	0.86	0.15
2650	220	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	223	TA+MS	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	TA+MS	30029	ESCNDO50	138	0.98	0.85	0.13

Appendix E

List of buses with more than 5% Voltage Deviation

Table E.3

2650	223	TA+MS	30030	ESCNDO51	138	0.99	0.88	0.11
2650	223	ENCINA	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	ENCINA	30029	ESCNDO50	138	0.98	0.85	0.13
2650	223	MISSION	30030	ESCNDO51	138	0.99	0.88	0.12
2650	223	MISSION	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	MISSION	30029	ESCNDO50	138	0.98	0.85	0.13
2650	223	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	NONE	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	NONE	30029	ESCNDO50	138	0.98	0.84	0.13
2650	223	SNL REY	30029	ESCNDO50	138	0.97	0.84	0.13
2650	223	SNL REY	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TALEGA	30029	ESCNDO50	138	0.98	0.84	0.13
2650	223	TALEGA	30349	SHADOWR	138	1.00	0.84	0.17
2650	234	TA+MS	30030	ESCNDO51	138	0.99	0.88	0.11
2650	234	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	MISSION	30030	ESCNDO51	138	0.99	0.88	0.11
2650	234	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.11

Appendix E

List of Undervoltage Buses (one SONGS off)

Table E.4

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	106	NONE	30109	BORREGO	69	0.92	0.86	0.06
2650	106	NONE	30109	BORREGO	69	0.92	0.86	0.06
2650	9	SNL REY	30371	GLNCLFTP	69	0.98	0.87	0.12
2650	165	SNL REY	30109	BORREGO	69	0.92	0.87	0.05
2650	9	ENCINA	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	ENCINA	30112	CAMERON	69	0.99	0.85	0.14
2650	9	ENCINA	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	SNL REY	30141	GLENCLIF	69	0.98	0.87	0.12
2650	9	ENCINA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	ENCINA	30233	BARRETT	69	0.99	0.85	0.15
2650	9	MISSION	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	MISSION	30112	CAMERON	69	1.00	0.86	0.14
2650	9	NONE	30141	GLENCLIF	69	0.99	0.87	0.12
2650	9	MISSION	30233	BARRETT	69	1.00	0.86	0.14
2650	9	NONE	30371	GLNCLFTP	69	0.99	0.87	0.12
2650	9	MISSION	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	NONE	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	NONE	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	165	ENCINA	30109	BORREGO	69	0.92	0.87	0.05
2650	9	NONE	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	NONE	30112	CAMERON	69	0.99	0.85	0.14
2650	9	NONE	30141	GLENCLIF	69	0.99	0.87	0.12
2650	9	NONE	30233	BARRETT	69	0.99	0.85	0.15
2650	9	NONE	30371	GLNCLFTP	69	0.99	0.87	0.12
2650	9	NONE	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	165	NONE	30109	BORREGO	69	0.92	0.87	0.05
2650	9	NONE	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	NONE	30233	BARRETT	69	0.99	0.85	0.15
2650	9	NONE	30112	CAMERON	69	0.99	0.85	0.14
2650	9	NONE	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	SNL REY	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30233	BARRETT	69	0.99	0.85	0.15
2650	9	ENCINA	30141	GLENCLIF	69	0.99	0.87	0.12
2650	9	SNL REY	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	SNL REY	30112	CAMERON	69	0.99	0.85	0.14
2650	165	NONE	30109	BORREGO	69	0.92	0.87	0.05
2650	9	ENCINA	30371	GLNCLFTP	69	0.99	0.87	0.12
2650	9	SNL REY	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	TALEGA	30233	BARRETT	69	1.00	0.85	0.14
2650	9	TALEGA	30112	CAMERON	69	0.99	0.86	0.14
2650	9	TALEGA	30110	BOULEVRD	69	0.98	0.86	0.13
2650	9	TALEGA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	TALEGA	30141	GLENCLIF	69	0.99	0.87	0.11
2650	9	TA+MS	30233	BARRETT	69	1.00	0.86	0.14
2650	9	TA+MS	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	TA+MS	30112	CAMERON	69	1.00	0.86	0.14
2650	9	TA+MS	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	TALEGA	30371	GLNCLFTP	69	0.99	0.87	0.11

Appendix E

List of Undervoltage Buses (one SONGS off)

Table E.4

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	9	MISSION	30141	GLENCLIF	69	1.00	0.88	0.12
2650	9	MISSION	30371	GLNCLFTP	69	1.00	0.88	0.12
2650	165	TALEGA	30109	BORREGO	69	0.93	0.88	0.05
2650	9	TA+MS	30141	GLENCLIF	69	1.00	0.88	0.11
2650	9	TA+MS	30371	GLNCLFTP	69	1.00	0.88	0.11
2650	12	ENCINA	30030	ESCNDO51	138	0.99	0.86	0.13
2650	12	MISSION	30030	ESCNDO51	138	0.99	0.86	0.13
2650	12	NONE	30030	ESCNDO51	138	0.99	0.86	0.13
2650	12	NONE	30030	ESCNDO51	138	0.99	0.86	0.13
2650	12	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	12	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	12	TA+MS	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	SNL REY	30349	SHADOWR	138	1.00	0.82	0.18
2650	24	ENCINA	30029	ESCNDO50	138	0.98	0.83	0.14
2650	24	MISSION	30029	ESCNDO50	138	0.98	0.83	0.14
2650	223	NONE	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	NONE	30349	SHADOWR	138	1.00	0.83	0.17
2650	24	NONE	30029	ESCNDO50	138	0.97	0.83	0.14
2650	24	NONE	30029	ESCNDO50	138	0.97	0.83	0.14
2650	24	SNL REY	30029	ESCNDO50	138	0.97	0.84	0.13
2650	223	TALEGA	30349	SHADOWR	138	1.00	0.83	0.17
2650	24	TALEGA	30029	ESCNDO50	138	0.98	0.84	0.13
2650	24	TA+MS	30029	ESCNDO50	138	0.98	0.84	0.13
2650	223	ENCINA	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	MISSION	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	TA+MS	30349	SHADOWR	138	1.00	0.84	0.16
2650	165	MISSION	30109	BORREGO	69	0.93	0.88	0.05
2650	165	TA+MS	30109	BORREGO	69	0.93	0.88	0.05
2650	106	NONE	30173	NARROWS	69	0.94	0.88	0.06
2650	106	NONE	30173	NARROWS	69	0.94	0.88	0.06
2650	1	SNL REY	30109	BORREGO	69	0.92	0.89	0.04
2650	142	SNL REY	30109	BORREGO	69	0.92	0.89	0.03
2650	9	SNL REY	30109	BORREGO	69	0.92	0.89	0.03
2650	165	SNL REY	30173	NARROWS	69	0.94	0.89	0.05
2650	223	SNL REY	30109	BORREGO	69	0.92	0.89	0.03
2650	142	ENCINA	30109	BORREGO	69	0.92	0.89	0.03
2650	142	NONE	30109	BORREGO	69	0.92	0.89	0.03
2650	142	NONE	30109	BORREGO	69	0.92	0.89	0.03
2650	9	NONE	30109	BORREGO	69	0.92	0.89	0.03
2650	9	NONE	30109	BORREGO	69	0.92	0.89	0.03
2650	143	ENCINA	30029	ESCNDO50	138	0.98	0.85	0.12
2650	143	MISSION	30029	ESCNDO50	138	0.98	0.85	0.12
2650	143	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	143	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	143	SNL REY	30029	ESCNDO50	138	0.97	0.85	0.12
2650	143	TALEGA	30029	ESCNDO50	138	0.98	0.85	0.12
2650	143	TA+MS	30029	ESCNDO50	138	0.98	0.85	0.12
2650	165	ENCINA	30173	NARROWS	69	0.94	0.89	0.05

Appendix E

List of Undervoltage Buses (one SONGS off)

Table E.4

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	165	NONE	30173	NARROWS	69	0.94	0.89	0.05
2650	223	NONE	30109	BORREGO	69	0.92	0.89	0.03
2650	165	NONE	30173	NARROWS	69	0.94	0.89	0.05
2650	223	NONE	30109	BORREGO	69	0.92	0.89	0.03
2650	9	ENCINA	30109	BORREGO	69	0.92	0.89	0.03
2650	165	TALEGA	30173	NARROWS	69	0.94	0.89	0.05
2650	234	ENCINA	30109	BORREGO	69	0.92	0.89	0.03
2650	165	MISSION	30173	NARROWS	69	0.95	0.89	0.05
2650	66	TALEGA	30109	BORREGO	69	0.93	0.89	0.03
2650	142	TALEGA	30109	BORREGO	69	0.93	0.89	0.03
2650	165	TA+MS	30173	NARROWS	69	0.95	0.90	0.05
2650	219	ENCINA	30029	ESCNDO50	138	0.98	0.85	0.12
2650	219	SNL REY	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	MISSION	30029	ESCNDO50	138	0.98	0.85	0.12
2650	219	NONE	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	NONE	30349	SHADOWR	138	1.00	0.84	0.16
2650	220	SNL REY	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	NONE	30029	ESCNDO50	138	0.97	0.86	0.12
2650	219	NONE	30029	ESCNDO50	138	0.97	0.86	0.12
2650	219	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.12
2650	24	SNL REY	30349	SHADOWR	138	1.00	0.85	0.16
2650	219	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	219	TA+MS	30029	ESCNDO50	138	0.98	0.86	0.12
2650	220	NONE	30349	SHADOWR	138	1.00	0.85	0.16
2650	220	NONE	30349	SHADOWR	138	1.00	0.85	0.16
2650	24	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	220	MISSION	30029	ESCNDO50	138	0.98	0.86	0.12
2650	220	NONE	30029	ESCNDO50	138	0.97	0.86	0.11
2650	220	NONE	30029	ESCNDO50	138	0.97	0.86	0.11
2650	219	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	SNL REY	30029	ESCNDO50	138	0.97	0.86	0.11
2650	220	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	TA+MS	30029	ESCNDO50	138	0.98	0.86	0.11
2650	223	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	24	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	223	ENCINA	30029	ESCNDO50	138	0.98	0.87	0.10
2650	223	MISSION	30029	ESCNDO50	138	0.98	0.87	0.10
2650	223	MISSION	30030	ESCNDO51	138	0.99	0.87	0.12
2650	219	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	234	SNL REY	30109	BORREGO	69	0.92	0.89	0.03
2650	223	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	236	ENCINA	30109	BORREGO	69	0.92	0.89	0.03
2650	219	MISSION	30349	SHADOWR	138	1.00	0.85	0.15
2650	223	NONE	30029	ESCNDO50	138	0.97	0.87	0.10

Appendix E

List of Undervoltage Buses (one SONGS off)

Table E.4

IMPORT	OUTAGE CASE	UPFC LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	220	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	223	NONE	30029	ESCNDO50	138	0.97	0.87	0.10
2650	223	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	24	MISSION	30349	SHADOWR	138	1.00	0.86	0.15
2650	223	SNL REY	30029	ESCNDO50	138	0.97	0.88	0.10
2650	223	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TALEGA	30029	ESCNDO50	138	0.98	0.88	0.10
2650	220	MISSION	30349	SHADOWR	138	1.00	0.86	0.15
2650	223	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	237	ENCINA	30109	BORREGO	69	0.92	0.90	0.03
2650	223	TA+MS	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TA+MS	30029	ESCNDO50	138	0.98	0.88	0.10
2650	219	TA+MS	30349	SHADOWR	138	1.00	0.86	0.15
2650	9	TALEGA	30109	BORREGO	69	0.93	0.90	0.03
2650	24	TA+MS	30349	SHADOWR	138	1.00	0.86	0.15
2650	234	NONE	30109	BORREGO	69	0.92	0.90	0.03
2650	220	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14
2650	234	NONE	30109	BORREGO	69	0.92	0.90	0.03
2650	234	ENCINA	30030	ESCNDO51	138	0.99	0.88	0.10
2650	234	MISSION	30030	ESCNDO51	138	0.99	0.88	0.10
2650	234	NONE	30030	ESCNDO51	138	0.99	0.88	0.10
2650	66	ENCINA	30109	BORREGO	69	0.92	0.90	0.03
2650	234	NONE	30030	ESCNDO51	138	0.99	0.88	0.10
2650	1	NONE	30109	BORREGO	69	0.92	0.90	0.02
2650	234	SNL REY	30030	ESCNDO51	138	0.99	0.89	0.10
2650	234	TALEGA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	234	TA+MS	30030	ESCNDO51	138	0.99	0.89	0.10
2650	1	NONE	30109	BORREGO	69	0.92	0.90	0.02
2650	223	TALEGA	30109	BORREGO	69	0.93	0.90	0.03
2650	224	SNL REY	30109	BORREGO	69	0.92	0.90	0.02

Appendix E

List of buses with more than 5% Voltage Deviation

(one SONGS off)

Table E.5

IMPORT	OUTAGE CASE	DEVICE LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	9	ENCINA	30141	GLENCLIF	69	0.99	0.87	0.12
2650	9	NONE	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	ENCINA	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	SNL REY	30233	BARRETT	69	0.99	0.85	0.15
2650	9	ENCINA	30371	GLNCLFTP	69	0.99	0.87	0.12
2650	9	ENCINA	30112	CAMERON	69	0.99	0.85	0.14
2650	9	MISSION	30371	GLNCLFTP	69	1.00	0.88	0.12
2650	9	ENCINA	30233	BARRETT	69	0.99	0.85	0.15
2650	9	MISSION	30141	GLENCLIF	69	1.00	0.88	0.12
2650	9	NONE	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	ENCINA	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	MISSION	30112	CAMERON	69	1.00	0.86	0.14
2650	9	NONE	30233	BARRETT	69	0.99	0.85	0.15
2650	9	NONE	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	SNL REY	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	NONE	30371	GLNCLFTP	69	0.99	0.87	0.12
2650	9	NONE	30141	GLENCLIF	69	0.99	0.87	0.12
2650	9	NONE	30112	CAMERON	69	0.99	0.85	0.14
2650	9	NONE	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	NONE	30112	CAMERON	69	0.99	0.85	0.14
2650	9	NONE	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	NONE	30141	GLENCLIF	69	0.99	0.87	0.12
2650	9	NONE	30233	BARRETT	69	0.99	0.85	0.15
2650	9	NONE	30371	GLNCLFTP	69	0.99	0.87	0.12
2650	9	NONE	30110	BOULEVRD	69	0.98	0.85	0.13
2650	9	ENCINA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	SNL REY	30123	DESCANSO	69	0.99	0.90	0.09
2650	9	SNL REY	30112	CAMERON	69	0.99	0.85	0.14
2650	9	SNL REY	30141	GLENCLIF	69	0.98	0.87	0.12
2650	9	SNL REY	30371	GLNCLFTP	69	0.98	0.87	0.12
2650	9	TALEGA	30371	GLNCLFTP	69	0.99	0.87	0.11
2650	9	MISSION	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	9	TALEGA	30141	GLENCLIF	69	0.99	0.87	0.11
2650	9	TALEGA	30112	CAMERON	69	0.99	0.86	0.14
2650	9	MISSION	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	MISSION	30233	BARRETT	69	1.00	0.86	0.14
2650	9	TA+MS	30141	GLENCLIF	69	1.00	0.88	0.11
2650	9	TA+MS	30112	CAMERON	69	1.00	0.86	0.14
2650	9	TALEGA	30106	BOLVRDTP	69	0.99	0.86	0.13
2650	9	TA+MS	30371	GLNCLFTP	69	1.00	0.88	0.11
2650	9	TALEGA	30233	BARRETT	69	1.00	0.85	0.14
2650	9	TALEGA	30110	BOULEVRD	69	0.98	0.86	0.13
2650	9	TA+MS	30110	BOULEVRD	69	0.99	0.86	0.13
2650	9	TA+MS	30233	BARRETT	69	1.00	0.86	0.14

Appendix E

List of buses with more than 5% Voltage Deviation

(one SONGS off)

Table E.5

IMPORT	OUTAGE CASE*	DEVICE LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	9	TA+MS	30106	BOLVRDTP	69	1.00	0.87	0.13
2650	223	SNL REY	30030	ESCNDO51	138	0.99	0.86	0.13
2650	223	NONE	30030	ESCNDO51	138	0.99	0.86	0.13
2650	223	NONE	30030	ESCNDO51	138	0.99	0.86	0.13
2650	234	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	234	SNL REY	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	ENCINA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	SNL REY	30349	SHADOWR	138	1.00	0.82	0.18
2650	24	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	223	NONE	30349	SHADOWR	138	1.00	0.83	0.17
2650	24	MISSION	30029	ESCNDO50	138	0.98	0.86	0.11
2650	24	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	223	NONE	30349	SHADOWR	138	1.00	0.83	0.17
2650	24	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	24	SNL REY	30029	ESCNDO50	138	0.97	0.85	0.12
2650	223	TALEGA	30349	SHADOWR	138	1.00	0.83	0.17
2650	24	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	24	TA+MS	30029	ESCNDO50	138	0.98	0.86	0.11
2650	223	ENCINA	30349	SHADOWR	138	1.00	0.83	0.17
2650	223	MISSION	30349	SHADOWR	138	1.00	0.84	0.16
2650	223	TA+MS	30349	SHADOWR	138	1.00	0.84	0.16
2650	106	NONE	30109	BORREGO	69	0.92	0.86	0.06
2650	106	NONE	30109	BORREGO	69	0.92	0.86	0.06
2650	106	NONE	30173	NARROWS	69	0.94	0.88	0.06
2650	106	NONE	30173	NARROWS	69	0.94	0.88	0.06
2650	143	ENCINA	30029	ESCNDO50	138	0.98	0.88	0.10
2650	143	MISSION	30029	ESCNDO50	138	0.98	0.88	0.09
2650	143	NONE	30029	ESCNDO50	138	0.97	0.87	0.10
2650	143	NONE	30029	ESCNDO50	138	0.97	0.87	0.10
2650	143	SNL REY	30029	ESCNDO50	138	0.97	0.87	0.10
2650	143	TALEGA	30029	ESCNDO50	138	0.98	0.88	0.10
2650	143	TA+MS	30029	ESCNDO50	138	0.98	0.88	0.09
2650	165	ENCINA	30173	NARROWS	69	0.94	0.89	0.05
2650	165	MISSION	30109	BORREGO	69	0.93	0.88	0.05
2650	165	MISSION	30173	NARROWS	69	0.95	0.89	0.05
2650	165	TA+MS	30109	BORREGO	69	0.93	0.88	0.05
2650	165	ENCINA	30109	BORREGO	69	0.92	0.87	0.05
2650	165	NONE	30173	NARROWS	69	0.94	0.89	0.05
2650	165	NONE	30109	BORREGO	69	0.92	0.87	0.05
2650	165	NONE	30173	NARROWS	69	0.94	0.89	0.05
2650	165	NONE	30109	BORREGO	69	0.92	0.87	0.05
2650	165	SNL REY	30173	NARROWS	69	0.94	0.89	0.05
2650	165	SNL REY	30109	BORREGO	69	0.92	0.87	0.05
2650	165	TA+MS	30173	NARROWS	69	0.95	0.90	0.05

Appendix E

List of buses with more than 5% Voltage Deviation

(one SONGS off)

Table E.5

IMPORT	OUTAGE CASE	DEVICE LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	165	TALEGA	30109	BORREGO	69	0.93	0.88	0.05
2650	219	SNL REY	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	219	MISSION	30029	ESCNDO50	138	0.98	0.86	0.11
2650	219	NONE	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	219	NONE	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	219	SNL REY	30029	ESCNDO50	138	0.97	0.85	0.12
2650	220	SNL REY	30349	SHADOWR	138	1.00	0.84	0.16
2650	219	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	24	SNL REY	30349	SHADOWR	138	1.00	0.85	0.16
2650	219	TA+MS	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	NONE	30349	SHADOWR	138	1.00	0.85	0.16
2650	220	NONE	30349	SHADOWR	138	1.00	0.85	0.16
2650	24	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	NONE	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	ENCINA	30029	ESCNDO50	138	0.98	0.86	0.12
2650	220	MISSION	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	219	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	NONE	30029	ESCNDO50	138	0.97	0.85	0.12
2650	220	SNL REY	30029	ESCNDO50	138	0.97	0.85	0.12
2650	220	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	24	ENCINA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	TALEGA	30029	ESCNDO50	138	0.98	0.86	0.11
2650	220	TA+MS	30029	ESCNDO50	138	0.98	0.87	0.11
2650	24	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	234	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	ENCINA	30029	ESCNDO50	138	0.98	0.84	0.13
2650	223	MISSION	30029	ESCNDO50	138	0.98	0.85	0.13
2650	234	NONE	30030	ESCNDO51	138	0.99	0.87	0.12
2650	219	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	220	TALEGA	30349	SHADOWR	138	1.00	0.85	0.15
2650	219	MISSION	30349	SHADOWR	138	1.00	0.85	0.15
2650	223	NONE	30029	ESCNDO50	138	0.97	0.83	0.14
2650	223	NONE	30029	ESCNDO50	138	0.97	0.83	0.14
2650	223	MISSION	30030	ESCNDO51	138	0.99	0.87	0.12
2650	220	MISSION	30349	SHADOWR	138	1.00	0.86	0.15
2650	223	SNL REY	30029	ESCNDO50	138	0.97	0.83	0.14
2650	234	MISSION	30030	ESCNDO51	138	0.99	0.87	0.12
2650	223	TALEGA	30029	ESCNDO50	138	0.98	0.84	0.13
2650	24	MISSION	30349	SHADOWR	138	1.00	0.86	0.15
2650	223	TA+MS	30029	ESCNDO50	138	0.98	0.85	0.13
2650	234	TALEGA	30030	ESCNDO51	138	0.99	0.87	0.12

Appendix E

List of buses with more than 5% Voltage Deviation

(one SONGS off)

Table E.5

IMPORT	OUTAGE CASE	DEVICE LOCATION	BUSNUM	BUSNAME	KV	PRE-VOLT	POST-VOLT	DELTA
2650	24	TA+MS	30349	SHADOWR	138	1.00	0.86	0.15
2650	223	TA+MS	30030	ESCNDO51	138	0.99	0.88	0.12
2650	219	TA+MS	30349	SHADOWR	138	1.00	0.86	0.15
2650	234	TA+MS	30030	ESCNDO51	138	0.99	0.88	0.11
2650	220	TA+MS	30349	SHADOWR	138	1.00	0.86	0.14
2650	224	SNL REY	30227	PALOMAR	138	1.01	0.91	0.10
2650	12	SNL REY	30030	ESCNDO51	138	0.99	0.88	0.10
2650	12	NONE	30030	ESCNDO51	138	0.99	0.88	0.10
2650	12	NONE	30030	ESCNDO51	138	0.99	0.88	0.10
2650	12	ENCINA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	TALEGA	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	MISSION	30030	ESCNDO51	138	0.99	0.89	0.10
2650	12	TA+MS	30030	ESCNDO51	138	0.99	0.89	0.10

Table E.6

PROJECT COST ANALYSIS

TL # / BK #	FROM BUS	FROM KV	TO BUS	TO KV	%LOAD EMER	N_RATING (MVA)	E_RATING (MVA)	XFMR	LENGTH (MI)	STRUCTURE	COND/SIZE/SIDE	PROPOSAL	COST EST. ($000)
PV-NG	PALOVRDE	500	N GILA	500	101.47	1212	1212	0	114 4	STL TOWERS		INCREASE COMPENSATION (2)	$0
50002	N GILA	500	IMPRLVLY	500	100 32	1212	1212	0	81.1	STL TOWERS		INCREASE COMPENSATION (2)	$0
23011	ESCNDIDO	230	ENCINA	230	150 21	797	797	0	15 35	STL TOWERS	1109 / BUNDLED / 2 SIDES	NEW 230/69 XFMR (3)	$4,837
23030	ESCNDIDO	230	TALEGA	230	100 91	456	456	0	51 05	STL TOWERS	1033/SINGLE/1 SIDE	BUNDLE (4)	$5,054
23050	IMPRLVLY	230	ROA-230	230	169.12	408	408	0	9 48	STL TOWERS	1033/SINGLE/1 SIDE	TRIPPING SCHEME	$0
23006	MISSION	230	S ONOFRE	230	121.70	456	456	0	53	STL TOWERS	1033/SINGLE/2 SIDES	BUNDLE	$5,247
23012	PENSQTOS	230	ENCINA	230	150 41	797	797	0	18 04	STL POLES	1109/BUNDLED/2 SIDES	NEW 230/69 XFMR	$4,837
23002B	SNLSRYTP	230	MISSION	230	112.18	456	456	0	35.14	STL TOWERS	1033/SINGLE/2 SIDES	BUNDLE (5)	$3,479
23052	TALEGA	230	S ONOFRE	230	120 69	456	578	0	6 91	STL TOWERS	2 SIDES	BUNDLE (1)	$4,596
13804C	BATIQTOS	138	BATIQTP	138	118 04	195	195	0	0 72	UG	1750/AL UG	EMERGENCY	$0
13802B	CALAVRTP	138	SHADOWR	138	106 50	112	112	0	3 46	WOOD		RECONDUCTOR (1)	$1,932
13832	SANLUSRY	138	SANMATEO	138	176 69	222	222	0	21 65	STL TOWERS		RECONDUCTOR (1)	$789
13835C	SANMATEO	138	SANMTOTP	138	186 09	228	228	0	3 49	TOWERS/WOODS		NEW LINE (1)	$1,977
13835A	TALEGA	138	SANMTOTP	138	175 35	274	274	0	0 37	WOOD		NEW LINE (1)	$210
664D	EASTGTP	69	MIRAMRTP	69	128 60	50	50	0	0 39	WOOD	4/0 CU/SINGLE	BLANKET PROJECT	$200
664C	EASTGTP	69	ROSE CYN	69	101.35	50	50	0	5 2	WOOD	4/0 CU/SINGLE	RECONDUCTOR	$927
636	ELLIOTT	69	SANTEE	69	100 71	68	68	0	10 63	?	336/SINGLE	SANTEE CONVERSION	$0
692C	HORNO TP	69	JAP MESA	69	101 59	32	32	0	4 71	?	1/0 CU/SINGE	RECONDUCTOR	$798
695B	JAP MESA	69	TALEGATP	69	153.38	24	24	0	8.11	WOOD		RECONDUCTOR (1)	$852
680A	MELRSETP	69	SANLUSRY	69	119.75	102	102	0	4 47	UG	1750/AL UG	SCADA	$397
671	MISSION	69	ELLIOTT	69	102 42	137	137	0	7.04	?	336/BUNDLED	SANTEE CONVERSION	$0
639	SYCAMORE	69	ELLIOTT	69	104 22	68	68	0	7.96	WOOD	336/SINGLE	SANTEE CONVERSION	$0
BK70	ESCNDIDO	69	ESCNDIDO	230	129 29	224	239	1	-	-	-	REPLACE BRKR (1)	$526
BK50	ESCNDO50	138	ESCNDIDO	69	104 88	63	82	1	-	-	-		$4,506
BK51	ESCNDO51	138	ESCNDIDO	69	103 66	63	82	1	-	-	-		$4,506
BK50/51	LOSCOCHS	69	LOSCOCHS	138	100 65	140	155	1	-	-	-		$4,506
BK72	SANLUSRY	69	SANLUSRY	230	109 97	224	301	1	-	-	-		$4,837
BK50	SOUTHBAY	69	SOUTHBAY	138	115 85	140	164	1	-	-	-	OUTSIDE CRITERIA	$0
BK70	SYCAMORE	230	SYCAMORE	69	102.46	224	285	1	-	-	-	NEW 230/69XFMR (1)	$4,837
BK50	TALEGA	69	TALEGA	138	110 81	25	37	1	-	-	-	NEW 138/69XFMR	$4,506

(1) Existing capital budget project.
(2) Bypassing the series capacitor is identified as an alternative to the proposal.
(3) Reconductoring TL23011 is identified as an alternative to the proposal.
(4) Looping TL23006 (SO-MS) into Encina and installing a 230/69 kV bank at Encina is identifed as an alternative to the proposal.

Table E.7
EXPANSION COST ANALYSIS

IMPORT (MW)	(All)

COST ($000)				UPFC LOCATION				
FROMBUS	FROMKV	TOBUS	TOKV	ENCINA	MISSION	SNL REY	TALEGA	MS+TA
BATIQTOS	138	BATIQTP	138	$0	$0	$0	$0	$0
CALAVRTP	138	SHADOWR	138	$1,932	$1,932	$1,932	$1,932	
EASTGTP	69	MIRAMRTP	69	$200		$200	$200	
		ROSE CYN	69	$927				
ELLIOTT	69	SANTEE	69	$0		$0	$0	
ESCNDIDO	69	ESCNDIDO	230	$526	$526	$526	$526	$526
	230	ENCINA	230	$4,837				
		TALEGA	230			$5,054		
ESCNDO50	138	ESCNDIDO	69	$4,506		$4,506	$4,506	
ESCNDO51	138	ESCNDIDO	69	$4,506	$4,506			$4,506
IMPRLVLY	230	ELCENTRO	230	$0	$0	$0	$0	$0
		ROA-230	230	$0	$0	$0	$0	$0
JAP MESA	69	TALEGATP	69	$852	$852	$852	$852	$852
LOSCOCHS	69	LOSCOCHS	138		$4,506			$4,506
MELRSETP	69	SANLUSRY	69	$397	$397	$397	$397	$397
MISSION	69	ELLIOTT	69		$0			$0
	230	S.ONOFRE	230	$5,247		$5,247	$5,247	
PENSQTOS	230	ENCINA	230	$4,837				
SANLUSRY	69	SANLUSRY	230		$4,837	$4,837		
	138	SANMATEO	138	$789	$789	$789	$789	$789
SANMATEO	138	SANMTOTP	138	$1,977	$1,977	$1,977	$1,977	$1,977
SNLSRYTP	230	MISSION	230		$3,479	$3,479		$3,479
SOUTHBAY	69	SOUTHBAY	138	$0	$0	$0	$0	$0
SYCAMORE	69	ELLIOTT	69	$0		$0	$0	
	230	SYCAMORE	69	$4,837				
TALEGA	138	SANMTOTP	138	$210	$210	$210	$210	$210
	230	S.ONOFRE	230		$4,596	$4,596		

TOTAL COST ABOVE	**$36,580**	**$28,607**	**$34,602**	**$16,636**	**$17,242**	**$0**
UPFC COST	**$0**	**$18,800**	**$10,360**	**$4,520**	**$6,800**	**$17,160**
REACTIVE POWER SUPPORT COST	**$7,600**					
OTHER COSTS		**$2,000**	**$2,000**	**$2,000**	**$2,000**	**$4,000**
TOTAL COST	**$44,180**	**$49,407**	**$46,962**	**$23,156**	**$26,042**	**$21,160**

APPENDIX F

DISCOUNTED CASH FLOW ANALYSIS

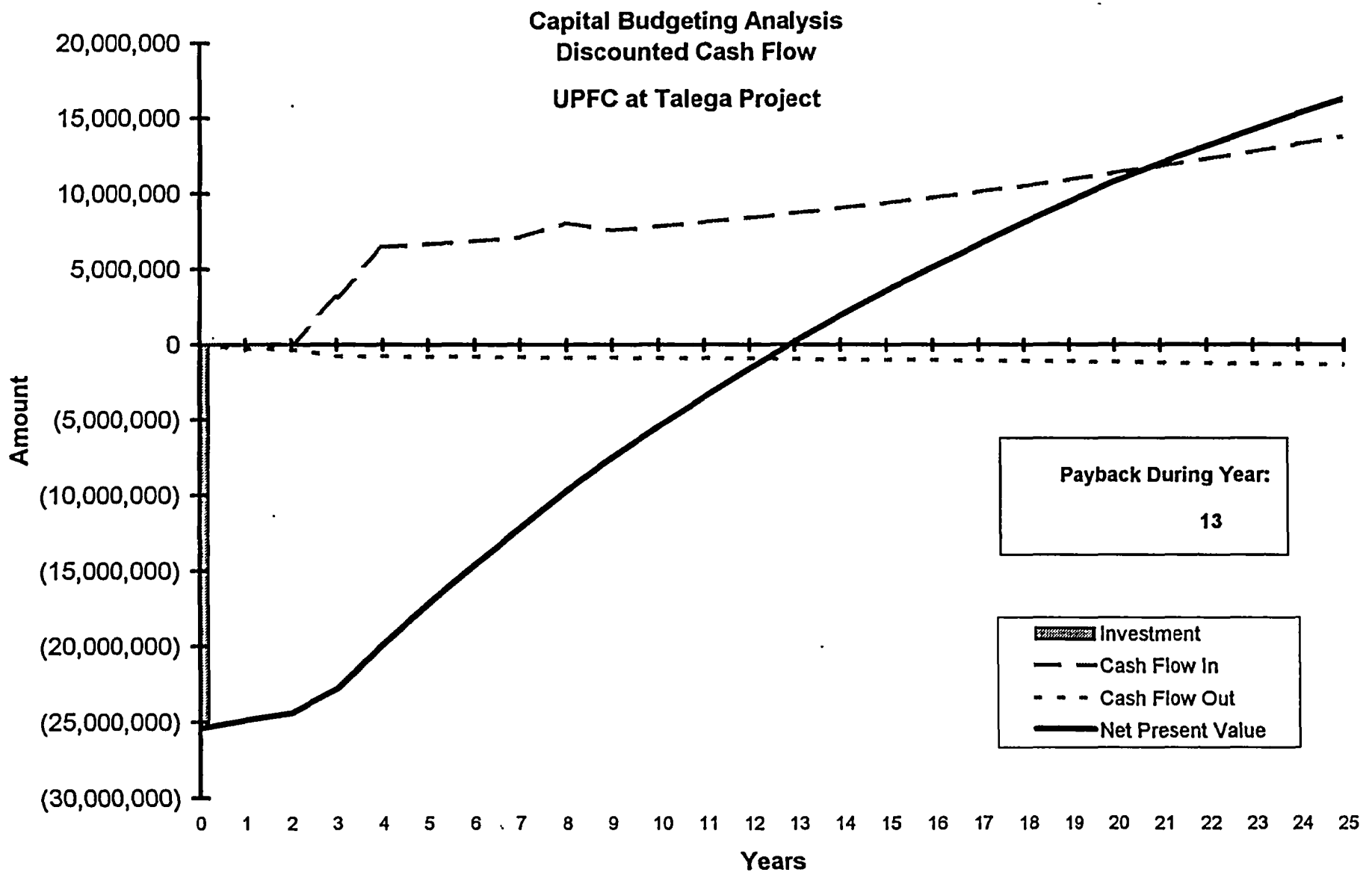
SDG&E Financial Services

Capital Budgeting Discounted Cash Flow (DCF) Model Version 3.0

Issue Date: 6/1/98

Instructions: See Word document, GUIDE98.DOC.

Worksheet	Description
Main Menu	Model overview
User Calcs	Blank worksheet for user calculations
Data Input Screens:	
Investments	Enter info for up to five investments
Rev & Exp	Enter project's expected revenues and expenses
Model Output:	
DCF Results	Discounted cash flow calculations and results
EVA Results	Economic value added calculations and results
DCF Chart	Discounted cash flow graph -- 25-year horizon
EVA Chart	Economic value added graph -- 25-year horizon
Calc	Underlying calculations


Capital Budgeting Analysis
Discounted Cash Flow
UPFC at Talega Project
20,000,000
15,000,000
10,000,000
5,000,000
0
(5,000,000)
(10,000,000)
(15,000,000)
(20,000,000)
(25,000,000)
(30,000,000)
Amount
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Years
Payback During Year:
13
Investment
Cash Flow In
Cash Flow Out
Net Present Value

SDG&E Financial Services

UPFC at Talega Project

DCF Results

Summary	
NPV of Project:	$ 23,490,169
Profitability Index:	1.9
WACC =	8.25%

SDG&E Financial Services

Investments Input (maximum of five investments)

UPFC at Talega Project

Investment 1	PFC at Talega Sub
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ 25,438,000 00
Investment Amt. (Escal.)	$ 25,438,000.00
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2 0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 2	Name of Asset 2
Input Data	
Inv. Made at Beg. of Yr.:	2
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1 5
State Tax Method (See codes at right)	2 0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 3	Name of Asset 3
Input Data	
Inv. Made at Beg. of Yr.:	3
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1 5
State Tax Method (See codes at right)	2 0
Net Salvage %	-90%
Property Tax? (0 = No, 1 = Yes)	1

Investment 4	Name of Asset 4
Input Data	
Inv. Made at Beg of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0 0
State Tax Method (See codes at right)	0 0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Investment 5	Name of Asset 5
Input Data	
Inv. Made at Beg of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0 0
State Tax Method (See codes at right)	0 0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Tax Method Codes

Federal

1.0 = Straight Line
1 5 = 150% DB
2 0 = 200% DB
3 0 = Tax Same as Book
4 0 = Immediate Writeoff
5 0 = Non Depr Asset

State

1 0 = Straight Line
1 5 = 150% DB
2 0 = 200% DB
3 0 = Tax Same as Book
4 0 = Immediate Writeoff
5 0 = Non Depr Asset

SDG&E Financial Services

Project Cash Flows

UPFC at Talega Project

If your cash flows do not already reflect future inflation, the model can automatically adjust them for inflation.

DO YOU WANT THE MODEL TO ESCALATE OUT-YEAR CASH FLOWS?

N

(Enter Y for yes, N for no.)

	Year 1 1999	Year 2 2000	Year 3 2001	Year 4 2002	Year 5 2003	Year 6 2004	Year 7 2005	Year 8 2006
Cash Flow In								
Load Growth	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Revenue 2	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0
==> Total	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Cash Flow Out								
O & M	0	0	494,149	507,985	522,716	538,398	555,088	573,406
Expense 2	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0
==> Total	0	0	494,149	507,985	522,716	538,398	555,088	573,406

UPFC at Talega Project

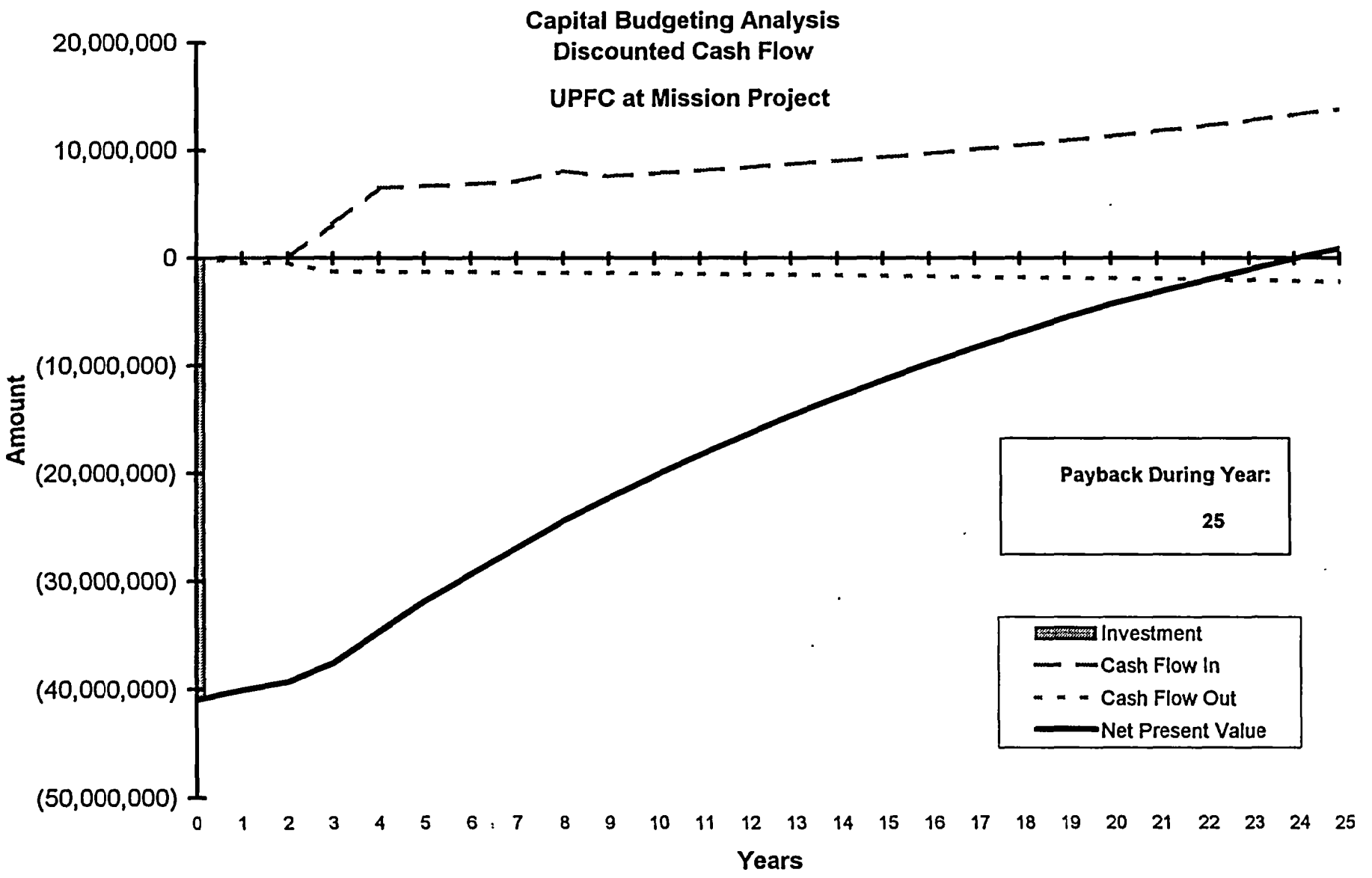
	Year 9 *2007*	*Year 10* *2008*	*Year 11* *2009*	*Year 12* *2010*	*Year 13* *2011*	*Year 14* *2012*	*Year 15* *2013*	*Year 16* *2014*	*Year 17* *2015*	*Year 18* *2016*	*Year 19* *2017*
Cash Flow In											
Load Growth	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Cash Flow Out											
O & M	592,902	613,061	634,518	657,360	681,683	706,905	733,767	761,651	790,593	821,426	853,462
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	592,902	613,061	634,518	657,360	681,683	706,905	733,767	761,651	790,593	821,426	853,462

UPFC at Talega Project

	Year 20 *2018*	*Year 21* *2019*	*Year 22* *2020*	*Year 23* *2021*	*Year 24* *2022*	*Year 25* *2023*	*Year 26* *2024*	*Year 27* *2025*	*Year 28* *2026*	*Year 29* *2027*	*Year 30* *2028*
Cash Flow In											
Load Growth	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Cash Flow Out											
O & M	887,601	923,105	960,029	998,430	1,038,367	1,079,902	1,123,098	1,168,022	1,214,743	1,263,332	1,313,866
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	887,601	923,105	960,029	998,430	1,038,367	1,079,902	1,123,098	1,168,022	1,214,743	1,263,332	1,313,866

UPFC at Talega Project

	Year 31 2029	*Year 32* 2030	*Year 33* 2031	*Year 34* 2032	*Year 35* 2033
Cash Flow In					
Load Growth	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Revenue 2	0	0	0	0	0
Revenue 3	0	0	0	0	0
Revenue 4	0	0	0	0	0
Revenue 5	0	0	0	0	0
==> Total	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Cash Flow Out					
O & M	1,366,420	1,421,077	1,477,920	1,537,037	1,598,519
Expense 2	0	0	0	0	0
Expense 3	0	0	0	0	0
Expense 4	0	0	0	0	0
Expense 5	0	0	0	0	0
Expense 6	0	0	0	0	0
Expense 7	0	0	0	0	0
==> Total	1,366,420	1,421,077	1,477,920	1,537,037	1,598,519


Capital Budgeting Analysis
Discounted Cash Flow
UPFC at Mission Project
20,000,000
10,000,000
0
(10,000,000)
(20,000,000)
(30,000,000)
(40,000,000)
(50,000,000)
Amount
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Years
Payback During Year:
25
Investment
Cash Flow In
Cash Flow Out
Net Present Value

SDG&E Financial Services

UPFC at Mission Project

DCF Results

Summary	
NPV of Project:	$ 6,879,220
Profitability Index:	1.2

WACC = 8.25%

SDG&E Financial Services

Investments Input (maximum of five investments)

UPFC at Mission Project

Investment 1	UPFC at Mission
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ 40,967,000.00
Investment Amt. (Escal.)	$ 40,967,000.00
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 2	Name of Asset 2
Input Data	
Inv. Made at Beg. of Yr.:	2
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 3	Name of Asset 3
Input Data	
Inv. Made at Beg. of Yr.:	3
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-80%
Property Tax? (0 = No, 1 = Yes)	1

Investment 4	Name of Asset 4
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0.0
State Tax Method (See codes at right)	0.0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Investment 5	Name of Asset 5
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0.0
State Tax Method (See codes at right)	0.0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Tax Method Codes

Federal

1.0 = Straight Line
1.5 = 150% DB
2.0 = 200% DB
3.0 = Tax Same as Book
4.0 = Immediate Writeoff
5.0 = Non Depr Asset

State

1.0 = Straight Line
1.5 = 150% DB
2.0 = 200% DB
3.0 = Tax Same as Book
4.0 = Immediate Writeoff
5.0 = Non Depr Asset

SDG&E Financial Services

Project Cash Flows

UPFC at Mission Project

If your cash flows do not already reflect future inflation, the model can automatically adjust them for inflation.

DO YOU WANT THE MODEL TO ESCALATE OUT-YEAR CASH FLOWS?

N

(Enter Y for yes, N for no.)

	Year 1 *1999*	*Year 2* *2000*	*Year 3* *2001*	*Year 4* *2002*	*Year 5* *2003*	*Year 6* *2004*	*Year 7* *2005*	*Year 8* *2006*
Cash Flow In								
Load Growth	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Revenue 2	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0
==> Total	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Cash Flow Out								
O & M	0	0	795,872	818,156	841,883	867,139	894,020	923,523
Expense 2	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0
==> Total	0	0	795,872	818,156	841,883	867,139	894,020	923,523

UPFC at Mission Projec

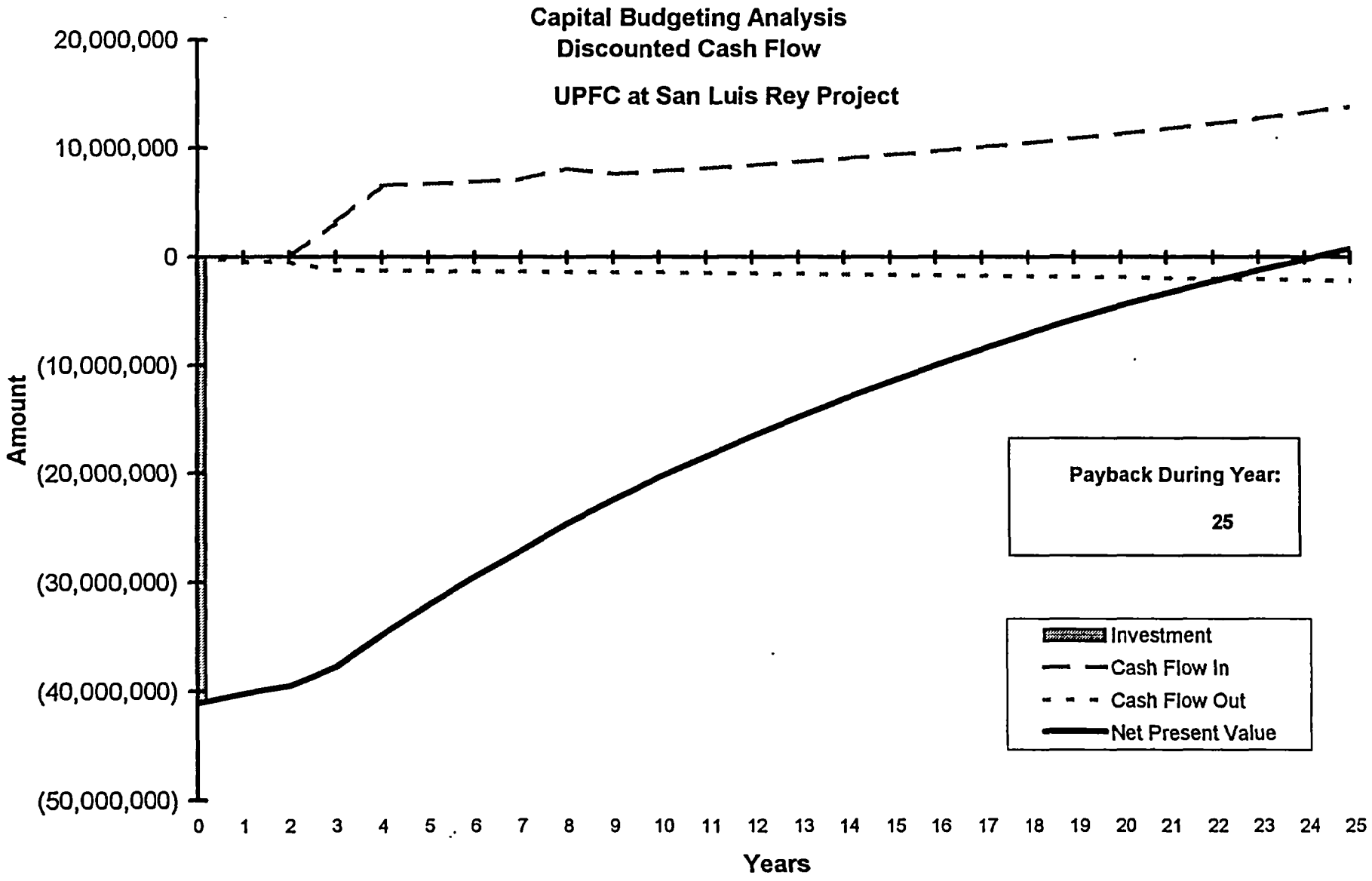
	Year 9 *2007*	*Year 10* *2008*	*Year 11* *2009*	*Year 12* *2010*	*Year 13* *2011*	*Year 14* *2012*	*Year 15* *2013*	*Year 16* *2014*	*Year 17* *2015*	*Year 18* *2016*	*Year 19* *2017*
Cash Flow In											
Load Growth	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Cash Flow Out											
O & M	954,923	987,390	1,021,949	1,058,739	1,097,912	1,138,535	1,181,799	1,226,708	1,273,323	1,322,982	1,374,579
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	954,923	987,390	1,021,949	1,058,739	1,097,912	1,138,535	1,181,799	1,226,708	1,273,323	1,322,982	1,374,579

UPFC at Mission Projec

	Year 20 *2018*	*Year 21* *2019*	*Year 22* *2020*	*Year 23* *2021*	*Year 24* *2022*	*Year 25* *2023*	*Year 26* *2024*	*Year 27* *2025*	*Year 28* *2026*	*Year 29* *2027*	*Year 30* *2028*
Cash Flow In											
Load Growth	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Cash Flow Out											
O & M	1,429,562	1,486,744	1,546,214	1,608,063	1,672,385	1,739,281	1,808,852	1,881,206	1,956,454	2,034,712	2,116,101
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	1,429,562	1,486,744	1,546,214	1,608,063	1,672,385	1,739,281	1,808,852	1,881,206	1,956,454	2,034,712	2,116,101

UPFC at Mission Projec

	Year 31 2029	*Year 32* 2030	*Year 33* 2031	*Year 34* 2032	*Year 35* 2033
Cash Flow In					
Load Growth	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Revenue 2	0	0	0	0	0
Revenue 3	0	0	0	0	0
Revenue 4	0	0	0	0	0
Revenue 5	0	0	0	0	0
==> Total	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Cash Flow Out					
O & M	2,200,745	2,288,774	2,380,325	2,475,538	2,574,560
Expense 2	0	0	0	0	0
Expense 3	0	0	0	0	0
Expense 4	0	0	0	0	0
Expense 5	0	0	0	0	0
Expense 6	0	0	0	0	0
Expense 7	0	0	0	0	0
==> Total	2,200,745	2,288,774	2,380,325	2,475,538	2,574,560


Capital Budgeting Analysis
Discounted Cash Flow
UPFC at San Luis Rey Project
20,000,000
10,000,000
0
(10,000,000)
(20,000,000)
(30,000,000)
(40,000,000)
(50,000,000)
Amount
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Years
Payback During Year:
25
Investment
Cash Flow In
Cash Flow Out
Net Present Value

SDG&E Financial Services

UPFC at San Luis Rey Project

DCF Results

Summary	
NPV of Project:	$ 6,713,439
Profitability Index:	1.2

WACC = 8.25%

SDG&E Financial Services

Investments Input (maximum of five investments)

UPFC at San Luis Rey Project

Investment 1	UPFC at MS & TA
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ 41,122,000.00
Investment Amt. (Escal.)	$ 41,122,000.00
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 2	Name of Asset 2
Input Data	
Inv. Made at Beg. of Yr.:	2
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 3	Name of Asset 3
Input Data	
Inv. Made at Beg. of Yr.:	3
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-80%
Property Tax? (0 = No, 1 = Yes)	1

Investment 4	Name of Asset 4
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0.0
State Tax Method (See codes at right)	0.0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Investment 5	Name of Asset 5
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0.0
State Tax Method (See codes at right)	0.0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Tax Method Codes

Federal

1.0 = Straight Line
1.5 = 150% DB
2.0 = 200% DB
3.0 = Tax Same as Book
4.0 = Immediate Writeoff
5.0 = Non Depr Asset

State

1.0 = Straight Line
1.5 = 150% DB
2.0 = 200% DB
3.0 = Tax Same as Book
4.0 = Immediate Writeoff
5.0 = Non Depr Asset

SDG&E Financial Services

Project Cash Flows

UPFC at San Luis Rey Project

If your cash flows do not already reflect future inflation, the model can automatically adjust them for inflation.

DO YOU WANT THE MODEL TO ESCALATE OUT-YEAR CASH FLOWS?

N

(Enter Y for yes, N for no.)

	Year 1 *1999*	*Year 2* *2000*	*Year 3* *2001*	*Year 4* *2002*	*Year 5* *2003*	*Year 6* *2004*	*Year 7* *2005*	*Year 8* *2006*
Cash Flow In								
Load Growth	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Revenue 2	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0
==> Total	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Cash Flow Out								
O & M	0	0	798,883	821,252	845,068	870,420	897,403	927,017
Expense 2	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0
==> Total	0	0	798,883	821,252	845,068	870,420	897,403	927,017

UPFC at San Luis Rey P

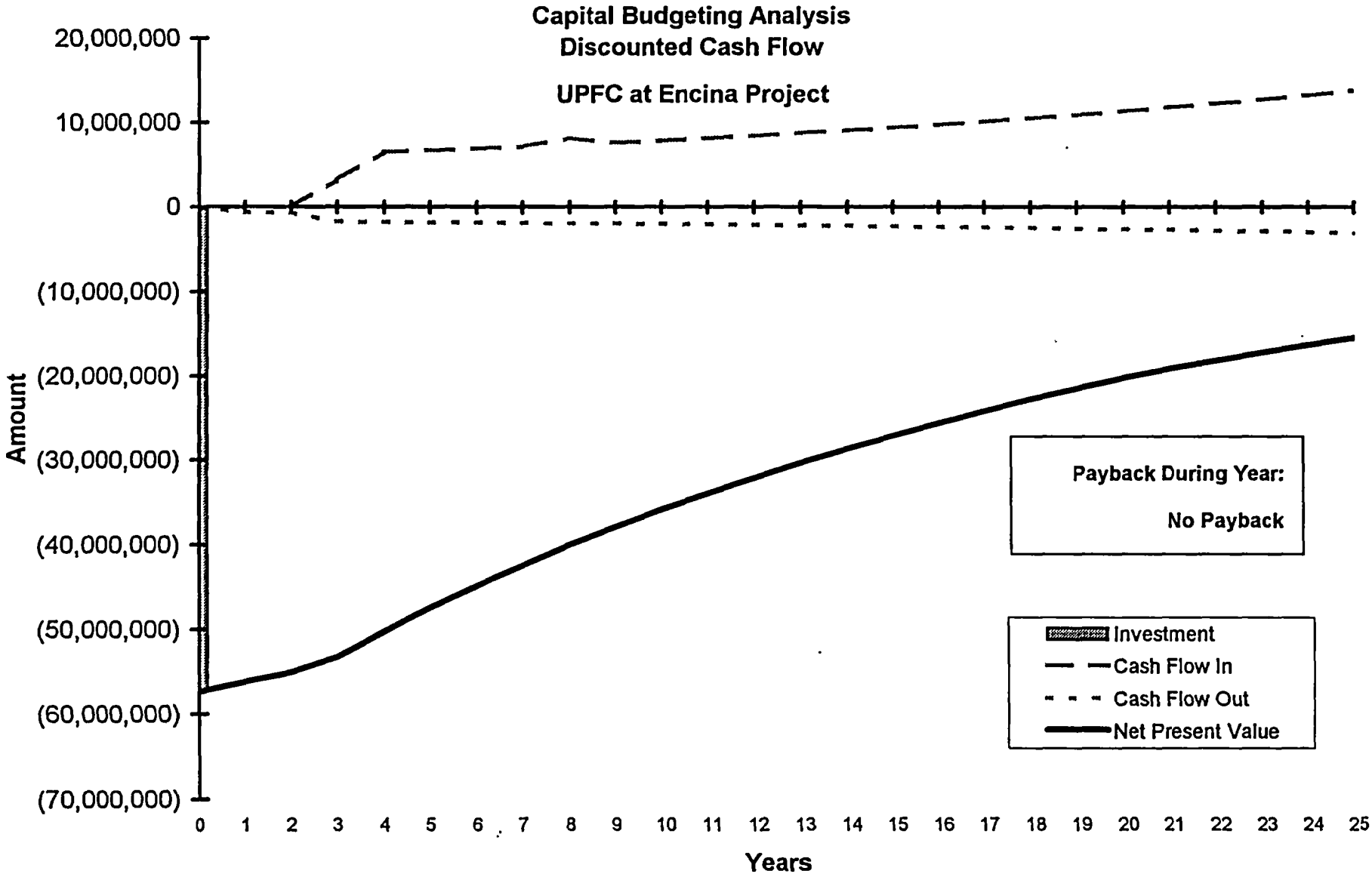
	Year 9 *2007*	*Year 10* *2008*	*Year 11* *2009*	*Year 12* *2010*	*Year 13* *2011*	*Year 14* *2012*	*Year 15* *2013*	*Year 16* *2014*	*Year 17* *2015*	*Year 18* *2016*	*Year 19* *2017*
Cash Flow In											
Load Growth	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Cash Flow Out											
O & M	958,536	991,126	1,025,815	1,062,745	1,102,066	1,142,843	1,186,271	1,231,349	1,278,140	1,327,988	1,379,779
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	958,536	991,126	1,025,815	1,062,745	1,102,066	1,142,843	1,186,271	1,231,349	1,278,140	1,327,988	1,379,779

UPFC at San Luis Rey P

	Year 20 *2018*	*Year 21* *2019*	*Year 22* *2020*	*Year 23* *2021*	*Year 24* *2022*	*Year 25* *2023*	*Year 26* *2024*	*Year 27* *2025*	*Year 28* *2026*	*Year 29* *2027*	*Year 30* *2028*
Cash Flow In											
Load Growth	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Cash Flow Out											
O & M	1,434,971	1,492,369	1,552,064	1,614,147	1,678,713	1,745,861	1,815,696	1,888,323	1,963,856	2,042,411	2,124,107
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	1,434,971	1,492,369	1,552,064	1,614,147	1,678,713	1,745,861	1,815,696	1,888,323	1,963,856	2,042,411	2,124,107

UPFC at San Luis Rey P

	Year 31 *2029*	*Year 32* *2030*	*Year 33* *2031*	*Year 34* *2032*	*Year 35* *2033*
Cash Flow In					
Load Growth	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Revenue 2	0	0	0	0	0
Revenue 3	0	0	0	0	0
Revenue 4	0	0	0	0	0
Revenue 5	0	0	0	0	0
==> Total	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Cash Flow Out					
O & M	2,209,071	2,297,434	2,389,332	2,484,905	2,584,301
Expense 2	0	0	0	0	0
Expense 3	0	0	0	0	0
Expense 4	0	0	0	0	0
Expense 5	0	0	0	0	0
Expense 6	0	0	0	0	0
Expense 7	0	0	0	0	0
==> Total	2,209,071	2,297,434	2,389,332	2,484,905	2,584,301


Capital Budgeting Analysis
Discounted Cash Flow
UPFC at Encina Project
20,000,000
10,000,000
0
(10,000,000)
(20,000,000)
(30,000,000)
(40,000,000)
(50,000,000)
(60,000,000)
(70,000,000)
Amount
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Years
Payback During Year:
No Payback
Investment
Cash Flow In
Cash Flow Out
Net Present Value

SDG&E Financial Services

UPFC at Encina Project

DCF Results

Summary	
NPV of Project:	$ (10,675,060)
Profitability Index:	0.8
WACC =	8.25%

SDG&E Financial Services

Investments Input (maximum of five investments)

UPFC at Encina Project

Investment 1	UPFC at Mission
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ 57,380,000 00
Investment Amt. (Escal.)	$ 57,380,000 00
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 2	Name of Asset 2
Input Data	
Inv. Made at Beg. of Yr.:	2
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1 5
State Tax Method (See codes at right)	2 0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 3	Name of Asset 3
Input Data	
Inv. Made at Beg. of Yr.:	3
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1 5
State Tax Method (See codes at right)	2 0
Net Salvage %	-80%
Property Tax? (0 = No, 1 = Yes)	1

Investment 4	Name of Asset 4
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0 0
State Tax Method (See codes at right)	0 0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Investment 5	Name of Asset 5
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0 0
State Tax Method (See codes at right)	0 0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Tax Method Codes

Federal

1 0 = Straight Line
1.5 = 150% DB
2 0 = 200% DB
3 0 = Tax Same as Book
4 0 = Immediate Writeoff
5 0 = Non Depr Asset

State

1 0 = Straight Line
1 5 = 150% DB
2 0 = 200% DB
3 0 = Tax Same as Book
4 0 = Immediate Writeoff
5 0 = Non Depr Asset

SDG&E Financial Services

Project Cash Flows

UPFC at Encina Project

If your cash flows do not already reflect future inflation, the model can automatically adjust them for inflation.

DO YOU WANT THE MODEL TO ESCALATE OUT-YEAR CASH FLOWS?

N

(Enter Y for yes, N for no.)

	Year 1 *1999*	*Year 2* *2000*	*Year 3* *2001*	*Year 4* *2002*	*Year 5* *2003*	*Year 6* *2004*	*Year 7* *2005*	*Year 8* *2006*
Cash Flow In								
Load Growth	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Revenue 2	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0
==> Total	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Cash Flow Out								
O & M	0	0	1,114,729	1,145,942	1,179,174	1,214,549	1,252,200	1,293,523
Expense 2	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0
==> Total	0	0	1,114,729	1,145,942	1,179,174	1,214,549	1,252,200	1,293,523

UPFC at Encina Project

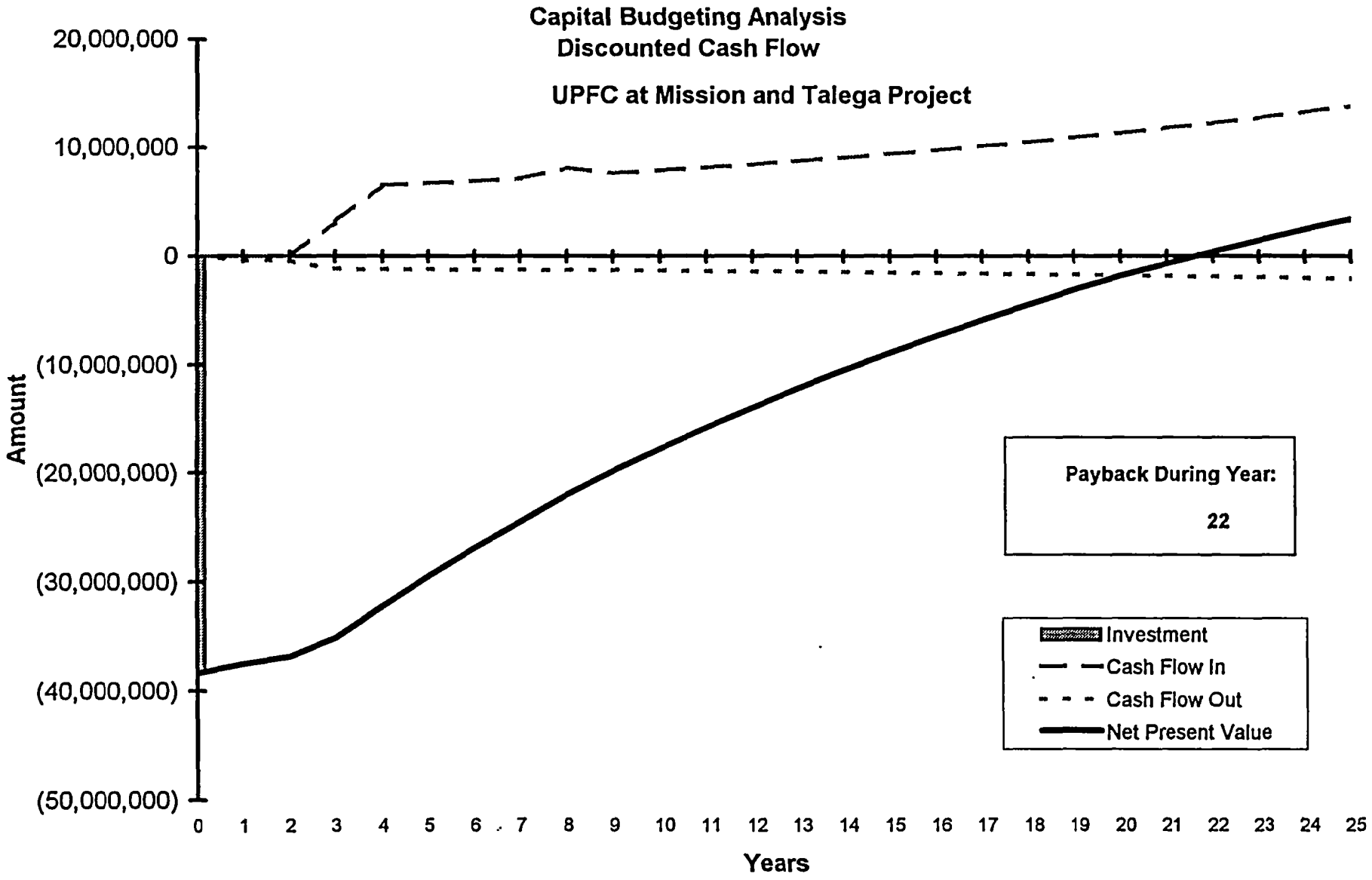
	Year 9 *2007*	*Year 10* *2008*	*Year 11* *2009*	*Year 12* *2010*	*Year 13* *2011*	*Year 14* *2012*	*Year 15* *2013*	*Year 16* *2014*	*Year 17* *2015*	*Year 18* *2016*	*Year 19* *2017*
Cash Flow In											
Load Growth	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Cash Flow Out											
O & M	1,337,503	1,382,978	1,431,382	1,482,912	1,537,779	1,594,677	1,655,275	1,718,176	1,783,466	1,853,021	1,925,289
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	1,337,503	1,382,978	1,431,382	1,482,912	1,537,779	1,594,677	1,655,275	1,718,176	1,783,466	1,853,021	1,925,289

UPFC at Encina Project

	Year 20 *2018*	*Year 21* *2019*	*Year 22* *2020*	*Year 23* *2021*	*Year 24* *2022*	*Year 25* *2023*	*Year 26* *2024*	*Year 27* *2025*	*Year 28* *2026*	*Year 29* *2027*	*Year 30* *2028*
Cash Flow In											
Load Growth	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Cash Flow Out											
O & M	2,002,301	2,082,393	2,165,689	2,252,316	2,342,409	2,436,105	2,533,549	2,634,891	2,740,287	2,849,898	2,963,894
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	2,002,301	2,082,393	2,165,689	2,252,316	2,342,409	2,436,105	2,533,549	2,634,891	2,740,287	2,849,898	2,963,894

UPFC at Encina Project

	Year 31 *2029*	*Year 32* *2030*	*Year 33* *2031*	*Year 34* *2032*	*Year 35* *2033*
Cash Flow In					
Load Growth	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Revenue 2	0	0	0	0	0
Revenue 3	0	0	0	0	0
Revenue 4	0	0	0	0	0
Revenue 5	0	0	0	0	0
==> Total	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Cash Flow Out					
O & M	3,082,450	3,205,748	3,333,978	3,467,337	3,606,031
Expense 2	0	0	0	0	0
Expense 3	0	0	0	0	0
Expense 4	0	0	0	0	0
Expense 5	0	0	0	0	0
Expense 6	0	0	0	0	0
Expense 7	0	0	0	0	0
==> Total	3,082,450	3,205,748	3,333,978	3,467,337	3,606,031


Capital Budgeting Analysis
Discounted Cash Flow
UPFC at Mission and Talega Project
20,000,000
10,000,000
0
(10,000,000)
(20,000,000)
(30,000,000)
(40,000,000)
(50,000,000)
Amount
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Years
Payback During Year:
22
Investment
Cash Flow In
Cash Flow Out
Net Present Value

SDG&E Financial Services

UPFC at Mission and Talega Project

DCF Results

Summary	
NPV of Project:	$ 9,622,578
Profitability Index:	1.3
WACC =	8.25%

SDG&E Financial Services

Investments Input (maximum of five investments)

UPFC at Mission and Talega Project

Investment 1	UPFC at MS & TA
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ 38,402,000 00
Investment Amt. (Escal.)	$ 38,402,000 00
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 2	Name of Asset 2
Input Data	
Inv. Made at Beg. of Yr.:	2
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-100%
Property Tax? (0 = No, 1 = Yes)	1

Investment 3	Name of Asset 3
Input Data	
Inv. Made at Beg of Yr.:	3
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	20
State Tax Life	30
Useful Life to SDG&E	33
Federal Tax Method (See codes at right)	1.5
State Tax Method (See codes at right)	2.0
Net Salvage %	-80%
Property Tax? (0 = No, 1 = Yes)	1

Investment 4	Name of Asset 4
Input Data	
Inv. Made at Beg. of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0 0
State Tax Method (See codes at right)	0 0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Investment 5	Name of Asset 5
Input Data	
Inv. Made at Beg of Yr.:	1
Escalate Investment? (0 = No, 1 = Yes)	0
Inv. Amt. (In Today's $)	$ -
Investment Amt. (Escal.)	$ -
Federal Tax Life	0
State Tax Life	0
Useful Life to SDG&E	0
Federal Tax Method (See codes at right)	0 0
State Tax Method (See codes at right)	0 0
Net Salvage %	0%
Property Tax? (0 = No, 1 = Yes)	1

Tax Method Codes

Federal

1 0 = Straight Line
1 5 = 150% DB
2 0 = 200% DB
3 0 = Tax Same as Book
4 0 = Immediate Writeoff
5 0 = Non Depr Asset

State

1 0 = Straight Line
1 5 = 150% DB
2 0 = 200% DB
3 0 = Tax Same as Book
4 0 = Immediate Writeoff
5 0 = Non Depr Asset

SDG&E Financial Services

Project Cash Flows

UPFC at Mission and Talega Project

If your cash flows do not already reflect future inflation, the model can automatically adjust them for inflation.

DO YOU WANT THE MODEL TO ESCALATE OUT-YEAR CASH FLOWS?

N

(Enter Y for yes, N for no.)

	Year 1 *1999*	*Year 2* *2000*	*Year 3* *2001*	*Year 4* *2002*	*Year 5* *2003*	*Year 6* *2004*	*Year 7* *2005*	*Year 8* *2006*
Cash Flow In								
Load Growth	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Revenue 2	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0
==> Total	0	0	3,162,788	6,506,777	6,696,214	6,893,889	7,108,036	8,079,934
Cash Flow Out								
O & M	0	0	746,041	766,930	789,171	812,846	838,045	865,700
Expense 2	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0
==> Total	0	0	746,041	766,930	789,171	812,846	838,045	865,700

UPFC at Mission and Ta

	Year 9 2007	Year 10 2008	Year 11 2009	Year 12 2010	Year 13 2011	Year 14 2012	Year 15 2013	Year 16 2014	Year 17 2015	Year 18 2016	Year 19 2017
Cash Flow In											
Load Growth	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	7,585,748	7,841,078	8,112,880	8,401,155	8,714,139	9,035,359	9,381,289	9,735,456	10,106,095	10,501,443	10,913,264
Cash Flow Out											
O & M	895,134	925,568	957,963	992,450	1,029,171	1,067,250	1,107,805	1,149,902	1,193,598	1,240,149	1,288,514
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	895,134	925,568	957,963	992,450	1,029,171	1,067,250	1,107,805	1,149,902	1,193,598	1,240,149	1,288,514

UPFC at Mission and Ta

	Year 20 *2018*	*Year 21* *2019*	*Year 22* *2020*	*Year 23* *2021*	*Year 24* *2022*	*Year 25* *2023*	*Year 26* *2024*	*Year 27* *2025*	*Year 28* *2026*	*Year 29* *2027*	*Year 30* *2028*
Cash Flow In											
Load Growth	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Revenue 2	0	0	0	0	0	0	0	0	0	0	0
Revenue 3	0	0	0	0	0	0	0	0	0	0	0
Revenue 4	0	0	0	0	0	0	0	0	0	0	0
Revenue 5	0	0	0	0	0	0	0	0	0	0	0
==> Total	11,349,795	11,802,798	12,272,275	12,766,460	13,277,119	13,804,250	14,356,091	14,932,640	15,533,899	16,151,631	16,794,073
Cash Flow Out											
O & M	1,340,055	1,393,657	1,449,403	1,507,380	1,567,675	1,630,382	1,695,597	1,763,421	1,833,958	1,907,316	1,983,609
Expense 2	0	0	0	0	0	0	0	0	0	0	0
Expense 3	0	0	0	0	0	0	0	0	0	0	0
Expense 4	0	0	0	0	0	0	0	0	0	0	0
Expense 5	0	0	0	0	0	0	0	0	0	0	0
Expense 6	0	0	0	0	0	0	0	0	0	0	0
Expense 7	0	0	0	0	0	0	0	0	0	0	0
==> Total	1,340,055	1,393,657	1,449,403	1,507,380	1,567,675	1,630,382	1,695,597	1,763,421	1,833,958	1,907,316	1,983,609

UPFC at Mission and Ta

	Year 31 *2029*	*Year 32* *2030*	*Year 33* *2031*	*Year 34* *2032*	*Year 35* *2033*
Cash Flow In					
Load Growth	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Revenue 2	0	0	0	0	0
Revenue 3	0	0	0	0	0
Revenue 4	0	0	0	0	0
Revenue 5	0	0	0	0	0
==> Total	17,469,460	18,169,556	18,894,361	19,652,112	20,434,573
Cash Flow Out					
O & M	2,062,953	2,145,471	2,231,290	2,320,542	2,413,363
Expense 2	0	0	0	0	0
Expense 3	0	0	0	0	0
Expense 4	0	0	0	0	0
Expense 5	0	0	0	0	0
Expense 6	0	0	0	0	0
Expense 7	0	0	0	0	0
==> Total	2,062,953	2,145,471	2,231,290	2,320,542	2,413,363