[redacted]

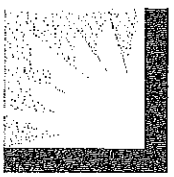
WDT 227

SYSTEM IMPACT STUDY

April 27, 2007

Prepared by:

Audel De La Torre – Distribution Engineering



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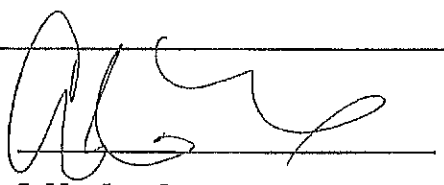
Approved by:



Alicia Lopez
Engineering Manager

EXECUTIVE SUMMARY

[redacted] a limited liability company, 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 102 MW generating facility [redacted] to be "looped" interconnected at the [redacted] – Capitan 66kV line. Distribution service pursuant to the WDAT is proposed to be from [redacted] to the California Independent System Operator (ISO) grid at SCE's 230kV Goleta Substation. The proposed in-service date of the [redacted] is May 1, 2008.

The [redacted] is a generation system consisting of [redacted] 13.8 kV, 155.1 KVA Hitachi Generator package GH1550A. The generation facility will utilize [redacted] 100 MVA, 13.8 kV/66 kV step-up transformer to interconnect the generator to 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, and 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 analysis to determine whether the energy associated with the [redacted] can be transmitted through SCE's system to the ISO grid at Goleta Substation, without creating the need for modifications to SCE's system and/or the ISO grid. The study showed that, with the [redacted] on-line:

- For both peak load and light load conditions, the addition of the [redacted] caused an overload of 140% and 105% violation of SCE's thermal loading criteria under base case and N-1 conditions, respectively. Specifically, the overload occurred on the portion (4.5 miles) of the 336 ACSR conductor between Capitan Substation and the interconnection point of the [redacted] that is routed parallel to Highway 101. This violation can be mitigated by reconductoring the existing 336 ACSR with 954 conductor or limiting the [redacted] output to no more than 70MW.

- No 66 kV circuit breakers and no 230 kV circuit breakers will need to be upgraded due to the Goleta Peaker Project

- 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)	$ 3.20 M
RTU installed at [redacted]	$ 0.05 M
Reconductor and pole replacement	$ 3.15 M
Circuit breaker replacements (66 kV, 230 kV)	$ 0.00 M
35%ITCC	$ 2.24 M
Total non-binding order of magnitude cost estimate	$ 8.64 M

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 131D costs.

CONTENTS

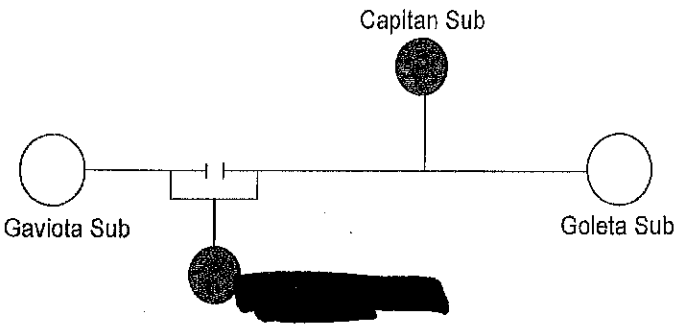
SOUTHERN CALIFORNIA EDISON
[redacted]

April 27, 2007

1. INTRODUCTION

[redacted] a limited liability company, 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 102 MW generating facility [redacted] to be interconnected at the Gaviota – Capitan 66kV line 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 Goleta Substation. The proposed in-service date of the [redacted] is May 1, 2008.

The [redacted] is a generation system consisting of one (1) 13.8 kV, 155.1 KVA Hitachi Generator package GH1550A a net generation export of 102 MW. The generation facility will utilize [redacted] 100 MVA, 13.8 kV/66 kV step-up transformer to interconnect the generator to 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, and 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 analysis to determine whether the energy associated with the [redacted] can be transmitted through SCE's system to the ISO grid at Goleta Substation, 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 analysis on SCE's Goleta 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 two system load conditions: peak loads and light loads. The peak load forecast was based on SCE's 2007-2016 Distribution Substation Plan. The light load forecast was determined to be 40% 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 the [redacted] caused any violations of SCE's thermal loading criteria.

D. Short-Circuit Duty Study

This study evaluated the [redacted] mpact on three-phase and phase to ground short-circuit duties seen by substation circuit breakers at the 66 kV level. Symmetrical three-phase fault currents 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] ncreased three-phase short-circuit or the single-line-to ground duties by 0.1 kA or more were identified, 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] causes an overload violation (140% and 145% respectively) of SCE's thermal loading criteria under base case conditions. Specifically, the overload occurred on the portion (4.5 miles) of 336 ACSR conductor between Capitan Substation and the interconnection point of the [redacted] that is routed parallel to Highway 101.

For both peak load and light load conditions, the addition of the [redacted] caused an overload violation (105% and 110% respectively) of SCE's thermal loading criteria under N-1 conditions. Specifically, the overload occurred on the portion (4.5 miles) of 336 ACSR conductor between Capitan Substation and the interconnection point of the [redacted] that is routed parallel to Highway 101.

B. *Short-Circuit Duty Study*

Table 1 summarizes the impact of the [redacted] on symmetrical three-phase short-circuit and single-line-to-ground duties at various 66 kV buses on the SCE system. 13 buses were identified where the [redacted] increased three-phase short-circuit or 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	3-Phase SCD	Single-Line-to-Ground SCD	
		Ita :D A)	CBs Requiring Replacement
Capitan		2	0
Carpinteria		0	0
Colegio		3	0
Desal		1	0
Ellwood		4	0
Gaviota		3	0
Goleta		2	0
Isla Vista		4	0
Onshore		3	0
Ortega		0	0
San Marcos		2	0
Santa Barbara		1	0
Vegas		3	0
Wellhead		2	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)	$ 3.20 M
RTU installed at [redacted]	$ 0.05 M
Reconductor and pole replacement	$ 3.15 M
Circuit breaker replacements (66 kV, 230 kV)	$ 0.00 M
35%ITCC	$ 2.24 M
Total non-binding order of magnitude cost estimate	$ 8.64 M

5. CONCLUSIONS

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

- For both peak load and light load conditions, the addition of the [redacted] caused an overload violation of SCE's thermal loading criteria of 140% and 145% under base case and 105% and 110% under N-1 conditions, respectively. Specifically, the overload occurred on the portion (4.5 miles) of 336 ACSR conductor between Capitan Substation and the interconnection point of the [redacted] that is routed parallel to Highway 101. This violation can be mitigated by reconductoring the existing 336 ACSR with 954 SAC conductor or by limiting the [redacted] output to no more than 70MW.

- 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)	$ 3.20 M
RTU installed at [redacted]	$ 0.05 M
Reconductor and pole replacement	$ 3.15 M
Circuit breaker replacements (66 kV, 230 kV)	$ 0.00 M
35%ITCC	$ 2.24 M
Total non-binding order of magnitude cost estimate	$ 8.64 M

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 131D costs.

66kV System Operational Study Result
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 102 MW generating facility [redacted] to be "looped" interconnected at the Gaviota – Capitan 66kV line. Distribution service pursuant to the WDAT is proposed to be from [redacted] to the California Independent System Operator (ISO) grid at SCE's 230kV Goleta Substation. The proposed in-service date of the [redacted] is May 1, 2008.

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 May 1, 2008 (including the [redacted]). Substations where the [redacted] increased short-circuit duties (three phase or phase to ground) by 0.1 kA or more were identified, 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:

- No 66 kV circuit breakers upgraded due to the [redacted]

Table 1: Short-Circuit Duty Summary

Bus Names	3-Phase SCD	Single-Line-to-Ground SCD	
		Ita CD A)	CBs Requiring Replacement
Capitan		.3	0
Carpinteri		.0	0
Colegio		.6	0
Desal		.2	0
Ellwood		.9	0
Gaviota		.0	0
Goleta		.6	0
Isla Vista		.9	0
Onshore		.6	0
Ortega		.0	0
San Marco		.4	0
Santa Barbara		.2	0
Vegas		.5	0
WellHead		.1	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)	$ 3.20 M
RTU installed at [redacted]	$ 0.05 M
Reconductor and pole replacement	$ 3.15 M
Circuit breaker replacements (66 kV, 230 kV)	$ 0.00 M
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Total non-binding order of magnitude cost estimate	$ 8.64 M

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.

Appendix B

[redacted]

WHOLESALE DISTRIBUTION ACCESS TARIFF

SYSTEM IMPACT STUDY
TRANSMISSION ASSESSMENT

May 4, 2007

SOUTHERN CALIFORNIA
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Prepared by
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Southern California Edison Company

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Manager, Generation
Interconnection Planning

[redacted]

SYSTEM IMPACT STUDY - TRANSMISSION ASSESSMENT

EXECUTIVE SUMMARY

[redacted] applied to Southern California Edison ("SCE") for Distribution Service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"), Large Generator Interconnection Procedures ("LGIP"). [redacted] propose to connect [redacted] simple cycle gas turbine at [redacted] generating facility in Goleta, California ("Project"), with a maximum operating rating at 102 MW. [redacted] proposes to loop into SCE's [redacted] Capitan 66 kV line for the delivery of energy to the ISO Grid at SCE's Goleta Substation. The in-service date proposed by [redacted] is May 1, 2008.

SCE has performed a System Impact Study to determine the adequacy of SCE's transmission system to accommodate the Project. The study found the following:

- The system is adequate to accommodate the Project under Peak Load conditions and all application queue projects modeled.
- The system is not adequate to accommodate the Project under Off Peak Load conditions and all application queue projects modeled.

The use of congestion management protocols, subject to CAISO concurrence, or implementation of a Special Projection System will be required to mitigate the identified thermal overload problems.

A facilities study will be required for the Project.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. SCE's Field Engineering department has performed a System Impact Study on the SCE affected distribution network.

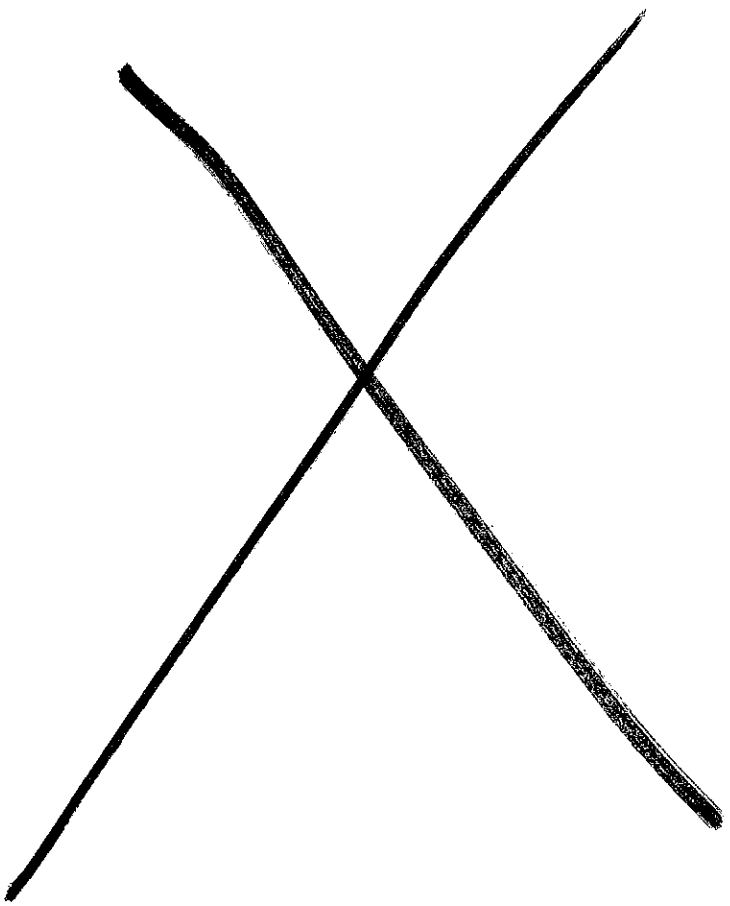
STUDY RESULTS

The study results show that the existing system is not adequate to accommodate the Project without upgrades.

A. Power Flow Study Conclusions

Base case

Under both Peak and Off Peak Load conditions, there were no base case overloads identified.



B. **Post-Transient Voltage Stability Study Conclusions**

There are no identified post transient voltage criteria violations due to the addition of the Project.

C. **Transient Stability Study Conclusions**

There were no transient stability problems identified due to the addition of the Project. The transient stability study was conducted assuming models for the Project consistent with models for other [redacted] currently in the queue. If the actual project

equipment varies from that assumed for the purposes of this study, a review of these stability findings may be required.

D. **Short Circuit Study Conclusions**

The addition [redacted] has impacted four 230 kV substations with increases in the short circuit duty at or above 0.1 kA. Engineering concluded that no CB replacements or upgrades are triggered by the Project on the Bulk Power System.

SCOPE OF WORK FOR FACILITIES STUDY

A. Interconnection Facilities:
Refer to Field engineering System Impact Study Report.

B. Transmission Upgrades (Case A: Triggered Cost)
SCE recommends the use of congestion management to mitigate the [redacted] off-peak single contingency overloads identified with the inclusion of pre-project overload mitigation (see CASE B below), subject to CAISO approval to mitigate these problems. In the event that the CAISO deems congestion management not acceptable, the installation of protection equipment at Sylmar and Pardee and corresponding telecommunication will be required to support a SPS to mitigate these problems. The estimated cost for these facilities is $1,442,000 (not subject to ITCC tax).

C. Transmission Upgrades (Case B: All required)
The transmission upgrades to mitigate overloads triggered by projects in queue ahead of the Project include the following:

1) Upgrade Pardee-Sylmar No.1 and 2 lines.
   - Replace [redacted] wave traps with new 4000A rated at SCE Pardee end at a cost of $150,000 total (not subject to ITCC tax).
   - Replace [redacted] wave traps, [redacted] circuit breakers and [redacted] disconnect switches with new 4000A rated at LADWP Sylmar end, cost to be determined by LADWP.

2) The following Circuit Breakers need to be replaced or upgraded:
   - [redacted] CBs at Antelope 220 kV at a total cost of $4,046,000 (not subject to ITCC tax).

Note:

a. The above cost estimates are order of magnitude estimates subject to change based on results of the Facilities Study.
b. Study results may change due to other projects ahead of the queue in the area. A new study may be required if projects ahead of the queue are changed.

COST ESTIMATE

If the use of congestion management to mitigate the off-peak overloads is not approved by the CAISO, the nonbinding cost Estimates associated with the transmission upgrades identified to be triggered by the Project is $1,442,000.

The nonbinding cost estimates associated with the transmission upgrades identified to be triggered by prior projects in the queue is $4,196,000 (excluding ITCC tax) as specified in Item C under "Scope of Work for Facilities Study". This does not include the cost associated with upgrades of LADWP facilities.

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[redacted]

WHOLESALE DISTRIBUTION ACCESS TARIFF

SYSTEM IMPACT STUDY
TRANSMISSION ASSESSMENT

I.INTRODUCTION

[redacted] applied to Southern California Edison ("SCE") for Distribution Service under the terms of SCE's Wholesale Distribution Access Tariff ("WDAT"), Large Generator Interconnection Procedures ("LGIP") [redacted] propose to connect a single simple cycle gas turbine at [redacted] generating facility in Goleta, California ("Project"), with a maximum operating rating at 102 MW. [redacted] proposes to loop into SCE's [redacted]-Capitan 66 kV line for the delivery of energy to the ISO Grid at SCE's Goleta Substation. The in-service date proposed by [redacted] is May 1, 2008.

SCE has performed a System Impact Study to determine the adequacy of SCE's transmission system to accommodate the Project. The study indicated that the system is not adequate to accommodate the 102 MW of generation without modifications. A facilities study will be required for the Project.

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 representing: (a) 2010 Peak Load with very high internal northern area generation and Midway – Vincent (Path 26) flow at its maximum rating of 4000 MW, and (b) 2011 Off-Peak load with very high internal northern area generation and Midway – Vincent (Path 26) flow at its maximum rating of 4000 MW. These conditions reflected the most critical expected loading conditions for the transmission system in SCE's northern area.

II. STUDY CONDITIONS AND ASSUMPTIONS

A. Planning Criteria

The 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 or sub-transmission lines and 500/230 kV transformer banks ("AA-Bank"):
Assuming both San Onofre Units 2 and 3 in service and then:

- Single Contingencies (N-1 Line or N-1 AA-Bank)
- Double Contingencies (N-2 Two Lines, N-1 Line and N-1 AA-Bank)
  (Outages of two AA-Banks are beyond the Planning Criteria)

The following criteria are used:

Table 2.1 Transmission Planning Criteria

Transmission Lines	Base Case	Limiting Component Normal Rating
	N-1	Limiting Component A-Rating
	N-2	Limiting Component B-Rating
500-230 kV Transformer Banks	Base Case	Normal Loading Rating
	Long & Short Term	As Defined by SCE Operating Bulletins

System upgrades or Special Protection Systems 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, outlined below, were used for interconnecting generation into the SCE transmission system, which fall under CAISO jurisdiction (these principles may be subject to change for future interconnection projects).

- Congestion management, as a means to mitigate base case overloads and contingency 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 the Project (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 the Project. 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 Project. The Project, 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, the Project 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 Project 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 Project and all facilities in service

c. if congestion exists in the area with the addition of the Project 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.

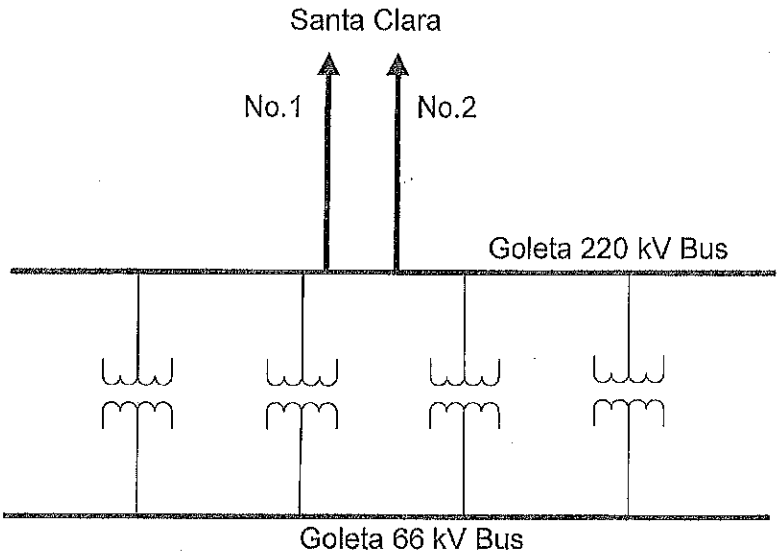
B. [redacted]

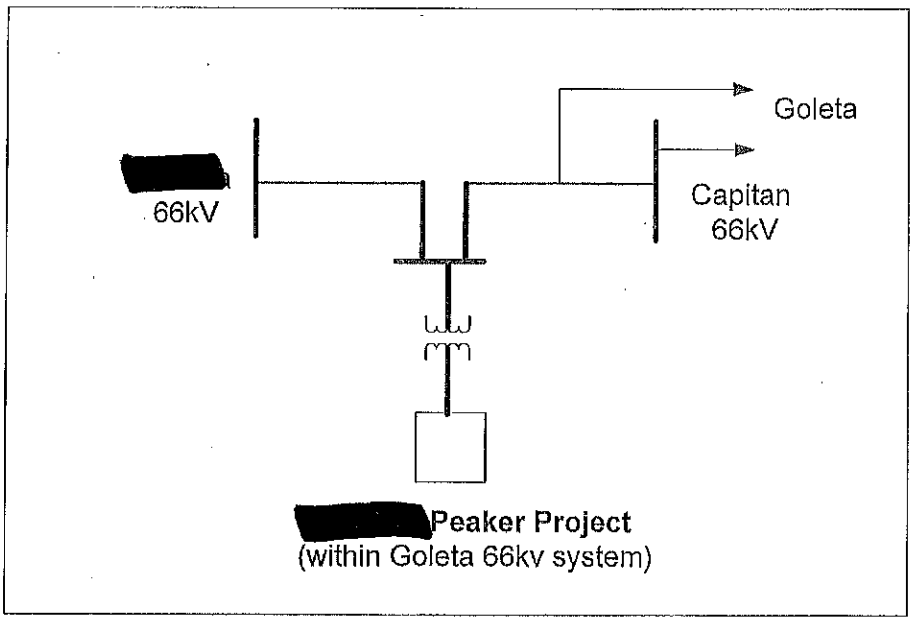
[redacted] is located in city of Goleta. The interconnection point is a loop into the Capitan[redacted]66 kV line. The delivery point to the ISO grid is Goleta 230 kV. The in-service date proposed by [redacted] is May 1, 2008. Figure 1 displays the equivalent one line diagram that Transmission & Interconnection Planning use to model the new generation.

FIGURE 1

[redacted]

SCHEMATIC SINGLE LINE DIAGRAM





C. System Conditions

To simulate the SCE transmission system for analysis, the study selected the databases that were used to conduct the SCE Annual CAISO Controlled Transmission Assessment. In order to identify the facilities upgrades triggered by the Project, System Impact studies considered the existing system arrangement with the addition of all higher-queued transmission projects and the proposed transmission upgrades to accommodate higher-queued generating projects. Also considered are the 4500 MW Tehachapi wind generation and the Tehachapi Transmission Plan proposed in the California Southern Regional Transmission Plan (CSRTP) forum.

The bulk power study considered scenarios that evaluated maximum Midway – Vincent (Path 26) imports and maximum generation from Big Creek hydro units, Tehachapi Wind generation, market generation and Qualified Facilities in the Northern area. These conditions were evaluated to identify critical case scenarios that would stress the SCE 500-kV transmission system and the South of Vincent transmission system. In addition, the study considered two system load conditions: 2010 Peak Load and 2011 Off Peak Load Conditions.

D. Operating Procedure (OP-031)

The operating procedure OP-031 is for double outage of Goleta - Santa Clara 220 kV lines. Since there are no other 220 kV lines connected to Goleta substation upon loss of the Goleta – Santa Clara two transmission facilities, all of the Goleta load will be dropped and portion of the Goleta would be rolled to Santa Clara system.

The OP-031 operation involves:

- Restore load using Santa Clara 66 kV sub transmission tie lines with maximum 90MW.
- Call up Ellwood peaking unit to maximum output.
- Rolling blackouts for Goleta system load.

E. Power Flow Study

Power flow studies were conducted with and without the Project for a total of 4 base cases. Further descriptions of the base case assumptions are as follows:

a) 2010 Peak Load Conditions: Case 1 **without** the Project and Case 2 **with** the Project.

b) 2011 Off Peak Load Conditions: Case 3 without the Project and Case 4 with the Project.

With the addition of the Project, SCE's area total generation, imports, loads, and losses for each case are summarized in Table 2.2 below:

Table 2.2 Power Flow Cases

SCE AREA TOTAL GENERATION, IMPORT, LOAD AND LOSSES (MW)

F. Post Transient Voltage Stability Study

Those contingencies that show significant voltage deviations in the power flow analysis are selected for further analysis using governor power flow analysis. The voltage deviations are compared to the SCE guidelines of 7% for single contingency outages and 10% for double contingency outages.

G. Transient Stability Study

For transient stability evaluation, three-phase faults with normal clearing are studied for single contingencies; single-line-to-ground faults with delayed clearing are studied for double contingencies according to NERC/WECC planning criteria.

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
WECC DISTURBANCE-PERFORMANCE TABLE (in addition to NERC requirements)
OF ALLOWABLE EFFECTS ON OTHER SYSTEMS

NERC and WECC Categories	Outage Frequency Associated with the Performance Category (Outage/Year)	Transient Voltage Dip Standard	Minimum Transient Frequency Standard	Post-Transient Voltage Deviation Standard (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.

H. Short Circuit Duty

The data provided by [redacted] is used to evaluate short circuit duty impact on bulk power substations with duty increase at or above 0.1 kA.

III. POWER FLOW STUDY RESULTS

A. 2010 Peak Load Results

There were no overloads identified.

B. 2011 Off Peak Load Results

Base Case

There was on overloads identified.

Single Contingencies (N-1)

There were two transmission lines with N-1 overloads. With the addition of the Project, the post-contingency loadings on Pardee-Sylmar No.1 increased from 3656 A (122%) to 3761 A (125%) upon outage of Pardee-Sylmar 230 kV No.2 and vice-versa. This loading of 3761 A is in excess of the emergency rating as limited by terminal equipment as well as transmission line conductor thermal loading limit of 3710 A under single contingency conditions. Upgrades for higher queued projects will not be sufficient to mitigate these single contingency overloads.

Double Contingencies (N-2)

There were [redacted] transmission lines with N-2 overloads. With the addition of the Project, the post-contingency loadings on Pardee-Sylmar No.1 and 2 increased from 3564 A (119%) to 3637 A (121%). Upgrades for higher queued projects will be sufficient to mitigate these N-2 overload problems.

Table 3-1. Overload Results (2011 Off Peak Load Results)

Overloaded Transmission Facilities	Transmission Outage	Normal Rating	Emergency Rating	Pre Project		Post Project		Project Impact	
		Amps	Amps	Amps	Percent	Amps	Percent	Amps	Percent
Pardee-Sylmar 230									
Pardee-Sylmar 230									
Pardee-Sylmar 230									
Pardee-Sylmar 230									

It should be noted that the addition of this Project would provide for additional capability to provide service under loss of both Goleta-Santa Clara 230 kV lines. As discussed in the Assumption Section, SCE has an Operating Procedure to pick-up load following double outage contingency. Currently, there is insufficient system capability and local resources to provide service to the entire Goleta 66 kV system load under such an outage condition.

IV. POST TRANSIENT VOLTAGE STUDY RESULTS

There is no additional identified post transient voltage criteria violation due to the addition of the Project.

V. TRANSIENT STABILITY STUDY RESULTS

[redacted] proposed to connect a single Hitachi GH1550A (102MW) Generation to SCE's [redacted]-Capitan 66 kV line. To perform this stability study, generation Models consistent with Models provided by [redacted] for other similar projects in queue were assumed (see Appendix D). In the event that the equipment installed at this Project differs from the Models assumed for this study, a review of these study results may be required.

A. GE PSLF Version 16.004 Models

GE PSLF Version 16.004, recently adopted by WECC, supports updated system configurations and the generation turbine type proposed by [redacted]

GENTPF
This model is used to represent the generator model for the turbines.

ESAC7B
This model is used to represent the excitation system for the turbines.

TGOV3
This model is used to represent the governor controls for the turbines.

PSS2A
This model is used to represent the power system stabilizer controls for the turbines.

Note:
The parameters for these Models assumed for the [redacted] consistent with other [redacted]s in queue are provided in Appendix D.

B. Transient Stability Study Results

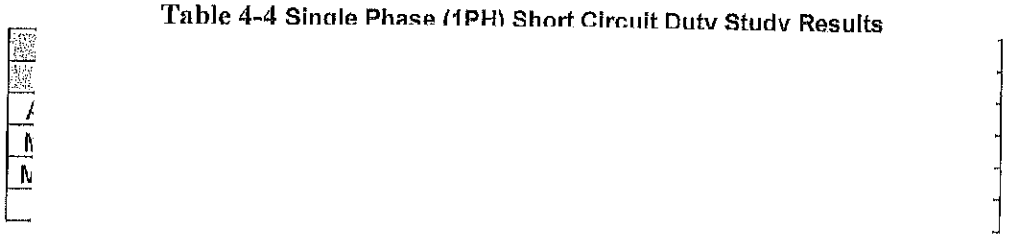
Based on the Modeling assumptions described above, the system is stable under both base case and single contingency conditions. However, under double contingency outage condition, the Goleta system will lose sources to the system and be islanded. As discussed in the power flow section, the Goleta system will benefit from the [redacted] which will help with restoration process and allowing additional load to be served.

VI. SHORT CURCUIT DUTY STUDY RESULTS

The results of the maximum symmetrical three-phase short circuit duty at the critical buses in the SCE bulk transmission system are summarized in Table 4-3.

The results of the maximum single-phase short circuit duty at the critical buses in the SCE bulk transmission system are summarized in Table 4-4.

Table 4-4 Single Phase (1PH) Short Circuit Duty Study Results



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VII. RECOMMENDATIONS

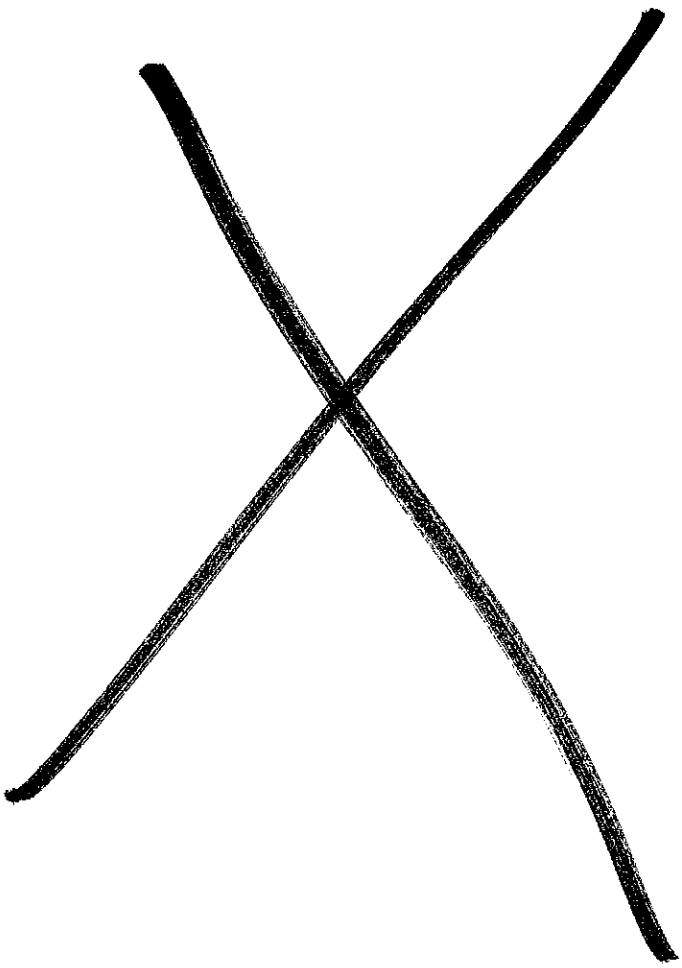
SCE recommends the use of congestion management to mitigate the two off-peak single contingency overloads identified with the inclusion of pre-project overload mitigation (see CASE B below), subject to CAISO approval to mitigate these problems. In the event that the CAISO deems congestion management not acceptable, the installation of protection equipment at Sylmar and Pardee and corresponding telecommunication will be requital to support a SPS to mitigate these problems. The estimated cost for these facilities is $1,442,000 (not subject to ITCC tax).

VIII. CONCLUSIONS

A. Power Flow Study Conclusions

Base case

Under both Peak and Off Peak Load conditions, there were no base case overloads identified.



B. Post Transient Voltage and Transient Stability Study Conclusions

There is no additional identified post transient voltage criteria violation due to the addition of the Project.

C. Short Circuit Duty Study Conclusions

The 3-phase short circuit duty is increased by 0.1 kA or more at [redacted] 230 kV substations. The 1-phase short circuit duty is increased by 0.1 kA at [redacted] 230 kV substations. Engineering concluded that no CB replacements or upgrades are triggered by the Project on the Bulk Power System.

IX. SCOPE OF WORK FOR FACILITIES STUDY

A. Interconnection Facilities:
Refer to Field engineering System Impact Study Report.

B. Transmission Upgrades (Case A: Triggered Cost)
SCE recommends the use of congestion management to mitigate the [redacted] off-peak single contingency overloads identified with the inclusion of pre-project overload mitigation (see CASE B below), subject to CAISO approval to mitigate these problems. In the event that the CAISO deems congestion management not acceptable, the installation of protection equipment at Sylmar and Pardee and corresponding telecommunication will be requital to support a SPS to mitigate these problems. The estimated cost for these facilities is $1,442,000 (not subject to ITCC tax).

C. Transmission Upgrades (Case B: All required)
There are other transmission upgrades to fix the overloads triggered by the projects in queue ahead of the Project. These upgrades will accommodate the Project. These upgrades include the following:

1) Upgrade Pardee-Sylmar No.1 and 2 lines.
   - Replace [redacted] wave traps with new 4000A rated at SCE Pardee end at a cost of $150,000 total (not subject to ITCC tax).
   - Replace [redacted] wave traps, four circuit breakers and [redacted] disconnect switches with new 4000A rated at LADWP Sylmar end, cost to be determined by LADWP.
2) The following Circuit Breakers need to be replaced or upgraded:
   - [redacted] CBs at Antelope 220 kV at a total cost of $4,046,000 (not subject to ITCC tax).

Note:
The above cost estimates are order of magnitude estimates subject to change based on results of the Facilities Study.
Study results may change due to other projects ahead of the queue in the area. A new study may be required if projects ahead of the queue are changed.

APPENDIX A. POWER FLOW DIAGRAMS

2010 Peak Load Case Power Flow Diagram (Pre Project)

2010 Peak Load Case Power Flow Diagram (Post Project)

2011 Off-Peak Load Case Power Flow Diagram (Pre Project)

2011 Off-Peak Load Case Power Flow Diagram (Post Project)

PAGES OMITTED FOR CEII REGULATIONS

APPENDIX C. STABILITY PLOTS

PAGES OMITTED FOR CEII REGULATIONS