WDT 231

System Impact Study

December 22, 2006
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SOUTHERN CALIFORNIA
EDISON
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SOUTHERN CALIFORNIA EDISON COMPANY

Approved by:

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Engineering Manager

EXECUTIVE SUMMARY

[redacted] applied to Southern California Edison ("SCE") Transmission and Distribution Business Units (TDBU) for distribution service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"). [redacted] will own and operate a 45.0 MW generating facility [redacted] to be interconnected to a dedicated position at the [redacted] 66KV switchrack [redacted]. Distribution service pursuant to the WDAT is proposed to be from the [redacted] to the California Independent System Operator ("ISO") grid at SCE's 230 kV [redacted]. The proposed in-service date of the [redacted] is July 2, 2007.

The [redacted] is a generation system consisting of [redacted] 13.8 kV, 71.2 KVA LM6000 Gas Turbine with net generation export of 47.1 MW. The generation facility will utilize [redacted] 45 MVA, 13.8 kV/66 kV step-up transformer to interconnect the generator to the SCE's system. As requested by [redacted] SCE performed a System Impact Study to identify the general electrical system impacts of the [redacted] possible mitigation measures to maintain conformance with SCE, ISO, or other applicable reliability planning criteria, and non-binding order of magnitude cost estimates for these mitigation measures.

The System Impact Study consisted of a power flow analysis, three-phase analysis and single-line-to-ground short circuit duty to determine whether the energy associated with th[redacted] can be transmitted through SCE's system to the ISO grid at [redacted] without creating the need for modifications to SCE's system and/or the ISO grid. The study showed that, with the [redacted] Plant on-line:

- Thermal loadings on the SCE subtransmission facilities used to provide the requested WDAT service were all within criteria limits.
- No 66 kV circuit breakers and no 230 kV circuit breakers will need to be upgraded due to the [redacted]
- Appendix B details study results for the ISO-controlled transmission grid.

Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows:

Interconnection (Substation and 66kV interconnection tie)	$ 1.00M
RTU installed a[redacted]	$ 0.05M
Circuit breaker replacements (66 kV, 230 kV)	$ 0.0M
35% ITCC Tax	$ 0.37M
Total non-binding order of magnitude cost estimate	$1.42M

Additional system studies (i.e., transient stability) will not be required unless requested by a third party. Refined cost estimates will be developed in a subsequent Facilities Study if requested [redacted] Non-binding cost estimate does not include any GO 131D costs.

CONTENTS

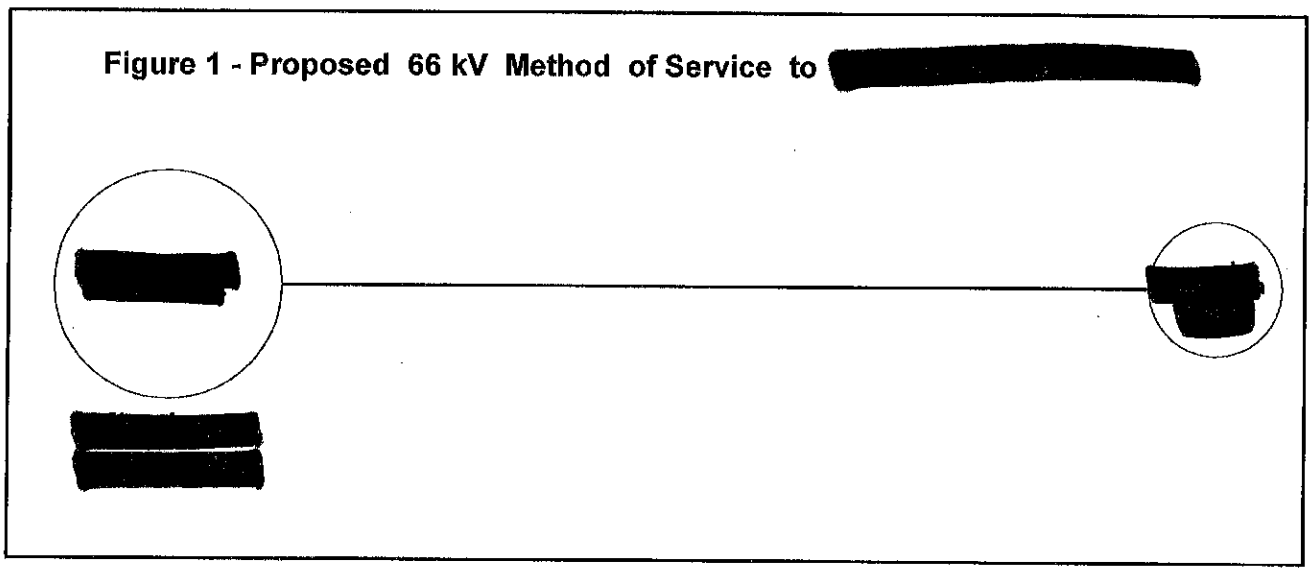
[redacted]

December 22, 2006

1. INTRODUCTION

[redacted] applied to Southern California Edison ("SCE") Transmission and Distribution Business Units (TDBU) for distribution service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"). [redacted] will own and operate a 45.0 MW generating facility [redacted] to be interconnected to a dedicated position at the [redacted] 66KV switchrack as shown on Figure 1.

Figure 1 - Proposed 66 kV Method of Service to [redacted]



Distribution service pursuant to the WDAT is proposed to be from the [redacted] to the California Independent System Operator ("ISO") grid at SCE's 230 kV [redacted] The proposed in-service date of the [redacted] is July 2, 2007.

The [redacted] is a generation system consisting of [redacted] 13.8 kV, 71.2 KVA LM6000 Gas Turbine with net generation export of 47.1 MW. The generation facility will utilize [redacted] 45 MVA, 13.8 kV/66 kV step-up transformer to interconnect the generator to the SCE's system. As requested by [redacted] SCE performed a System Impact Study to identify the general electrical system impacts of the [redacted] possible mitigation measures to maintain conformance with SCE, ISO, or other applicable reliability planning criteria, and non-binding order of magnitude cost estimates for these mitigation measures.

The System Impact Study consisted of a power flow analysis, three-phase analysis and single-line-to-ground short circuit duty to determine whether the energy associated with the [redacted] Plant can be transmitted through SCE's system to the ISO grid at [redacted], without creating the need for modifications to SCE's system and/or the ISO grid. This report describes the study conditions and assumptions and presents the results of the power flow and short-circuit duty analyses on SCE's [redacted] 66 kV subtransmission system. Appendix B details study results for the ISO-controlled transmission grid.

2. STUDY CONDITIONS AND METHODOLOGY

A. *Planning Criteria*

The study was conducted by applying SCE's planning criteria to the SCE facilities used to provide the requested WDAT service. Specifically, the main criteria applicable to this study are as follows:

Power Flow Criteria

Line loading should not exceed 100% of a conductor's thermal rating with all facilities in service (base case).

Line loading should not exceed 100% of a conductor's emergency rating with one line out of service (N-1).

Short-Circuit Duty Criteria

Short-circuit duty should not exceed a circuit breaker's interrupting capability with maximum area generation on-line.

B. *System Load Conditions*

The study considered [redacted] system load conditions: peak loads and light loads. The peak load forecast was based on SCE's 2006-2015 Distribution Substation Plan. The light load forecast was assumed to be 65% of the peak load forecast.

C. *Power Flow Study*

This study evaluated the [redacted] impact on line loadings for base case and N-1 conditions. Both peak load and light load conditions were modeled. Line loadings were monitored both with and without the [redacted] to determine if the addition of th[redacted] caused any violations of SCE's thermal loading criteria.

D. *Short-Circuit Duty Study*

This study evaluated the [redacted] impact on three-phase and phase-to- ground short-circuit duties seen by substation circuit breakers at the 66 kV level. [redacted] three-phase fault currents, X/R ratios and phase-to-ground short circuit duties were calculated both with and without the [redacted] to determine if the addition of the [redacted] caused any violations of SCE's short-circuit duty criteria.

The dataset used for the short-circuit study represented all existing generation and all projects in the queue (up to and including the [redacted] as on-line. Substations where the [redacted] increased three-phase short-circuit or the single-line-to-ground duties by 0.1 kA or more were flagged, and circuit breaker interrupting capabilities were reviewed at these substations to determine if any circuit breakers required replacement as a result of the [redacted]

3. DISCUSSION OF STUDY RESULTS

A. *Power Flow Study*

For both peak load and light load conditions, the addition of the [redacted] caused no violations of SCE's thermal loading criteria under base case conditions.
For both peak load and light load conditions, the addition of the [redacted] caused no violations of SCE's thermal loading criteria under N-1 conditions.

B. *Short-Circuit Duty Study*

Table 1 below summarizes the impact of the [redacted] on [redacted] three-phase short-circuit and single-line-to-ground duties at various 66 kV buses on the SCE system. [redacted] buses were flagged where the [redacted] increased three-phase short-circuit or the single-line- to-ground duties by 0.1 kA or more. A review of circuit breaker interrupting capabilities at these locations determined that no 66 kV circuit breakers will need to be replaced as a result of the [redacted]

Table 1: Short-Circuit Duty Summary

Bus Names	Voltage (KV)	[redacted]	[redacted]	CBs Requiring eplacement
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0
[redacted]	66			0

4. NON-BINDING ORDER OF MAGNITUDE COST ESTIMATES

Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows

Interconnection (Substation and 66kV interconnection tie)	$ 1.00M
RTU installed at [redacted]	$ 0.05M
Circuit breaker replacements (66 kV)	$ 0.0M
35% ITCC Tax	$ 0.37M
Total non-binding order of magnitude cost estimate	$1.42M

5. CONCLUSIONS

The results of this System Impact Study showed that, with the [redacted] on-line:

- Thermal loadings on the SCE subtransmission facilities used to provide the requested WDAT service were all within criteria limits.
- No 66 kV circuit breakers and no 230 kV circuit breakers will need to be upgraded due to the [redacted]
- Appendix B details study results for the ISO-controlled transmission grid.

Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows:

Interconnection (Substation and 66kV interconnection tie)	$ 1.00M
RTU installed at [redacted]	$ 0.05M
Circuit breaker replacements (66 kV, 230 kV)	$ 0.0M
35% ITCC Tax	$ 0.37M
Total non-binding order of magnitude cost estimate	$1.42M

Additional system studies (i.e., transient stability) will not be required unless requested by a third party. Refined cost estimates will be developed in a subsequent Facilities Study if requested by [redacted] Non-Binding cost estimate does not include any GO 131.

66kV System Operational Study Results
Appendix A

[redacted] applied to Southern California Edison ("SCE") Transmission and Distribution Business Units (TDBU) for distribution service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"). [redacted] will own and operate a 45.0 MW generating facility [redacted] to be interconnected to a dedicated position at the [redacted] 66KV switchrack [redacted] Distribution service pursuant to the WDAT is proposed to be from the [redacted] to the California Independent System Operator ("ISO") grid at SCE's 230 kV [redacted] The proposed in-service date of the [redacted] is July 2, 2007.

As requested by [redacted] SCE performed an Operational Study to identify the general electrical system impacts of the [redacted] and the required mitigation measures to maintain conformance with SCE, ISO, or other applicable reliability planning criteria, and non-binding order of magnitude cost estimates for these mitigation measures.

The Study Conditions and Methodology are similar to those in the System Impact Study except that the dataset used for the short-circuit study analysis represented all existing generation and all projects which are expected to be on line by July 2, 2007 (including the [redacted]. Substations where the [redacted] increased short-circuit duties (three phase or phase to ground) by 0.1 kA or more were flagged, and circuit breaker interrupting capabilities were reviewed at these substations to determine if any circuit breakers required replacement as a result of the [redacted]

The Operational Study showed that, with the [redacted] on-line:

- Thermal loadings on the SCE transmission and subtransmission facilities used to provide the requested WDAT service were all within criteria limits.
- No 66 kV circuit breakers will need to be replaced due to the [redacted]

Bus Names	Vol (k	CBs uiring icement
[redacted]		0
		0
		0
		0
		0
		0
		0
		0
		0
		0
		0

Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows:

Interconnection (Substation and 66kV interconnection tie)	$ 1.00M
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Additional system studies (i.e., transient stability) will not be required unless requested by a third party. Refined cost estimates will be developed in a subsequent Facilities Study if requested [redacted] Non-binding cost estimate does not include any GO 131D costs.

[redacted]

WHOLESALE DISTRIBUTION ACCESS TARIFF
LARGE GENERATOR INTERCONNECTION

SYSTEM IMPACT STUDY

December 15, 2006

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SYSTEM IMPACT STUDY

EXECUTIVE SUMMARY

INTRODUCTION

[redacted] applied to the Southern California Edison - Transmission and Distribution Business Unit (TDBU) for Interconnection pursuant to Wholesale Distribution Access Tariff (WDAT). [redacted] proposed to interconnect a new 45.03 MW generation projec[redacted] to the 66kV bus at [redacted]. The in-service date proposed by [redacted]s July 2, 2007. ***The study accuracy and the results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by*** [redacted]

Southern California Edison's Transmission & Interconnection Planning (SCE - TIP) has performed a System Impact Study (SIS) to determine the adequacy of SCE's Transmission System to accommodate the [redacted] The results of the SIS will be used as the basis to determine project cost allocation for facility upgrades in the Facilities Study. The study indicates that the system is adequate to accommodate the 45.03 MW of generation without transmission line modifications. However, Circuit Breaker replacements for greater capacity, are required. A Facilities Study will be required for the [redacted]

POWER FLOW STUDY RESULTS

The power flow study results show that no overloading problems are found on the transmission lines for base-case, N-1 and N-2 contingencies. Specifically:

Base Case (Spring and Summer Conditions)

There were no base case overloads attributed to [redacted]

Single Contingencies (Spring and Summer Conditions)

There were no single contingency overloads attributed to [redacted]

Double Contingencies (Spring and Summer Conditions)

There were no double contingency overloads attributed to [redacted]

There were overloads under both Single and Double Contingencies that were identified on the [redacted] – Walnut 230 kV line. The overloaded elements consist of terminal equipment which has already been identified by SCE to be replaced under the SERP program. These upgrades cause the loading to be under the allowable limits.

TRANSIENT STABILITY AND POST TRANSIENT STUDIES

SCE used study findings from earlier Interconnection Studies for large projects electrically proximate to this project and concluded that there are no transient stability and post transient impacts to the SCE transmission system from this proposed project.

SHORT CIRCUIT DUTY STUDY

The data provided by [redacted] has been used to study the Short Circuit Duty contribution by the project on the affected Transmission System substation circuit breakers. The addition of the Project has impacted multiple 500 kV and 230 kV substations with increases in the Short Circuit Duty. Apparatus Engineering has evaluated our existing breakers and determined that there maybe a need for circuit breaker upgrades.

THREE-PHASE FAULT DUTY
The addition of the project has impacted [redacted] 500kV substations and [redacted] 230kV substations with short circuit duty increases greater than 0.1kA

SINGLE – LINE TO GROUND FAULT DUTY
The addition of the project has impacted [redacted] 230kV substations with short circuit duty increases greater than 0.1kA.

See Tables 4.1 and 4.2 for more information

SCOPE OF WORK

The scope of work to accommodate the generation interconnection on the SCE Transmission System is listed below. This study has not assumed overload or short circuit mitigation requirements for projects ahead of it on the queue. The scope of work listed below are upgrades to mitigate pre-existing overloads, upon which this Project further increases the amount of overload, based on the current queue, at the time of this study.

1) No SCE Transmission System related components (Circuit Breakers and Transmission Lines) are triggered by the [redacted]. Distribution related components will be addressed by the Field Engineering SIS. The [redacted] is only exposed to Case B costs triggered by projects ahead of [redacted] in the queue. Please see Appendix A for more information.

COST OF UPGRADES

There is no cost of upgrades for the Transmission System assigned to the project, at this time. However, the assignment of network upgrade costs could change if the interconnection queue changes.

Note: Study results may be affected by changes in other projects ahead of the queue in the area. A re-study may be required if there are changes in the project queue or the scope of projects ahead in the queue. All cost estimates are rough order of magnitude, and are non-binding cost estimates.

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WHOLESALE DISTRIBUTION ACCESS TARIFF
LARGE GENERATOR INTERCONNECTION PROCEDURES

SYSTEM IMPACT STUDY

SOUTHERN CALIFORNIA EDISON - TRANSMISSION SYSTEM

INTRODUCTION

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Southern California Edison's Transmission & Interconnection Planning (SCE - TIP) has performed a System Impact Study to determine the adequacy of SCE's transmission system to accommodate the [redacted] The study indicates that the system is adequate to accommodate the 45.03 MW of generation without transmission line modifications. However, Circuit Breaker replacements, for greater capacity, are required. A Facilities Study will be required for the [redacted]

The results of the System Impact Study will be used as the basis to determine project cost allocation for facility upgrades in the Facilities Study. ***The study accuracy and the results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by*** [redacted] Any changes from the attached data could void the study results.

The study was performed for two system conditions: (a) 2007 heavy summer load forecast (one-in-ten-year heat wave assumption) with maximum SCE Eastern area generation, and (b) 2008 spring load forecast (65% of 2008 heavy summer peak load) with maximum SCE Eastern area generation. These conditions reflect the most critical expected loading condition for the transmission system in SCE's Eastern area.

STUDY CONDITIONS AND ASSUMPTIONS

A. Planning Criteria

The System Impact Study was conducted by applying the California Independent System Operator (CAISO) Reliability Criteria. More specifically, the main criteria applicable to this study are as follows:

Power Flow Assessment

The following contingencies are considered for transmission and subtransmission lines and 500/230 kV transformer banks ("AA-Banks"):

Assuming the largest unit (San Onofre [redacted]) initially off and then:

- Single Contingencies (loss of [redacted] line or [redacted] AA-Bank)

Assuming both San Onofre Units in service and then:

- Single Contingencies (loss of [redacted] line or [redacted] AA-Bank)
- Double Contingencies (loss of [redacted] lines or [redacted] line and [redacted] AA-Bank)
  (Outages of [redacted] AA-Banks are beyond the Planning Criteria)

The following criteria are used:

Transmission Lines	Base Case N-1 N-2	Limiting Component Normal Rating Limiting Component A-Rating Limiting Component B-Rating
AA-Banks	Base Case Long Term & Short Term	Normal Loading Rating As defined by SCE Operating Bulletin

System upgrades or Special Protection Schemes for transmission lines are generally recommended only for base case overloads, single contingency overloads in excess of the A-rating, and common mode failure double contingencies in excess of the B-rating.

Congestion Assessment

The following principles were used in determining whether congestion management, special protection schemes, or facility upgrades are required to mitigate base case, single contingency, or double contingency overloads:

- Congestion management, as a means to mitigate base case overloads, can be used if it is determined to be manageable and the CAISO concurs with the implementation.

- Facility upgrades will be required if it is determined that the use of congestion management is unmanageable as defined in the congestion management section that follows.

- Special protection schemes (SPS), in lieu of facility upgrades, will be recommended if the scheme is effective, does not jeopardize system integrity, does not exceed the current CAISO single and double contingency tripping limitations, does not adversely effect existing or proposed special protection schemes in the area, and can be readily implemented.

- Facility upgrades will be required if use of protection schemes is determined to be ineffective, the amount of tripping exceeds the current CAISO single and double contingency tripping limitations, adverse impacts are identified on existing or currently proposed special protection schemes, or the scheme cannot be readily implemented.

- Congestion management in preparation for the next contingency will be required, with CAISO concurrence, if no facility upgrades or special protection schemes are implemented.

The following study method was implemented to assess the extent of possible congestion:

a) Under Base Case with all transmission facilities in service, the system was evaluated with all existing interconnected generation and all generation requests in the area that have a queue position ahead of this request (pre-project).

b) Under Base Case with all transmission facilities in service, the system was reevaluated with the inclusion of th[redacted] (post-project).

If the normal loading limits of facilities are exceeded in (a), the overload is identified as an existing overload that was triggered by a project in queue ahead of th[redacted]. If the normal loading limits of facilities are exceeded in (b) and were not exceeded in (a), the overload is identified as triggered by the addition of the [redacted] The [redacted], assuming it is a market participant, and other market participants in the area may be subjected to congestion management, potential upgrade cost and/or participation of any proposed special protection scheme if the project addition aggravates or triggers the overload. Additionally, th[redacted] may have to participate in mitigation of overloads triggered by subsequent projects in queue, subject to FERC protocols and policies.

In order for congestion management to be a feasible alternative to system facilities, all of the following factors need to be satisfied:

- Time requirements for necessary coordination and communication between the CAISO operators, scheduling operators and SCE operators.
- Distinct Path/Corridor rating should be well defined so monitoring and detecting congestion and implementing congestion of the contributing generation resources can be performed when limits are exceeded.
- Sufficient amount of market generation in either side of the congested path/corridor should be available to eliminate market power.

- Manageable generation in the affected area is necessary so that operators can implement congestion management if required (i.e. the dispatch schedule is known and controllable).

The results of these studies should identify:

a. if capacity is available to accommodate the proposed [redacted] and all projects ahead in queue without the need for congestion management, special protection schemes, or facility upgrades

b. if overloads exist in the area after the addition of all projects in queue ahead of the [redacted] and all facilities in service

c. if congestion exists in the area with the addition of the [redacted] and all projects ahead in queue under single and double element outage conditions assuming no new special protection schemes are in place

d. if sufficient capacity is maintained to accommodate all Must-Run and Regulatory Must-Take generation resources with all facilities in service

e. if sufficient capacity is maintained to accommodate the total output of any one generation resource which is not classified as Must-Run.

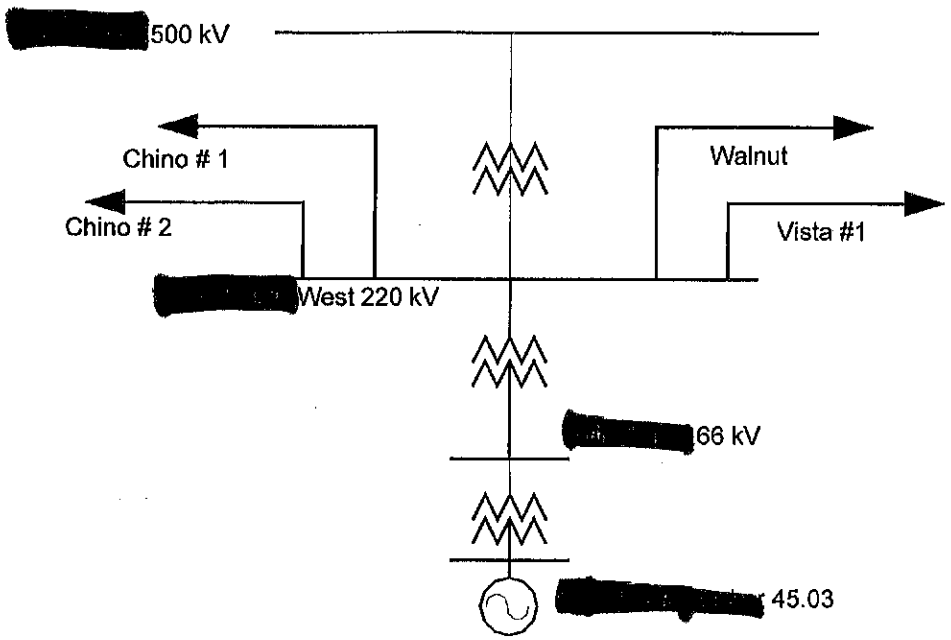
B. Modeling the Mira Loma Peaker Project

The proposed [redacted] is geographically located on the parcel of land in the Southeast corner of SCE's [redacted] Substation property. The Project has proposed to connect to the 66kV bus at [redacted] A one-line diagram of the proposed interconnection is shown below in Figure 1.

FIGURE 1

[redacted]

SIMPLIFIED SINGLE LINE DIAGRAM



System Conditions

To simulate the SCE transmission system for power flow analysis, the study selected the databases that were used to conduct the SCE CAISO Controlled 2005-2014 Transmission Expansion Plan. Power flow studies considered the existing system arrangement and reflected other transmission projects that occupy a higher position on the application queue. For example:

- Palo Verde – Devers No. 2 500-kV line was modeled in service
- Mountainview 1072 MW generator was modeled in service.
- All [redacted] West of Devers 230-kV lines have been upgraded
- Rancho Vista 500/230-kV substation was modeled in service
- Devers-Mirage 115-kV system is split into separate, radial, Devers and Mirage 115-kV systems.
- Oak Valley 230/115-kV substation is modeled.
- Jurupa 230/66-kV substation is modeled in service.
- [redacted] Etiwanda Peaker Project (WDT230) 44.5 MW is modeled.

The bulk power study considered scenarios that evaluated maximum generation from Qualified Facilities in SCE Eastern area. These conditions were evaluated to identify worst case scenarios that would stress the SCE's bulk transmission system network in the SCE Eastern area and vicinity. In addition, the study considered two system load conditions: 2007 heavy summer and 2008 spring. The summer peak load forecast was based on SCE's 2006 Transmission Expansion Plan, and reflects a one-in-ten-year heat wave assumption.

The 2007 heavy summer and 2008 light spring base cases were modified to reflect the inclusion of projects that occupy a higher position on the application queue than the Mira Loma Peaker Project. The 2008 spring load forecast assumed 65% of the heavy summer load forecast for the bulk transmission system.

C. Power Flow Study

The Power Flow Study was conducted for 2007 Heavy Summer and 2008 Spring load conditions with and without the [redacted] for a total of 4 cases. Further description of the case assumptions follows:

a) *2008 Spring*:

Case 1 **without** and Case 2 **with** the [redacted]

These two cases assumed 2007 spring load (65% of summer peak load for the total system) with maximum generation in SCE's Eastern area. Generation included: all market and all regulatory must-run units. Generation patterns were maximized in the SCE Eastern area to fully stress the system in order to identify the extent of potential congestion on the bulk power system with the addition of th[redacted]

b) 2007 Summer:

Case 3 **without** and Case 4 **with** the [redacted]

These two cases assumed 2007 heavy summer load with maximum generation in SCE's Eastern area. Generation included: all market and all regulatory must-run units. Generation patterns were maximized in the Eastern area to fully stress the system in order to identify extent of potential congestion on the bulk power system with the addition of the [redacted]

With the addition of the [redacted], SCE area total generation, imports, loads, and losses for cases 1-4 are summarized in the table below. For each of the four cases, load flow simulations of the bulk power system were conducted for the base case, single contingencies and double contingencies for transmission lines and 500/230-kV transformer banks to determine impacts to the SCE system. All single and double contingencies were simulated without implementation of applicable existing SPS.

SCE AREA TOTAL GENERATION, IMPORT, LOAD AND LOSSES (MW)				
	2008 Spring		2007 Summer	
	Case 1 (without project)	Case 2 (with project)	Case 3 (without project)	Case 4 (with project)
Generation	11301.1	11299.7	16573.2	16574.2
Import(-) / Export (+)	-5002.4	-5002.1	-8604.2	-8604.1
Load	15622.9	15622.9	24490.3	24496.3
Losses	680.61	678.87	687.15	687.92

D. Post Transient Voltage Study

Those contingencies that show significant voltage deviations in the power flow analysis are selected for further analysis using governor power flow analysis. Typically, voltage deviations of 5% or more in the power flow analysis are flagged for the post transient voltage study. The voltage deviations are compared to the SCE guidelines of 7% for single contingency outages and 10% for double contingency outages.

E. Transient Stability Study

WECC currently is in the process of adopting Generator Electrical Grid Fault Ride Through Capability Criteria. SCE currently supports a Low Voltage Ride-Through Criteria to ensure continued reliable service. A proposed Criteria that SCE supports, is as follows:

1. Generator is to remain in-service during system faults (three phase faults with normal clearing and single-line-to-ground with delayed clearing) unless clearing the fault effectively disconnects the generator from the system.

2. During the transient period, generator is required to remain in-service for the low voltage and frequency excursions specified in WECC Table W-1 (provided below) as applied to load bus constraint. These performance criteria are applied to the generator interconnection point, not the generator terminals.

3. Generators may be tripped after the fault period if this action is intended as part of a special protection scheme.

4. This Standard will not apply to individual units or to a site where the sum of the installed capabilities of all machines is less than 10MVA, unless it can be proven that reliability concerns exist.

5. The performance criteria of this Standard may be satisfied with performance of the generators or by installing equipment to satisfy the performance criteria.

6. The performance criterion of this Standard applies to any generation independent of the interconnected voltage level.

7. No exemption from this Standard will be given because of minor impact to the interconnected system.

8. Existing generators that go through any refurbishments or any replacements are then required to meet this Standard.

Table W-1

[redacted]

NERC and WECC Categories	[redacted]	[redacted]	[redacted]	[redacted] (See Note 2)
A	Not Applicable	Nothing in Addition to NERC		
B	≥ 0.33	Not to exceed **25%** at load buses or **30%** at non-load buses. Not to exceed **20%** **for more than 20 cycles** at load buses.	Not below **59.6 Hz** for 6 cycles or more at a load bus	Not to exceed **5%** at any bus
C	0.033 – 0.33	Not to exceed 30% at any bus. Not to exceed **20%** **for more than 40 cycles** at load buses.	Not below **59.0 Hz** for 6 cycles or more at a load bus	Not to exceed **10%** at any bus
D	< 0.033	Nothing in Addition to NERC		

Note 2: As an example in applying the WECC Disturbance-Performance Table, Category B disturbance in one system shall not cause a transient voltage dip in another system that is greater than 20% for more than 20 cycles at load buses, or exceed 25% at load buses or 30% at non-load buses at any time other than during the fault.

F. Short Circuit Duty Study

The data provided by the [redacted] was used to determine the impact on short circuit duty for the SCE Transmission System to determine the needs for circuit breaker upgrades.

POWER FLOW STUDY RESULTS

Spring and Summer Results

Base Case
There were no base case overloads attributed to [redacted]

Single Contingencies
There were no single contingency overloads attributed to [redacted]

Double Contingencies
There were no single contingency overloads attributed to [redacted]

There were overloads under both Single and Double Contingencies that were identified on the [redacted] – Walnut 230 kV line. The overloaded elements consist of terminal equipment which has already been identified by SCE to be replaced under the SERP (Substation Equipment Replacement Program) program. These upgrades cause the loading to be under the allowable limits.

TRANSIENT STABILITY AND POST TRANSIENT STUDIES

SCE used study findings from earlier Interconnection Studies for large projects electrically proximate to this project and concluded that there are no transient stability and post transient impacts to the SCE Transmission System from this proposed project.

SHORT CIRCUIT DUTY STUDY RESULTS

A. Short Circuit Duty Study Results

The following tables show the pre-project and post-project three-phase and single line to ground short circuit duty contributions. These tables include buses at which the incremental short circuit duty contribution of the project is 0.1 kA or greater, and where the 3-phase short circuit duty is at 60% or greater of the rated interrupting current of the lowest rated component at the station.

TABLE 4.1: THREE PHASE FAULT DUTY

Bus Nam[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			

In the event that any Applicant presently placed ahead of the [redacted] in the Application Queue withdraws their Application, the Short Circuit Duties will be re-calculated and all circuit breakers will be re-evaluated. The new evaluation may conclude that the [redacted] would be responsible for some or all of the replacements and upgrades identified in the pre-project case.

SCOPE OF WORK

Power Flow Study Conclusions

No transmission lines were triggered or aggravated by the addition of the [redacted] by 1% or more.

Short Circuit Duty Study Conclusions

3-PHASE FAULT DUTY
The addition of the project has impacted [redacted] 500kV substations and [redacted] 230kV substations with short circuit duty increases greater than 0.1kA

SINGLE – LINE TO GROUND FAULT DUTY
The addition of the project has impacted [redacted] 230kV substations with short circuit duty increases greater than 0.1kA.

None of these increases caused by the [redacted] triggered any Transmission System Circuit breakers. All are pre project conditions.

COST OF UPGRADES

No overload problems were identified for [redacted] This project did not increase any existing loading by 1% or more.

The [redacted] did not trigger any transmission line or circuit breaker upgrades. They are only exposed to the pre-project Case B costs triggered by projects ahead in the queue, these Case B costs are: **$49,123,000**

Engineering has evaluated the circuit breakers at all substations where the project contributed to the Short Circuit Duty results in an increase of 0.1kA or greater.

Circuit breaker replacements and upgrades to accommodate the generation interconnection on the SCE Transmission System are listed on Appendix A. This study has not assumed overload mitigation requirements for projects ahead of the queue.

Note: Study results may be affected by changes in other projects ahead of the queue in the area. A re-study may be required if there are changes in the project queue or the scope of projects ahead in the queue. All cost estimates are rough order of magnitude, and are non-binding cost estimates.

APPLICATION QUEUE for SYSTEM IMPACT STUDIES

CASE A - Triggered by [redacted]

ALL CB's ADEQUATE - NO REPLACEMENTS OR UPGRADES REQUIRED

CASE B - Triggered by earlier Projects ahead o[redacted]in Application Queue

STATION	SYSTEM	Replace	Upgrade	Sets of TRV's required	Cost of CB	Cost of TRV set of 3	Sub-Total CB	Sub-Total TRV	GRAND TOTAL
[redacted]	500kV	4	4	5	$ 1,948,000	$ 204,000	$ 7,792,000	$ 1,020,000	$ 8,812,000
[redacted]	220kV		1	1		$ 144,000	$ -	$ 144,000	$ 144,000
[redacted]	220kV	24			$ 629,000		$ 15,096,000	$ -	$ 15,096,000
[redacted]	220kV	4	6	8	$ 476,000	$ 144,000	$ 1,904,000	$ 1,152,000	$ 3,056,000
[redacted]	220kV	12			$ 629,000		$ 7,548,000	$ -	$ 7,548,000
[redacted]	220kV	23			$ 629,000		$ 14,467,000	$ -	$ 14,467,000
		67	11				$ 46,807,000	$ 2,316,000	$ 49,123,000

NOTES:

All costs in 2008 Dollars

ITCC Tax not included

(*) Additional costs of upgrading the [redacted] nd [redacted] 220kV Switchyards to 83kA is approximately $15,000,000 at each location

APPENDIX B. Application Queue

Project Name	Project Size (MW)
TOT005	830
WDT011	9
WDT034	2.1
WDT016	11.57
TOT022	16.5
WDT028	2.5
TOT023	3.71
1114	2.8
TOT015	45
TOT004	1000
TOT010	450
TOT018	750
WDT044	49.9
WDT014	5.6
WDT038	110
WDT040	17.1
WDT041	34
WDT042	40
TOT019	44.4
TOT021	22.2
TOT051	22.44
TOT032	850
TOT040	110
TOT041	280
WDT054	16.5
WDT072	10.5
TOT048	45.3

TOT056	90.6
WDT073	80
WDT075	39.6
WDT082	19.8
WDT080	28.5
TOT005	20
7019	1.5
WDT086	8
WDT085	2.4
WDT053	42.6
TOT067	330
WDT092	66
7033	6
7030	6
7044	2.25
2495	1.28
2502	2.7
7045	7.3
7034	2
7042	1
7068	47
WDT109	4.2
WDT110	5.6
WDT111	3.93
7056	2.12
WDT098	40
7057	1.3
2530	1.21
7075	2
7071	1.13

7036	3.8
2535	1
2521	10.6
EAK049	134
2529	2.28
2522	1.06
7070	5.74
2538	14.66
2540	1.1
7088	8
WDT118	9
WDT112	16.54
7084	2.4
TOT095	185
WDT019	45.5
TOT100	63
7094	1.4
7010	3.3
7100	1.5
7101	1.77
WDT133	48.3
WDT129	2.56
WDT123	8.73
WDT123	3
WDT123	6.75
2531	2.4
2546	4.9
TOT096	50
WDT124	32
WDT082	1.2

2543	1.1
TOT079	520
TOT102	65
TOT108	300
WDT147	45.6
TOT109	72
TOT111	17
TOT112	82
WDT131	8.4
TOT113	201
TOT117	300
TOT116	10
WDT163	5.6
WDT164	80
TOT119	157
WDT165	325
TOT120	100.5
WDT177	96
TOT121	599
WDT176	6.5
TOT037	810
TOT127	65
TOT129	1650
WDT179	49.9
TOT135	500.5
WDT182	507
TOT138	424.8
TOT131	850
TOT132	500
WDT190	49.9

TOT148	250
WDT205	99
TOT146	51
TOT149	610
TOT150	60
WDT213	49
TOT151	400
TOT152	120
TOT155	33
TOT156	34
TOT166	613.5
TOT160	570
TOT153	51
TOT154	570
TOT161	220
TOT164	180
TOT162	550
TOT163	600
TOT165	160
TOT167	120
TOT149	304
WDT221	8.5
TOT159	635
TOT157	600
TOT158	1400
CSDLA Puente Hills Project A	8
TOT171	150
TOT169	50
TOT170	150
WDT223	49.9

TOT172	550
TOT173	500
TOT174	1200
WDT227	102
WDT228	63
TOT175	300
WDT230	44.55