Appendix P, Imperial Irrigation District System Impact Study consists of the System Impact and Interconnection Study Report, contained herein, and a three-volume set of appendices. This three-volume set of appendices for the System Impact Study is provided under separate cover and can be obtained by request from the California Energy Commission.

IMPERIAL IRRIGATION DISTRICT

CE OBSIDIAN ENERGY
SALTON SEA UNIT 6

SYSTEM IMPACT AND INTERCONNNECTION STUDY REPORT

7/01/02

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1. Executive Summary

Imperial Irrigation District (IID) has entered into a Power Sales Agreement with CE Obsidian Energy LLC ("CalEnergy"). This agreement obligates IID to purchase contract capacity of up to 170 MW and associated energy from the proposed CalEnergy Salton Sea Unit 6 ("SSU6") electric generation facility for a period of twenty years.

The expected net output of the plant, after station service usage, will be approximately 185 MW. The studies assume that 15 MW in excess of IID's contract capacity would be integrated into IID's system as part of a prospective swap between IID and SSU6.[1]

The energy will be delivered to a point between SSU6 and IID's switching station adjacent to SSU6. Imperial Irrigation District has performed technical studies to determine the impacts of interconnecting SSU6 to its system. A plan of service has been developed for the full net rated capacity of the facility to be interconnected to IID's system and the associated energy to be integrated into IID's transmission system to serve IID's native load.

This study is based on California Energy Commission guidelines for a 6-month AFC review. The system was analyzed with and without SSU6 under steady-state conditions for a normal system and for single and multiple contingencies, for transient stability and post transient voltage analysis, and for short circuit fault duty analysis. The WECC 2005 heavy summer base case, compiled August 4, 2000, was updated and modified to represent current conditions and IID's system in detail. Stability input data for a representative unit was used for the dynamic stability portion of the analysis.

The connection and power delivery from SSU6 to IID's transmission system with the plan of service caused no significant transmission impact by itself. However, the interconnection with SSU6, the proposed Blythe Phase I and II interconnection, and load growth around Coachella Valley will require the following upgrades to IID's existing transmission facilities to avoid impacting the system:

1. Avenue 58: replace the 161/92 kV, 125 MVA transformer with a 225 MVA transformer.
2. Niland: replace the 161/92 kV, 75 MVA transformer with the Avenue 58 125 MVA transformer.
3. Coachella Valley: Install a parallel 161/92 kV, 125 MVA transformer with the existing 161/92 KV, 125 MVA transformer.

An operating restriction was identified for SSU6 an N-2 loss of both the 161 kV line from the project to IID's Midway substation and either the 161 kV line from the project to the El Centro Substation or to the Avenue 58 Substation at the time of extreme hot

[1] Should future sales other than a swap be considered, CalEnergy will submit a request for the appropriate transmission service.

weather conditions (50 degrees C). IID and CalEnergy will develop operating procedures for this potential event.

Due to certain pre-existing conditions, other transmission facilities were identified that require mitigation prior to the addition of SSU6. The corresponding impacts were not attributable to SSU6. The study is not intended to assign responsibilities to the mitigation plan described in this report.

1.1 Salton Sea Unit 6 Electric Generation Facility Project

SSU6 is a proposed 200 MW geothermal power generating facility to be located in the area of the existing Salton Sea geothermal power units near Niland, California. Project plans call for construction to begin in 2003 for the one-unit, geothermal steam power plant. The project is expected to be in service in the first quarter of 2005. The expected net output of the plant, after station service usage, will be approximately 185 MW.

1.2 Plan of Service

The Power Sales Agreement between Imperial Irrigation District (IID) and CalEnergy includes terms and conditions that make it imperative for IID to have very reliable facilities for interconnection of SSU6 to IID's transmission system. As a result, the plan of service described below exceeds the requirements that would otherwise be required if SSU6 were requesting, and IID were providing, point-to-point transmission service for SSU6.[2]

The proposed plan of service complies with all applicable transmission planning criteria in addition to providing reliable receipt and delivery of energy from the plant to IID's native load.

The SSU6 project will consist of one 200 MW electric generator connected to a 16/161 kV, 260 MVA step-up transformer[3]. SSU6's step-up transformer will be tied to two 161 kV circuits. The two 161 kV circuits will extend from SSU6 to a new IID 161 kV switching station located adjacent to SSU6. The point of interconnection will be at a point between the SSU6 property boundary and IID's new 161 kV switching station, (Initially named MAE Station) which will be owned, operated and maintained by IID. The equipment and structures in the IID switching station will be operated at 161 kV. The IID switching station will be a double-bus, double-breaker configuration (two breakers per circuit). The IID 161 kV switching station bus will interconnect to the following circuits:

[2] IID has performed extensive system impact studies for new generation within the area near CalEnergy in response to requests for interconnection and transmission services. As a result of these prior assessments, IID has extensive knowledge and understanding about the interconnection requirements and system impacts associated with the interconnection of SSU6 to this part of IID's transmission system.
[3] Sizing will be subject to final engineering.

- Two 161 kV (1033 ACSR conductor) circuits to SSU6 of approximately 500 feet in length.
- One double-circuit, 161 kV (constructed to 230 kV standards) steel pole line (1033ACSR conductor) of approximately 16 miles in length that will loop in and out IID's existing 161 kV El Centro Switching Station (ECSS) to Avenue 58 Substation line ("L" line) and
- One single-circuit, 161 kV (constructed to 230 kV standards) steel pole line (1033ACSR conductor) of approximately 14 miles in length that will interconnect to a 161 kV bus at IID's Midway Substation projected to be in service by 2004.

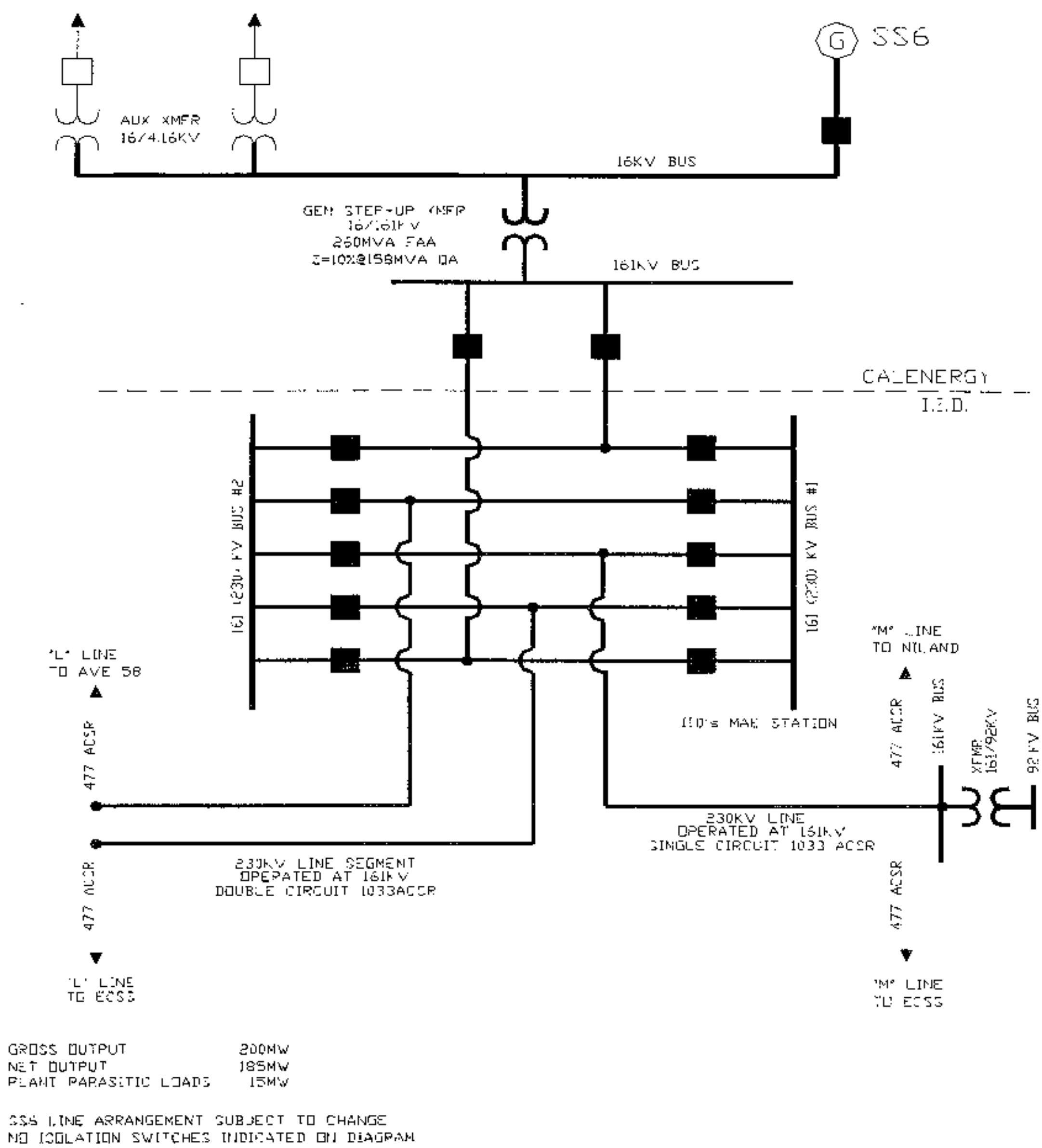
The existing "L" line is an 80-mile long 161 kV single-circuit, wood pole "H" frame transmission line with 477ACSR conductor connecting IID's southern service area (southern termination at the ECSS) with IID's northern service area (northern termination at the Ave 58 substation).

The 14-mile 161 kV line that terminates at the Midway Substation will serve as an additional interconnection in the event both segments of the "L" line are out of service. A 161 kV bus will be installed at IID's Midway substation by 2004 and will connect to the 92 kV bus through a 161/92 kV, 300 MVA transformer. The 161 kV bus at the Midway Substation will also allow IID to loop in and out IID's existing 161 kV "M" line. This line (in conjunction with the "N" line) currently serves as one of IID's interconnections between IID's southern service area (southern termination at the ECSS) with IID's northern service area (northern termination at the Coachella Valley Substation). [4]

[4] The "M" line terminates at the Niland Substation and interconnects with the "N" line (at the Niland Substation), which terminates at the Coachella Valley Substation.

The following simplified one-line diagram reflects the proposed interconnection facilities within IID's new switching station.

One–Line Diagram for Salton Sea 6



The following diagrams illustrate the location of the proposed plant with respect to the IID service area, and the configuration of IID's transmission system before and after the completion of plan of service and interconnection facilities.

IID SERVICE AREA PRE-PROJECT 2005 CONFIGURATION

5

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[5] The blue and green dashed lines represent the proposed Blythe I & II facilities currently scheduled to be completed prior to the SSU6 facilities.

6/28/02

IID SERVICE AREA POST-PROJECT 2005 CONFIGURATION

6

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[6]The blue and green dashed lines represent the proposed Blythe I & II facilities currently scheduled to be completed prior to the SSU6 facilities. The yellow dashed lines represent the proposed SSU6 facilities.

2. BASE CASE DEVELOPMENT

A series of heavy summer base cases were developed to evaluate the adequacy of the proposed plan of service and provide benchmarks with respect to the performance of the IID system when serving IID's load with SSU6, or in the alternative, imports of power into IID's control area. The performance of the IID power system is normally analyzed during the summer peak load period, where IID load and generation is at its maximum level. Seven base cases were developed to simulate realistic alternative generation dispatch scenarios:

1. 05hs_0a.sav: Pre-existing conditions
2. 05hs_1a.sav: 170 MW net generation from SSU6, replacing IID's imports with SSU6 generation.
3. 05hs_1a_1.sav: Same as case 2 above, but increase SSU6 net generation to 185 MW and a 15 MW swap, replacing 15 MW of IID's imports with the corresponding increase of 15 MW of SSU6.
4. 05hs_1a_2.sav: Same as case 2 above, but increase SSU6 net generation to 185 MW, and 15 MW swap replacing 15MW of IID's internal generation with the corresponding increase of 15 MW of SSU6.
5. 05hs_2a.sav: 170 MW net generation from SSU6, replacing IID's internal generation with SSU6 generation.
6. 05hs_2a_1.sav: Same as case 5 above but increase SSU6 net generation to 185 MW, and a 15 MW swap replacing 15 MW of IID's imports with the corresponding increase of 15 MW of SSU6.
7. 05hs_2a_2.sav: Same as case 5 above, but increase SSU6 net generation to 185 MW, and 15 MW swap replacing 15MW of IID's internal generation with the corresponding increase of 15 MW of SSU6.

The base cases were derived from the 2005HS1SA1, compiled August 4, 2000 by WECC, and obtained from the WECC bulletin board. The WECC base cases were reviewed and updated with a detailed representation (241 busses) of the IID system to replace the simplified model (74 busses) in the base case. The base cases were further amended to reflect:

- IID's current load forecast for 2005;
- The updated configuration of the South Western Power Link (SWPL) including the Hassayampa Switching Station and the 500kV line modifications related to Hassayampa;
- The connection of the Arlington generation project (670MW) to Hassayampa and the dispatch and schedule of that unit to San Diego Gas & Electric ("SDGE") and Southern California Edison ("SCE") to increase flows in the SWPL[7];

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[7] The dispatch of the Arlington generation to SDGE and SCE was done to stress the East of River Path, but were limited so as not to exceed the thermal rating of the Hassayampa to North Gila 500 kV line.

- The Blythe Energy Phase I (520 MW) and Phase II (520 MW) for a total of a 1040 MW facility interconnected to the Buck Boulevard Substation and related proposed transmission upgrades: a double-circuit 230KV transmission line from Buck Boulevard to IID's Midway Substation, a double-circuit, 230KV transmission line from Highline Station to ECSS, the upgrade to double circuit of the existing 230KV transmission line from IID's ECSS to SDG&E/IID's IV Substation and other minor upgrades needed to accommodate Blythe Energy's request for 500 megawatts of transmission service. The energy from the Blythe Energy facility was dispatched to ISO control grid.
- The replacement of the existing transformer (70 megawatts) at SCE's Eagle Mountain Substation with a 280MVA transformer[8].

2.1 INTERCHANGE SCHEDULES

The original WECC 2005 heavy summer base case interchange schedule assumed that IID was exporting 203MW. The WECC base case "05hs_0a" was modified to replace internal generation with imports from area 14. Area net interchanges were modified in the following areas: APS (14), PGE (30), SDG&E (22), SCE (24). Table 1 and Table 2 show the interchange for the different base case scenarios utilized in this study, including the original WECC base case.

[8] SCE is performing studies to increase the rating of PATH 59 and replace the Eagle Mountain transformer with a 280MVA transformer.

TABLE 1
HEAVY SUMMER INTERTCHANGE SCHEDULES
WECC ORIGINAL CASE 05HSSA1.SAV
CASES: 05HS_0a (PRE-PROJECT), 05HS_1a and 05HS_2a (POST PROJECT)

CASE:				05HSSA1.SAV		05HS_0a.SAV		05HS_1a.SAV		05HS_2a.SAV		
AREA-	-SWING-	--NAME--	--KV--	SWING MW	--PNET--	SWING MW	--PNET--	SWING MW	--PNET--	SWING MW	--PNET--	NAME
54	54143	BRAZ#1	13.7	40.6	-400	40.6	-400	40.6	-400	40.6	-400	ALBERTA
14	15903	AGUAFR 3	18	155.1	1548.1	144.5	3444.1	147.1	3319.1	144.4	3444.1	ARIZONA
50	50499	GMS G5	13.8	100	2570	99.8	2570	99.8	2570	99.8	2570	B.C.HYDRO
60	60100	BRWNL 5	13.8	179.4	1114	179.3	1114	179.1	1114	179.2	1113.9	IDAHO
26	26004	CASTAI1G	18	105.6	-1377	116.6	-1377	115.7	-1377	116.7	-1377	LADWP
20	20006	PJZ-U5	15	158.1	0	160.8	0	161.1	0	160.9	0	MEXICO-CFE
62	62001	KERR	13.8	105.4	1366	102.2	1366	102.2	1366	102.2	1366	MONTANA
18	18259	CLARK 9	13.8	56.8	-2710.9	56.4	-2710.9	56.4	-2710.9	56.4	-2710.9	NEVADA
10	11114	NEWMANG3	13.8	81.5	-750.4	79.3	-750.4	79.6	-750.4	79.3	-750.4	NEW MEXICO
40	40289	COULEE 2	13.8	1082.2	4050	1053.7	3710	1053	3710	1053.8	3710	NORTHWEST
65	66055	NAUGT G1	18	87.8	210.4	75.8	210.4	75.9	210.4	75.7	210.3	PACE
30	30000	PTSB 7	20	621.4	-1880	573.3	-2580.5	573	-2580.5	573.3	-2580.5	PG AND E
70	70105	CHEROK3	20	96.9	-952.8	93.8	-952.8	93.9	-952.8	93.8	-952.8	PSCOLORADO
22	22792	SOUTHBY4	20	165.7	-2053.1	174.6	-2423	174	-2423.1	174.5	-2423	SANDIEGO
64	64119	TRACY G3	13.8	111.8	-523	111.7	-523	111.7	-523	111.7	-523	SIERRA
24	24004	ALAMT4 G	18	246.4	-5328.5	263.2	-5627.1	261.2	-5627	263.8	-5627.1	SOCALIF
52	52163	WAN-G3	14.4	107.7	130	107.7	130	107.7	130	107.7	130	W KOOTENAY
19	19023	HOOVERA3	16.5	111.4	3578.1	94.8	3578.1	95	3578.1	94.7	3578.1	WAPA L.C.
73	73129	MBPP-1	24	425.6	1080.9	412.9	1080.9	413.4	1080.9	412.9	1080.9	WAPA R.M.
63	63005	FT PECK1	13.8	39.4	125	39.2	125	39.2	125	39.2	125	WAPA U.M.
8	8648	ELSTM 4	13.8	77.9	203.2	34.4	16.1	59.8	141.1	39.7	16.1	IID

TABLE 2
HEAVY SUMMER INTERTCHANGE SCHEDULES
CASES: 05HS_1a_1, 05HS_1a_2, 05HS_2a_1, and 05HS_2a_2 (POST PROJECT)

CASE:				05HS_1a_1.SAV		05HS_1a_2.SAV		05HS_2a_1.SAV		05HS_2a_2.SAV		
AREA-	-SWING-	--NAME--	--KV--	SWING MW	--PNET--	SWING MW	--PNET--	SWING MW	--PNET--	SWING MW	--PNET--	NAME
54	54143	BRAZ#1	13.7	40.6	-400	40.6	-400	40.6	-400	40.6	-400	ALBERTA
14	15903	AGUAFR 3	18	146.9	3319.1	147.1	3319.1	144.2	3444	144.5	3444.1	ARIZONA
50	50499	GMS G5	13.8	99.8	2570	99.8	2570	99.8	2570	99.8	2570	B.C.HYDRO
60	60100	BRWNL 5	13.8	179.1	1113.9	179.1	1113.9	179.2	1113.9	179.2	1113.9	IDAHO
26	26004	CASTAI1G	18	115.7	-1377	115.7	-1377	116.7	-1377	116.7	-1377	LADWP
20	20006	PJZ-U5	15	161.1	-0.1	161.1	0	160.9	0	160.9	0	MEXICO-CFE
62	62001	KERR	13.8	102.2	1366	102.2	1366	102.2	1366	102.2	1366	MONTANA
18	18259	CLARK 9	13.8	56.4	-2710.9	56.4	-2710.8	56.4	-2711	56.4	-2710.9	NEVADA
10	11114	NEWMANG3	13.8	79.6	-750.4	79.6	-750.4	79.3	-750.4	79.3	-750.4	NEW MEXICO
40	40289	COULEE 2	13.8	1053	3710	1053	3710	1053.9	3710.1	1053.8	3710	NORTHWEST
65	66055	NAUGT G1	18	76	210.4	75.9	210.3	75.8	210.4	75.7	210.3	PACE
30	30000	PTSB 7	20	572.8	-2580.5	572.9	-2580.3	573.4	-2580.4	573.3	-2580.5	PG AND E
70	70105	CHEROK3	20	93.9	-952.8	93.9	-952.8	93.8	-952.8	93.8	-952.8	PSCOLORADO
22	22792	SOUTHBY4	20	174	-2423	174	-2423	174.4	-2423.1	174.5	-2423	SANDIEGO
64	64119	TRACY G3	13.8	111.7	-523	111.7	-523	111.7	-523	111.7	-523	SIERRA
24	24004	ALAMT4 G	18	261	-5627	261.2	-5627	263.7	-5627	263.8	-5627.1	SOCALIF
52	52163	WAN-G3	14.4	107.7	130	107.7	130	107.7	130	107.7	130	W KOOTENAY
19	19023	HOOVERA3	16.5	94.7	3563.1	95	3578.1	94.4	3563.1	94.7	3578.1	WAPA L.C.
73	73129	MBPP-1	24	413.4	1080.9	413.4	1080.9	412.8	1080.8	412.9	1080.9	WAPA R.M.
63	63005	FT PECK1	13.8	39.2	125	39.2	125	39.2	125	39.2	125	WAPA U.M.
8	8648	ELSTM 4	13.8	60.7	156.1	60.4	141.1	40.5	31.1	40.3	16.1	IID

Table 3 summarizes the IID transmission interties flows for the seven cases analyzed in this study. Negative values indicate imports into IID's system.

TABLE 3
SUMMARY OF TRANSMISSION INTERTIES FLOWS

Intertie	Coachella-Devers Ramon-Mirage	ECSS-IV ckt 1 ECSS-IV ckt 2	Midway-Buck230 kV ckt 1 Midway-Buck 230 kV ckt 2	Niland-Blythe Pilot Knob-Knob	Yucca 161-Yucca 69 Xfrmr #1 Yucca 161-Yucca 69 Xfrmr #2
Intertie Designation	Path 42	SN&SS Lines	BN&BS Lines	F&D Lines	Yucca Tr.
Voltage	230 kV	230 kV	230 Kv	161 kV	161 kV
Boundary	SCE	SDG&E	WAPA	WAPA	APS
05hs_0a	458.7 MW	275.2 MW	-620.0 MW	-126.0 MW	28.3 MW
05hs_1a	507.1 MW	322.7 MW	-616.6 MW	-107.0 MW	34.8 MW
05hs_2a	444.8 MW	284.3 MW	-620.5 MW	-122.1 MW	29.5 MW
05hs_1a_1	512.2 MW	327.7 MW	-615.4 MW	-103.9 MW	35.5 MW
05hs_1a_2	507.8 MW	322.2 MW	-616.4 MW	-107.1 MW	34.5 MW
05hs_2a_1	449.9 MW	289.3 MW	-619.3 MW	-119.0 MW	30.2 MW
05hs_2a_2	445.5 MW	283.9 MW	-620.3 MW	-122.2 MW	29.2 MW

3. STUDY METHODOLOGY

3.1 Powerflow Cases

Diagrams of the 2005 Heavy Summer Base Case (pre-project and post-project) power flows are included as Attachments 11A, 12A, 13A, 14A, 15A, 16A and 17A.Seven cases were developed (previously described in section 2, page 7) to represent various operating conditions including two levels of net interchange (141 MW and 16.1 MW). CalEnergy's proposed unit will deliver power to the IID system through contractual agreements, thus minimizing any significant impact on external systems.

3.2 Contingencies

A series of single and multiple contingencies were simulated for each of the base cases. The list of contingencies studied included 92 kV, 161 kV, 230 kV and 500 kV transmission line outages and 230/92 kV and 161/92 kV transformer outages and combinations of these outages where appropriate. Credible double and triple contingencies were limited to transmission facilities that in combination with one another could have the potential to cause a significant adverse impact on other transmission.

A list of all contingencies studied is included in Attachment 5. Results of the contingency analysis are both summarized and detailed in attachments to this report. The following table provides a guide to the contingency results.

TABLE 4
GUIDE TO CONTINGENCY RESULTS

Base Case	Base Case Results	Base Case Diagram	Outage Diagrams	Post-Contingency Results > 90%[9]	Contingency Summary	Full Contingency Report
05hs_0a	ATT 11	ATT 11A	ATT 11B	ATT 11C	ATT 11D	ATT 11E
05hs_1a	ATT 12	ATT 12A	ATT 12B	ATT 12C	ATT 12D	ATT 12E
05hs_2a	ATT 13	ATT 13A	ATT 13B	ATT 13C	ATT 13D	ATT 13E
05hs_1a_1	ATT 14	ATT 14A	ATT 14B	ATT 14C	ATT 14D	ATT 14E
05hs_1a_2	ATT 15	ATT 15A	ATT 15B	ATT 15C	ATT 15D	ATT 15E
05hs_2a_1	ATT 16	ATT 16A	ATT 16B	ATT 16C	ATT 16D	ATT 16E
05hs_2a_2	ATT 17	ATT 17A	ATT 17B	ATT 17C	ATT 17D	ATT 17E

3.3 Short Circuit Fault Duty Analysis

A short circuit fault duty analysis of the interconnection of SSU6 and related transmission facilities was conducted with and without the SSU6 Project to determine the adequacy of IID's circuit breakers

3.4 Stability

The transient stability analysis was conducted for three conditions to test the most severe conditions:

1. A three-phase fault on the MAE Station 161 kV bus that causes both the MAE – Midway 161 kV and the MAE – ECSS 161 kV lines to open. The fault is cleared in 4 cycles. This is considered to be the most severe transient stability condition for the study since the loss of two lines from the SSU6 project to the IID system leaves only one 50-mile, 161 kV line to the Avenue 58 Substation in IID's northern system with the unit operating at full load.
2. A three-phase fault on the ECSS 230 kV bus that causes both the ECSS 230/161 kV transformer to open . The fault is cleared in 4 cycles.
3. A three-phase fault on the Midway Substation 230 kV bus that causes the Midway 230/92 kV transformer to open. The fault is cleared in 4 cycles.

The post transient voltage analysis is used to determine if sufficient reactive demand is available to prevent voltage collapse within the region where the proposed unit is located. Q-V curves are generated comparing the pre-project base case and the post-project base cases.

[9] Elements loaded above 90% before contingency are not shown in this report.

4. PLANNING CRITERIA

IID customarily relies upon WECC planning criteria for studies of this nature. In some instances, IID has adopted additional criteria as indicated below. The WECC planning criteria used in this study are described in the document "Reliability Criteria for Transmission System Planning." The specific criteria utilized in this study are listed below:

- Pre-disturbance bus voltages must be between 0.95 per unit and 1.05 per unit. (This is an IID requirement that is not included in the WECC criteria).
- Allowable post-transient voltage deviation of five (5) percent for N-1 Contingencies (deviation from pre-disturbance voltage).
- Allowable post-transient voltage deviation of ten (10) percent for N-2 contingencies (deviation from pre-disturbance voltage).
- Post-transient bus voltages must be at least 0.90 per unit. (This is an IID requirement that is not included in the WECC criteria).
- Allowable single contingency transient voltage deviation of 25 percent, with a maximum duration of 20 cycles for deviations greater than 20 percent.
- Allowable double contingency transient voltage deviation of 30 percent, with a maximum duration of 40 cycles for deviations greater than 20 percent.
- Pre and post-disturbance loading to remain within the emergency ratings of all equipment and line conductors. The emergency ratings are determined by the owner/operator of each equipment item.

5. RESULTS

5.1 Powerflow Analysis: (Summary in Attachments 8 and 9, Detailed reports and diagrams in Attachments 11 through 17)

The transmission system impact study identified three minor transmission conditions that require mitigation, or operating procedures, for the connection of, and power delivery from, SSU6 to IID's transmission system. No significant transmission impacts were identified. The following IID transmission facilities require upgrades to mitigate expected loadings as a result of contingencies that were analyzed:

1. Avenue 58 161kV/92kV, 125 MVA transformer loads to 72% in the pre-project base case to a maximum of 96% in post-project base case 05hs2a_2. Multiple contingencies load this transformer in the range of 100 to 104%.
   The following contingencies load the transformer in excess of 110%.

Contingency #	Description	load	Case
18	Coachella Valley 230KV to Midway 230 KV Circuit 1 and 2	123%	05hs2a_1
50	Midway 161KV to MAE and MAE SUB to ECSS 161KV lines	122%	05hs2a_2
153	Coachella Valley 161/92 KV transformer	129%	05hs2a_2

2. Niland 161/92 kV, 75 MVA transformer loads to 92% in the pre-project base case to a maximum of 116% in post-project base case 05hs2a_2. Multiple contingencies load this transformer in excess of 120% to a maximum of 143% during the loss of the Niland to Coachella Valley 161 kV line (Contingency No. 40)
3. Coachella Valley 161/92 kV, 125 MVA transformer loads under 70% in all the base cases, The following contingencies load the transformer in excess of 100%

Contingency #	Description	load	Case
18	Coachella Valley 230KV to Midway 230 KV Circuit 1 and 2	128%	05hs2a_1
152	Ave 58 SUB 161/92 KV transformer	123%	05hs2a_1

The proposed mitigation plan consists of:

1. Avenue 58; replace the 161/92 kV, 125 MVA transformer with a 225 MVA transformer,
2. Niland; replace the 161/92 kV, 75 MVA transformer with the Avenue 58 125 MVA transformer, and
3. Coachella Valley Install a parallel 161/92 kV, 125 MVA transformer with the existing 161/92 KV transformer, 125 MVA transformer.

In addition to the above mitigation plan, the possibility for the requirement of an operating procedure was identified under the unlikely contingency of loosing both the 161 kV line from the project to IID's Midway Substation, and either the 161 kV line from the project to the El Centro Switching Station (Contingency No. 50) or to the Avenue 58

Substation (Contingency No. 51) at the time of extreme hot weather conditions (50 degrees C). The existing portion of the line is 477 ACSR conductor rated at 165 MW at 50 degrees C under normal operating conditions[10]. IID and CalEnergy will develop operating procedures for this potential event.

Due to certain pre-existing conditions, other transmission constraints were identified that require mitigation prior to the addition of SSU6. The corresponding impacts were not attributable to SSU6. The study is not intended to assign responsibilities to the mitigation plan described in this report.

5.2 Short Circuit Fault Duty Analysis: (Attachment 10)

The short circuit fault duty analysis identified three 92KV breakers at 92.8% of their maximum interrupting rating in the pre-project base case and 93.6% of their maximum interrupting rating in the post-project base case, the following table show the description and location of these breakers.

Substation	Breaker	KV	Short Circuit Interrupting Rating	Pre-project Short Circuit	Post-project Short Circuit
Coachella Valley	X10	92	20000	18563	18715
	CLNO	92	20000	18563	18715
	CXSO	92	20000	18563	18715

Because these breakers were already nearing capacity, the Engineering section recommends these breakers be replaced, however this is not solely attributable to the addition of SSU6

5.3 Stability Analysis: (Attachments 18 and 19)

Transient stability analysis (ATT-18)

The system did not experience any transient stability problems for even the most severe contingency identified, loss of two of the outlet line from the SSU6 leaving a 50-mile long line to IID's Avenue 58 Substation carrying the entire 185 MW output of the plant. Attachment 18 contains the results of the analysis.

Post-transient study: (ATT-19)

The IID's 230KV, 161KV and 92KV buses were analyzed, Q-V curves were generated for every bus comparing the pre-project and post-project cases for the 230kv Ramon to Mirage line outage. No voltage problems were identified in the post transient voltage analysis. Attachment 19 contains the results of the analysis.

5.4 System Loss Analysis: (Attachment 7)

[10] IID is investigating an emergency rating for the existing "L" line and expects that the rating will accommodate the full output of the plant for a period during an emergency. Regardless, SSU6 would be able to deliver the 170 MW associated with IID's purchase contract even under the normal rating.

Table 5 and Table 6 summarize the operating characteristics of IID's system for each case including the level of generation, net and scheduled interchange, system load, and transmission losses by voltage level. In addition, a number of statistics of the modeled system are summarized for each of the respective cases. Similar tables can be found in Attachment 7.

TABLE 5

SYSTEM GENERATION, INTERCHANGE, LOAD and LOSS SUMMARY
CASES: 05HS_0a (PRE-PROJECT), 05HS_1a and 05HS_2a (POST PROJECT)

CASE: IID AREA 8	05hs_0a.sav -----MW----	----MVAR---	05hs_1a.sav -----MW----	----MVAR---	05hs_2a.sav -----MW----	----MVAR---
Generation	950.114	50.605	1095.478	74.422	975.865	80.284
Actual Load	858.39	416.14	873.39	418.64	873.39	418.64
Net actual shunt	0	-492.655	0	-491.491	0	-484.441
Net actual svd	0	0	0	0	0	0
Net Interchange	16.108	-242.328	141.003	-262.66	21.448	-265.276
Sched Interchange	16.1		141.1		16.1	
Loss	75.619	369.428	81.085	409.954	81.025	411.38
Loss at 13.20 Kv	0.028	0.343	0.028	0.343	0.028	0.343
Loss at 13.80 Kv	2.599	62.569	2.449	59.925	1.891	50.475
Losś at 14.40 Kv	0.621	13.809	0.62	13.782	0.621	13.822
Loss at 34.50 Kv	1.264	-0.796	1.069	-2.431	1.001	-2.896
Loss at 92.00 Kv	17.409	75.729	17.783	76.946	19.159	86.11
Loss at 161.00 Kv	11.913	-3.298	14.179	20.755	16.029	30.138
Loss at 230.00 Kv	41.628	215.361	44.8	234.922	42.137	227.662
Loss at other Kv	0.158	5.712	0.157	5.711	0.158	5.727
Largest mismatch MVA	0.0019	0.0193	0.0008	0.0207	0.0028	0.0211
Generators	46		45		40	
Loads	62		63		63	
Shunts	50		50		50	
Svd	0		0		0	
Buses	246		246		246	
Lines	165		169		169	
Transformers	77		78		78	
DC buses	0		0		0	
DC converters	0		0		0	
DC lines	0		0		0	

TABLE 6

SYSTEM GENERATION, INTERCHANGE, LOAD and LOSS SUMMARY
CASES: 05HS_1a_1, 05HS_1a_2, 05HS_2a_1, and 05HS_2a_2 (POST PROJECT)

CASE: IID AREA 8	05hs_1a_1.sav -----MW----	----MVAR---	05hs_1a_2.sav -----MW----	----MVAR---	05hs_2a_1.sav -----MW----	----MVAR---	05hs_2a_2.sav -----MW----	----MVAR---
Generation	1111.448	78.236	1096.125	76.873	986.225	83.566	970.981	83.062
Actual Load	873.39	418.64	873.39	418.64	873.39	418.64	873.39	418.64
Net actual shunt	0	-491.121	0	-491.408	0	-484.116	0	-484.449
Net actual svd	0	0	0	0	0	0	0	0
Net Interchange	156.073	-267.48	141.083	-263.809	31.109	-268.63	16.09	-265.159
Sched Interchange	156.1		141.1		31.1		16.1	
Loss	81.988	418.216	81.654	413.47	81.727	417.692	81.503	414.011
Loss at 13.20 Kv	0.028	0.343	0.028	0.343	0.028	0.343	0.028	0.343
Loss at 13.80 Kv	2.455	60.13	2.383	57.195	1.88	50.02	1.81	47.156
Loss at 14.40 Kv	0.62	13.786	0.62	13.784	0.621	13.824	0.621	13.823
Loss at 34.50 Kv	1.07	-2.429	1.067	-2.439	1	-2.898	0.996	-2.906
Loss at 92.00 Kv	17.819	77.365	17.812	77.662	19.188	86.62	19.242	87.521
Loss at 161.00 Kv	14.653	25.961	14.726	26.046	16.512	35.319	16.599	35.465
Loss at 230.00 Kv	45.186	237.349	44.861	235.162	42.337	228.735	42.047	226.873
Loss at other Kv	0.157	5.71	0.158	5.715	0.158	5.728	0.159	5.736
Largest mismatch MVA	0.0023	0.0209	0.0015	0.0209	0.0013	0.0212	0.0019	0.0191
Generators	45		45		40		40	
Loads	63		63		63		63	
Shunts	50		50		50		50	
Svd	0		0		0		0	
Buses	246		246		246		246	
Lines	169		169		169		169	
Transformers	78		78		78		78	
DC buses	0		0		0		0	
DC converters	0		0		0		0	
DC lines	0		0		0		0	

6. CONCLUSIONS

SSU6 can be interconnected with the IID transmission system with the plan of service and the mitigation plan described in this report.

The addition of SSU6 within IID's control area does not degrade IID's transmission system.

The addition of SSU6 and related transmission lines will increase operator flexibility for maintaining the transmission system during steady-state and contingency conditions.