

WDT 235

SYSTEM IMPACT STUDY

December 22, 2006

Re-study: December 31, 2007

Prepared by:

Audel De La Torre – Distribution Engineering



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Approved by:

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**Alicia Lopez
Engineering Manager**

EXECUTIVE SUMMARY

In order to identify any potential impacts that could have been caused by the withdrawal of WDT 227 which was planned to be connected to the same system as this project, a re-study of SCE's [REDACTED] Impact Study for WDT 235 was performed. The re-study determined that the initial results of this report remain accurate and viable. Specifically, Power Flow and Short Circuit Duty results identified on section 3 (Discussion of Study Results). The only change associated with the withdrawal of WDT 227 is that the Operational and the Application Queue study results are now the same. As a result, the previous Operational Study (Appendix A) has been modified and the results combined with the Application Queue study results. The report has been modified such that the previous Transmission Assessment (Appendix B) portion has been re-labeled as Appendix A, and the Operational Queue study result previously labeled (Appendix A) has been removed.

[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 47.2 MW generating facility [REDACTED] to be interconnected at the 66kV bus at [REDACTED]. Distribution service pursuant to the WDAT is proposed to be from [REDACTED] to the California Independent System Operator (ISO) grid at SCE's 230kV [REDACTED]. The proposed in-service date of the [REDACTED] is August 1, 2008.

The [REDACTED] is a generation system consisting of [REDACTED] 13.8 kV, 71.2 KVA [REDACTED] PC-Spring gas fired turbine-generator package which will include: Selective Catalytic Reduction, Gas Compressor, Water Injection, Black Start Capability, and Continuous Emissions Monitoring System, with a net generation export of 47.2 MW. The generation facility will utilize [REDACTED] 45 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 [REDACTED] without creating the need for modifications to SCE's system and/or the ISO grid. The 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 A 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)	\$ 1.08 M
RTU installed at [REDACTED]	\$ 0.05 M
Circuit breaker replacements (66 kV, 230 kV)	\$ 0.00 M
35%ITCC	\$ 0.39 M
Total non-binding order of magnitude cost estimate	\$1.52 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.

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APPENDIX

- A. Transmission Assessment

[REDACTED]

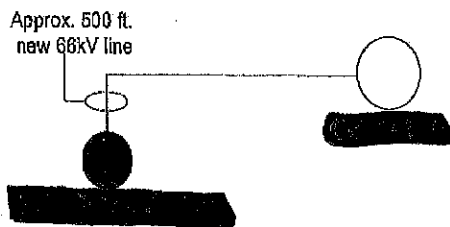
December 31, 2007

1. INTRODUCTION

In order to identify any potential impacts that could have been caused by the withdrawal of WDT 227 which was planned to be connected to the same system as this project, a re-study of SCE's [REDACTED] System Impact Study for WDT 235 was performed. The re-study determined that the initial results of this report remain accurate and viable. Specifically, Power Flow and Short Circuit Duty results identified on section 3 (Discussion of Study Results). The only change associated with the withdrawal of WDT 227 is that the Operational and the Application Queue study results are now the same. As a result, the previous Operational Study (Appendix A) has been modified and the results combined with the Application Queue study results. The report has been modified such that the previous Transmission Assessment (Appendix B) portion has been re-labeled as Appendix A, and the Operational Queue study result previously labeled (Appendix A) has been removed.

[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 47.2 MW generating facility [REDACTED] to be interconnected at the 66kV bus at [REDACTED] 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 August 1, 2008.

The [REDACTED] is a generation system consisting of [REDACTED] 13.8 kV, 71.2 KVA [REDACTED] PC-Spring gas fired turbine-generator package which will include: Selective Catalytic Reduction, Gas Compressor, Water Injection, Black Start Capability, and Continuous Emissions Monitoring System, with a net generation export

of 47.2 MW. The generation facility will utilize [REDACTED] 45 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 [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 analysis on SCE's [REDACTED] 66 kV subtransmission system. Appendix B details study results for the ISO-controlled transmission grid.

2. APPLICATION AND OPERATIONAL QUEUE 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 2008-2017 Distribution Substation Plan. The light load forecast was assumed to be 25% 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] 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 and X/R ratios 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 APPLICATION AND OPERATIONAL QUEUE 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.

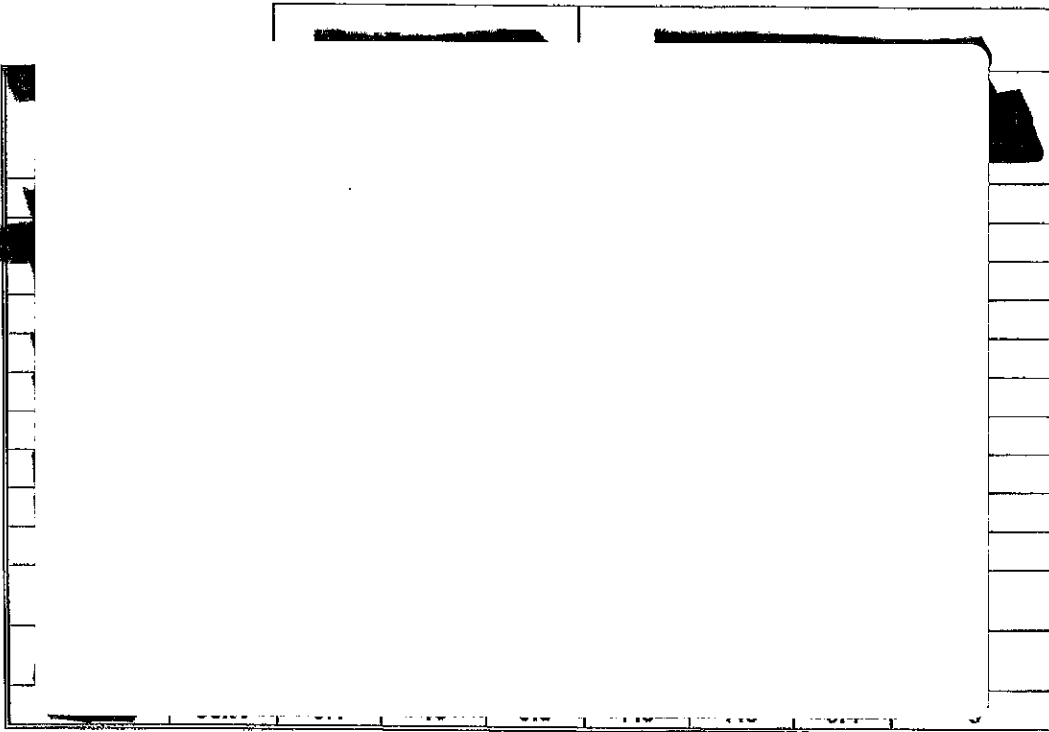
For both peak load and light load conditions, the addition of the [REDACTED] caused no violations of SCE's thermal loading criteria under N-1 conditions.

B. Short-Circuit Duty Study

Table 1 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 flagged 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



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)	\$ 1.08M
RTU installed at [REDACTED]	\$ 0.05M
Circuit breaker replacements (66 kV)	\$ 0.0M
35%ITCC	\$ 0.39
<hr/> Total non-binding order of magnitude cost estimate	<hr/> \$1.52M

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 A 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)	\$ 1.08M
RTU installed at [REDACTED]	\$ 0.05M
Circuit breaker replacements (66 kV, 230 kV)	\$ 0.0M
35%ITCC	\$ 0.39
Total non-binding order of magnitude cost estimate	\$1.52M

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.

Appendix A
Transmission Assessment

[REDACTED]

WHOLESALE DISTRIBUTION ACCESS TARIFF

SYSTEM IMPACT STUDY
TRANSMISSION ASSESSMENT

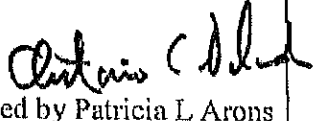
December 18, 2006



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fn

[REDACTED]

SYSTEM IMPACT STUDY - TRANSMISSION ASSESSMENT

EXECUTIVE SUMMARY

[REDACTED] proposed to install 5 peaking generating stations on its distribution or sub-transmission grid. The installation of up to 250 MW peaking generation was directed by California Public Utilities Commission (CPUC) to meet the reliability requirement for summer 2007. [REDACTED] ("Project") is [REDACTED] peaking generating stations. The Project will consist of a [REDACTED] simple cycle gas turbine with a maximum operating output of 47.21 MW. The interconnection point is [REDACTED]. The delivery point to the ISO Grid is at [REDACTED]. The in-service date proposed by SCE is July 2, 2007.

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 2007 Peak Load conditions per the operational queue.
- The system is adequate to accommodate the Project under Peak Load conditions per the application queue.
- The system is not adequate to accommodate the Project under Off Peak Load conditions without modification per the application queue.

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 SCE* [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

A. Power Flow Study Conclusions

1) Operational Queue Study

There were no overloads identified.

2) Application Queue Study

Base case

Under both Peak and Off Peak Load conditions, there was no base case overload identified.

B.

SCOPE OF WORK FOR FACILITIES STUDY

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

- B. Transmission Upgrades (Case A: Triggered Cost)
There are no transmission upgrades triggered by the Project.

- C. Transmission Upgrades (Case B: All Cost)
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 wave traps with new 4000A rated at SCE Pardee end at a cost of \$172,000 total (not subject to ITCC tax).
 - Replace wave traps, four circuit breakers and eight 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:
 - Application Queue: One CB at Vincent 220 kV at a total cost of \$288,000 (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

The nonbinding cost Estimates associated with the transmission upgrades identified to be triggered by the Project is \$0.

The nonbinding cost estimates associated with the transmission upgrades identified to be triggered by prior projects in the queue is \$460,000 (excluding ITCC tax) as specified in Item 3 under "Scope of Work for Facilities Study".

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[REDACTED]

WHOLESALE DISTRIBUTION ACCESS TARIFF

SYSTEM IMPACT STUDY TRANSMISSION ASSESSMENT

I. INTRODUCTION

[REDACTED] proposed to install 5 peaker units on its distribution or sub-transmission grid. The installation of up to 250 MW peaking generation was directed by California Public Utilities Commission (CPUC) to meet the reliability requirement for summer 2007. [REDACTED] ("Project") is a back location for the five peaking generating stations. The Project will consist of a [REDACTED] simple cycle gas turbine, with a maximum operating output of 47.21 MW. The interconnection point is [REDACTED]. The delivery point to the ISO Grid is at [REDACTED]. The in-service date proposed by [REDACTED] is July 2, 2007.

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 2007 Peak Load conditions per the operational queue.
- The system is adequate to accommodate the Project under Peak Load conditions per the application queue.
- The system is not adequate to accommodate the Project under Off Peak Load conditions without modification per the application queue.

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.

The study was performed for three system conditions representing: (a) Operational Queue: 2007 Peak Load per the operational queue with very high internal northern area generation and Midway – Vincent (Path 26) flow at its maximum rating of 4000 MW, (b) Application Queue: 2010 Peak load with very high internal northern area generation and Midway – Vincent (Path 26) flow at its maximum rating of 4000 MW, and (c) Application Queue: 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:

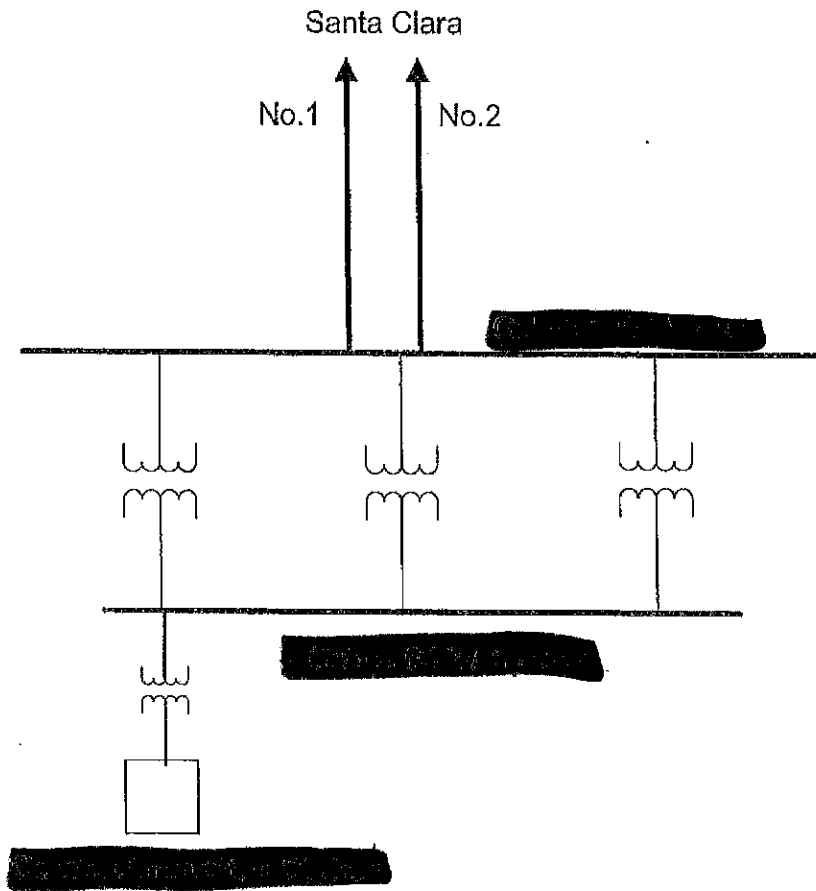
- a. if capacity is available to accommodate the proposed Project and all projects ahead in queue without the need for congestion management, special protection schemes, or facility upgrades
- b. if overloads exist in the area after the addition of all projects in queue ahead of the Project and all facilities 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 about 100 feet from [REDACTED]. The interconnection point is [REDACTED] in [REDACTED]. The delivery point to the ISO grid is [REDACTED]. The proposed operating date is July 2, 2007. 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.

The Operational Queue Study considered the existing system arrangement with the addition of all planned transmission projects and all generating projects which have an earlier or the same operating date, regardless of the position in the application queue.

The Application Queue Study 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: 2007 Peak Load Conditions for Operational Queue Study, 2010 Peak Load and 2011 Off Peak Load Conditions for Application Queue Study.

D. Power Flow Study

Power flow studies were conducted with and without the Project for a total of 6 base cases. Further descriptions of the base case assumptions are as follows:

- a) 2007 Peak Load Conditions: Case 1 **without** the Project and Case 2 **with** the Project. This is an operational queue study.
- b) 2010 Peak Load Conditions: Case 3 **without** the Project and Case 4 **with** the Project. This is an application queue study.
- c) 2011 Off Peak Load Conditions: Case 5 **without** the Project and Case 6 **with** the Project. This is an application queue study.

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)						
	2007 Peak Load Conditions		2010 Peak Load Conditions		2011 Off Peak Load Conditions	
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Generation	17209	17209	19638	19641	13068	13071
Import	9052	9051	8156	8155	5442	5442
Load	24435	24435	26241	26241	17014	17104
Losses	554	555	699	702	560	563

E. 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. 2007 Peak Load Results (Operational Queue Study)

There were no overloads identified.

B. 2010 Peak Load Results (Application Queue Study)

There were no overloads identified.

C. 2011 Off Peak Load Results (Application Queue Study)

Base Case

There was on overloads identified.

Single Contingencies (N-1)

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Double Contingencies (N-2)

There were [REDACTED] lines with N-2 overloads. With the addition of the Project, the post-contingency loadings on Pardee-Sylmar No.1 and 2 increased from 3597 A



Project Percent	Project Amps	Project Impact Percent
125%	48	2%
125%	48	2%
121%	35	1%
121%	35	1%

IV. SHORT CIRCUIT DUTY STUDY RESULTS

Three-Phase Short Circuit Duty Study Results

1) Operational Queue Study

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 4-1.

Table 4-1 Three Phase (3PH) Short Circuit Duty Study Results

The results of the maximum single-phase short circuit duty at the critical buses in the SCE bulk transmission system are summarized in Table 4-2.

Table 4-2 Single Phase Short Circuit Duty Study Results

2) Application Queue Study

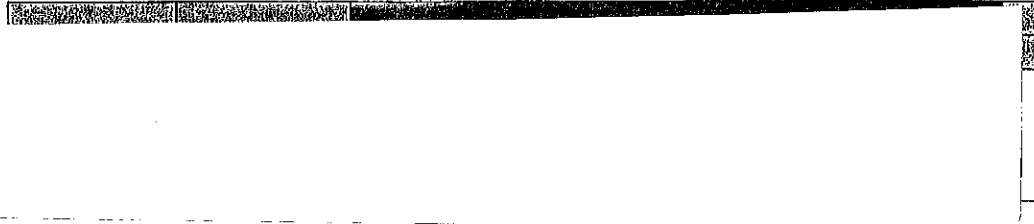
The results of the maximum symmetrical three-phase short circuit duty at the critical buses in the SCE bulk transmission system are summarized in Table 4-3.

Table 4-3 Three Phase (3PH) Short Circuit Duty Study Results



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



V. CONCLUSIONS

A. Power Flow Study Conclusions

1) Operational Queue Study

There were no overloads identified.

2) Application Queue Study

Base case

Under both Peak and Off Peak Load conditions, there was no base case overload identified.

Single Contingencies

Under Peak Load conditions, there was no N-1 overload identified.

Double Contingencies

Under Peak Load conditions, there was no N-2 overload identified.

B. Short Circuit Duty Study Conclusions

1) Operational Queue Study

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

2) Application Queue Study

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

VI. SCOPE OF WORK FOR FACILITIES STUDY

A. Interconnection Facilities:

Refer to Field engineering System Impact Study Report.

B. Transmission Upgrades (Case A: Triggered Cost):

There are no transmission upgrades triggered by the Project.

C. Transmission Upgrades (Case B: All Cost)

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 to 4000A

- Replace [REDACTED] wave traps with new 4000A rated at SCE Pardee end at a cost of \$172,000 total (not subject to ITCC tax).
- Replace [REDACTED] wave traps, four circuit breakers and eight 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:

- Application Queue: [REDACTED] at Vincent 220 kV at a total cost of \$288,000 (not subject to ITCC tax).

Note:

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

2007 Peak Load Case Power Flow Diagram (Pre Project)

2007 Peak Load Case Power Flow Diagram (Post Project)

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 B. Operational Queue

Project Name	Project Size (MW)
WDT038	110
WDT044	49.9
WDT041	34
WDT040	17.1
TOT040	110
WDT075	39.6
WDT072	10.5
WDT086	8
WDT080	28.5
TOT010	450
TOT048	45.3
TOT056	90.6
WDT082	19.8
7068	47
WDT098	40
2538	14.66
TOT005	830
TOT005	20
WDT019	45.5
TOT102	65
WDT073	80
WDT131	8.4
WDT124	32
WDT133	48.3
TOT111	17

TOT112	82
TOT095	185
TOT018	750
TOT067	330
EAK049	134
WDT177	96
TOT004	1000
TOT109	72
WDT164	80
TOT127	65
WDT179	49.9
WDT190	49.9
WDT 223	49.9
WDT230	44.55
WDT233	47.21
WDT231	45.03
WDT229	47.13
WDT236	47.9
 WDT235	47.21

APPENDIX C. 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
WDT233	47.21
WDT231	45.03
WDT229	47.13
WDT236	47.9
 WDT235	47.21