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February 11, 2008
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Mr. Jack Caswell
California Energy Commission
Systems Assessment and Facilities Siting Division
1516 9th Street, MS 15
Sacramento, CA 95814-5504

RE: Data Response, Set 1B
Ivanpah Solar Electric Generating System (07-AFC-5)

Dear Mr. Caswell:

On behalf of Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC, please find attached one original and 12 hard copies of Data Response, Set 1B, which provide supplemental responses to Staff's data requests dated December 12, 2007.

Included in this submittal are the following oversize documents. The number of copies provided is shown in parenthesis. Please let us know if you need more hard copies. Electronic copies of these documents will be provided to the parties upon request.

- Attachment DR19-1, Delineation of Waters of the United States for the Ivanpah Solar Energy Project (13 copies)
- Attachment DR57-1, Preliminary Draft Drainage, Erosion, and Sediment Control Plan (7 copies)
- Attachment DR93-1B, Final Interconnection System Impact Study for DPT 1 (i.e., Ivanpah 2) (5 copies)

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

Enclosure
c: POS List
Project File

ATTACHMENT DR93-1B

Interconnection System Impact Study

Generation Interconnection

Bright Source Energy, Inc.

DPT1 Project

Final Report

California ISO
Your Link to Power

February 1, 2008

This study has been completed in coordination with
Sothern California Edison per the Large Generator Interconnection Procedure

EXECUTIVE SUMMARY

Bright Source Energy, Inc ("BSE") applied to the California Independent System Operator ("CAISO") for interconnection of the proposed DPT1 Power Project ("DPT1") pursuant to section 3.5 of the Large Generator Interconnection Procedures ("LGIP") issued under the CAISO Tariff. The DPT1 Project, a steam turbine via solar thermal generating facility to be located near Primm, Nevada, will have a maximum net plant output of 100 MW and will consist of four solar-powered steam boilers powering a synchronous steam turbine generator. BSE proposes to interconnect the DPT1 Project into the SCE electrical system and deliver energy and/or ancillary services to the California Independent System Operator ("CAISO") Controlled Grid by looping the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV transmission line in and out of a new substation (referred to in this study as "Ivanpah"[1]). The requested in-service date is February 28, 2010 with a commercial operation date of June 30, 2010.

SCE has performed a System Impact Study (SIS) to determine the adequacy of SCE's electrical system, including that portion of SCE's electrical system that is part of the CAISO controlled grid, to accommodate the DPT1 Project. The Study was performed for two system conditions: a 2013 heavy summer with a one-in-ten load forecast and a 2013 light spring load forecast (65% of the heavy summer load). These conditions reflect the most critical expected loading condition for the transmission system in SCE's area. The study included all queued ahead generation projects in the study area ahead of the DPT1 Project regardless of the in-service dates of such prior projects. The system load condition assumptions were based on the latest in-service date of all queued ahead projects.

Results of the System Impact Study will be used as the basis to determine appropriate project cost allocation for facility upgrades in the Facilities Study. ***The study accuracy and results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by BSE.*** Any changes from the data provided could void the study results. The Study report provides detailed Study assumptions and conditions of the system in which the Study was conducted.

Please be aware that a restudy may be required to reflect the system configuration if a higher queued generation or transmission project that was modeled in the system impact study withdraws or is modified in accordance with applicable tariff allowances.

CONCLUSION

To interconnect the DPT1 Project in a manner that addresses the generation needs in the area, avoids short-lived "piece-meal" solutions, minimizes environmental impacts, minimizes overall cost exposure to rate-payers, minimizes service interruptions, minimizes the need for generation curtailments while upgrades are implemented, and provides the minimum set of facilities for DPT1 thus minimizing upfront cost responsibility to DPT1, the following upgrades are required:

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[1] The final name of the substation is subject to change once SCE finalizes the substation name evaluation efforts.

1. Construction of a new Ivanpah Substation sized to accommodate ultimate 230/115 kV facilities with initial 115 kV facilities

2. Installation of appropriate fully redundant and diverse telecommunication facilities to support both a special protection system that would trip the DPT1 Project under specific outage contingencies as well as overall system protection

Based on the study results, the existing SCE transmission facilities with the above minimum set of facility upgrades required to interconnect the DPT1 Project are not adequate to accommodate the DPT1 Project without additional facility upgrades.

Power Flow

Under base case conditions, a portion of the existing Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line as well as the existing 230/115 kV transformer at Eldorado were found to load beyond the maximum allowable limits. To mitigate these two base case overloads, the following upgrades are recommended:

- Removal of approximately 36 miles of a portion of the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line (the existing 115 kV infrastructure cannot support transmission of greater capacity)

- Construction of a new 36-mile higher capacity transmission line

- Replacement of the existing 230/115 kV transformer bank at the Eldorado Substation

Classification for these facilities (reliability or delivery) will be determined by the CAISO in conjunction with SCE as part of the Facilities Study. If it is determined that the base case overloads identified can be managed with congestion management, the amount of available transmission capacity on the Eldorado leg of the Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line would range between 63 MW and 80 MW for all the queued projects in the vicinity of the DPT1 Project. The DPT1 Project could be subjected to significant curtailment in real-time operation. The amount of generation that will likely be subjected to congestion management is expected to be between 83 MW and 100 MW for both a queued ahead project in the Mountain Pass area and the DPT1 Project which collectively total 163 MW.

In addition, the above network upgrades could become required reliability upgrades for one of the subsequent projects proposed to interconnect at the same location and currently queued lower than the DPT1 Project. This includes the remainder of the 400 MW project, that includes the DPT1 project, for which an Application for Certification was filed at California Energy Commission. Therefore, if DPT1 Project chooses to use congestion management instead of constructing the network upgrades identified to mitigate the base case overloads, the DPT1 Project would be subject to extensive scheduled outage after its commercial operation during the period when such network upgrades are constructed. This extensive scheduled outage would be required upon lower queued projects opting to be fully deliverable or upon the determination that the upgrades are required to mitigate reliability criteria violations.

Transient Stability Results

Transient stability studies identified that the DPT1 steam generator experiences transient instability under 15-cycle closed-in (three-phase-to-ground) system faults located at or near the proposed Ivanpah 115 kV substation. To mitigate the transient stability problem, the following reliability upgrades are recommended:

- Upgrade SCE 115 kV system protection near the proposed Ivanpah substation to provide for primary protection fault clearing times of less than 8 cycles

- Ensure project developer installs out-of-step protection on the DPT1 steam generator

Post-Transient Voltage Results

Depending on the amount of generation resource that is on-line, loss of either the Eldorado-Ivanpah transmission line or loss of the transformation at Eldorado resulted in a significant voltage deviation including a voltage collapse, in the Dunn Siding and Baker substation areas. To mitigate this problem, the following reliability upgrades are recommended:

- Install a Special Protection System that trips the DPT1 Project under outages of transmission facilities connecting the proposed Ivanpah Substation to Eldorado (transmission line and transformer bank at Eldorado)

Short-Circuit Duty Study Results

Under a three-phase-to-ground short-circuit duty study, a total of one 500 kV, two 230 kV, and three 115 kV existing substation locations were identified to require detailed engineering review. Under a single-phase-to-ground short-circuit duty study, a total of one 230 kV and one 115 kV existing substation locations were identified to require detailed engineering review. The results of the detailed engineering review identified that three 230 kV 50 kA circuit breakers at the Lugo Substation will need to be replaced and that two 230 kV 50 kA circuit breakers also at the Lugo Substation will need to be upgraded to 63 kA rating by installing transient recovery voltage (TRV) capacitor banks. However, these reliability upgrades were not triggered by the DPT1 project.

Operational Study Sensitivity Results

This sensitivity study identified the need for additional telecommunication and system protection facilities to allow of early interconnection and delivery of the project output while facility upgrades are placed in service. The study determined that the maximum amount of generation that DPT1 can be expected to produce will be 82 MW provided the queued ahead generation project does not materialize prior to the in-service date of the identified transmission facility upgrades. If the queued ahead project does materialize, the DPT1 project could be limited to no more than 22 MW if the queued ahead project is at full output.

Deliverability Assessment

Separate studies entitled "Deliverability Assessments" will be performed by the CAISO[2] which will determine whether or not the project is deemed as 100% deliverable to the Grid for the Resource Adequacy (RA) purpose. If the project is found to be less than 100% deliverable, the study will recommend conceptual mitigation measures to make it 100% deliverable. The following is the website link to the CAISO's Deliverability Baseline Studies:

http://www.caiso.com/ 1c44/1c44b5c31cce0.html

Cost Estimates

The ***Nonbinding*** Cost Estimate for the interconnection facilities and reliability network upgrades triggered by the DPT1 is $100.6 million[3]. The ***Nonbinding*** Cost Estimate for DPT1's maximum exposure for network upgrades triggered by queued ahead projects is $2.9 million. These estimates have been developed without detailed cost engineering and will be refined in the Facilities Study.

Facility Study

A Facilities Study will be required for the DPT1 Project. The Facilities Study will include detailed cost estimates for SCE upgrades and direct assignment facilities required to interconnect the DPT1 Project and should:

1. Develop cost estimates and schedule for the construction of a new substation to loop the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line and provide a line position for a 115 kV radial gen-tie required to connect the DPT1 Project

2. Develop cost estimates and schedule for the removal of approximately 36 miles of a portion of the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line

3. Develop cost estimates and schedule for the construction of a new 36-mile higher capacity transmission line built to 230 kV construction standards

4. Develop cost estimates and schedule for the replacement of the existing 102 MVA transformer bank at the Eldorado Substation with a new 280 MVA unit

5. Develop cost estimates and schedule for upgrading the SCE 115 kV system protection near the proposed Ivanpah substation to provide for primary protection fault clearing times of less than 8 cycles

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[2] The deliverability study results for the DPT1 Project are anticipated to be available by the end of 2007.

[3] A determination of cost responsibility will be established by the time the Facilities Study is completed

6. Develop cost estimates and schedule for the installation of a special protection system to trip the DPT1 Project under outages of transmission facilities connecting the proposed Ivanpah Substation to Eldorado (transmission line and transformer bank at Eldorado)

7. Develop cost estimate and schedule for the upgrade of two and replacement of three 230 kV circuit breakers at the Lugo Substation

8. Review project developer out-of-step protection on the DPT1 steam generator to ensure it's sufficient to mitigate stability problems under an unlikely "stuck breaker" condition

9. Develop cost estimates and schedule for the delivery upgrades, if any, identified by the CAISO Deliverability Assessment.

10. Develop cost estimates and schedule for the telecommunication and protection facilities required to allow for temporary interconnection in a radial fashion while upgrades are placed in service (radial connection to Cool Water)

    a. Metering at Mountain Pass (bank loading), Wheaton Sub (gen-tie flow) and Ivanpah (gen-tie) flow to allow for close monitoring and coordination of generation and load demand to ensure loadings are maintained within limits and to transfer trip Ivanpah-Wheaton under outage of Cool Water-Baker-Dunn Siding-Wheaton to ensure load at Mountain Pass is not islanded with generation under such outage condition.

    b. Telecommunication facilities and protection equipment (fully redundant) necessary to monitor circuit breaker status at the Lugo and Kramer Substations and signal for trip under simultaneous outage of both the Kramer-Lugo 230 kV No.1 and No.2 transmission lines.

CONTENTS

BRIGHT SOURCE ENERGY, INC.
DPT1 PROJECT

SYSTEM IMPACT STUDY
February 1, 2008

I. INTRODUCTION

Bright Source Energy, Inc ("BSE") applied to the California Independent System Operator ("CAISO") for interconnection of the proposed DPT1 Power Project ("DPT1") pursuant to section 3.5 of the Large Generator Interconnection Procedures ("LGIP") issued under the CAISO Tariff. The DPT1 Project, a steam turbine via solar thermal generating facility to be located near Primm, Nevada, will have a maximum net plant output of 100 MW and will consist of four solar-powered steam boilers powering a synchronous steam turbine generator. BSE proposes to interconnect the DPT1 Project into the SCE electrical system and deliver energy and/or ancillary services to the California Independent System Operator ("CAISO") Controlled Grid by looping the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV transmission line in and out of a new substation (referred to in this study as "Ivanpah"[4]). The requested in-service date is February 28, 2010 with a commercial operation date of June 30, 2010.

SCE has performed a System Impact Study (SIS) to determine the adequacy of SCE's electrical system, including that portion of SCE's electrical system that is part of the CAISO controlled grid, to accommodate the DPT1 Project. The Study was performed for two system conditions: a 2013 heavy summer with a one-in-ten load forecast and a 2013 light spring load forecast (65% of the heavy summer load). These conditions reflect the most critical expected loading condition for the transmission system in SCE's area. The study included all queued ahead generation projects in the study area ahead of the DPT1 Project regardless of the in-service dates of such prior projects. The system load condition assumptions were based on the latest in-service date of all queued ahead projects.

Results of the System Impact Study will be used as the basis to determine appropriate project cost allocation for facility upgrades in the Facilities Study. ***The study accuracy and results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by BSE.*** Any changes from the data provided could void the study results. The Study report provides detailed Study assumptions and conditions of the system in which the Study was conducted.

II. STUDY CONDITIONS AND ASSUMPTIONS

A. Planning Criteria

The study was conducted by applying the CAISO Reliability Criteria. More specifically, the main criteria applicable to this study are as follows:

[4] The final name of the substation is subject to change once SCE finalizes the substation name evaluation efforts.

Power Flow Analysis

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

- Single Contingencies – Loss of one line or one AA-Bank
- Double Contingencies – Loss of two lines or one line and one AA-Bank identified as common mode failure elements (Outages of two AA-Banks are beyond the Planning Criteria)

The following reliability criteria are used:

Transmission Lines	Base Case	Limiting Component Normal Rating
	N-1	Limiting Component A-Rating
	N-2	Limiting Component B-Rating
AA-Banks (500/230 kV) Transformer Banks	Base Case	Normal Loading Rating
	Long Term & Short Term	As defined by SCE Operating Bulletin

System upgrades for transmission lines are generally recommended for all reliability criteria violations. Special Protection Systems (SPS) may be allowed for single contingency and credible double contingencies reliability criteria violation in place of system upgrades, provided that the SPS complies with the CAISO Planning Standards' New Generator SPS Guidelines.

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

- Congestion management, as a means to mitigate base case overloads, can be used if it is determined to be manageable and the CAISO Operations concurs with the implementation. Congestion management to mitigate criteria violations may include curtailment of the proposed generation project in real time as needed.

- Facility upgrades will be required if it is determined that the use of congestion management for base case overloads is unmanageable.

- SPS will be recommended for criteria violations under outage conditions if it effectively mitigates system problems, does not jeopardize system integrity, does not exceed the current CAISO single and double contingency tripping limitations, does not adversely impact existing or proposed SPS in the area, and conforms to existing CAISO SPS Guidelines.

- Facility upgrades will be required if the use of an SPS is determined to be ineffective, system integrity is jeopardized, the amount of generation tripping exceeds the current CAISO single and double contingency tripping limitations, adverse impacts are identified to existing or proposed SPS in the area, or the SPS does not conform with the existing SPS Guidelines.

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). Included in the study are CAISO-approved transmission projects queued ahead of the generation interconnection request.

b) Under Base Case with all transmission facilities in service, the system was reevaluated with the inclusion of the DPT1 Project (post-project).

If the emergency 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 DPT1 Project. If the emergency 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 DPT1 Project. The DPT1 Project and other market participants in the area may be subjected to congestion management, potential upgrade cost and/or participation of any proposed SPS if the project addition aggravates or triggers the overload. Additionally, the DPT1 Project may have to participate in mitigation of overloads triggered by subsequent projects in queue, subject to FERC protocols and policies.

Results of these studies should identify:

a) If capacity is available to accommodate the proposed DPT1 Project and all projects ahead in queue without the need for congestion management, SPS, or facility upgrades.

b) If base case overloads exist in the area after the addition of all projects in queue ahead of the DPT1 Project.

c) If base case overloads are triggered in the area after the addition of the DPT1 Project

The range of base case congestion for the DPT1 Project will be determined by reducing market generation projects in the Mountain Pass area including the DPT1 Project. For single and double element outage conditions, the same methodology will be used to identify how much generation tripping is required in order to determine if use of an SPS is appropriate. Use of SPS will be deemed inappropriate if the total amount of generation reduction is found to exceed 1,150 MW under loss of one transmission element and 1,400 MW under loss of two transmission elements. These limits are established by the CAISO utilizing the current Spinning Reserve Criteria.

B. Generation and Load Assumptions

To simulate the SCE transmission system for analysis, the study used databases that were developed to conduct SCE's Annual CAISO Controlled Facilities Expansion Program. The bulk power study considered two load conditions: 2013 heavy summer and a 2013 light spring case which assumed 65% of heavy summer load forecast. In addition, the bulk power study evaluated conditions with dispatch of generation outside of the SCE service territory and electrical system in a manner that maximized SCE imports on the West-of-River (Path 46) and included all pertinent queued ahead generation projects in the vicinity of the DPT1 Project. This was done in order to develop loading scenarios that would stress the transmission system in the area where DPT1 is interconnecting. Generation assumptions are provided below in Table 1-1. Heavy summer and light load study assumptions are provided below in Tables 1-2 and Table 1-3 respectively.

Table 1-1

ACTIVE QUEUED GENERATION PROJECTS MODELED IN THE STUDY

CAISO Queue #	Interconnection Point	(MW)	Requested Operating Date
SCE WDT112	Casa Diablo 115kV	16.54	2007
11	Mountain Pass 115kV	63	TBD
33	Control 115kV Bus	10	In-Service
SCE WDT164	Gale 115kV Bus	80	2006
58	Churchill-Bishop	62	2007
68	Pisgah	850	2009
83	Pisgah 230kV	60	2008
89	Victor 230kV Bus	570	2010
106	Mohave 500 kV	635	2009
109	Pisgah 230kV	550	
110	Pisgah 230kV	0*	2013
114	Victor-Black Mountain 115 kV	0*	2008
115	Pisgah-Lugo 230 kV	0*	2008
116	Pisgah-Lugo 230 kV	0*	2008
118	Mohave 500 kV	550	2009
120	Mohave 500 kV	0*	2011
125	Kramer 230 kV	0*	2010
126	Eldorado 230 or 500 kV	0*	2011
130	Mohave 500 kV	0*	2010

*These Projects were not modeled, since they cause thermal overloads to existing transmission elements and appropriate facility upgrades have not been identified. Once the SIS studies are completed for these projects and mitigation measures are determined, the DPT1 Project impacts on such upgrades will be assessed. Such study will be conducted as part of the Facilities Studies.

Table 1-2
Heavy Summer Load (MW) Assumptions

SUBSTATION	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ALAMITOS	196	198	201	203	200	**199**	199.2	194	194	194
ANTELOPE-BAILEY	814	897	925	970	1037	**729**	738.3	805	825	833
ANTELOPE EAST	0	0	0	0	0	**334**	333.9	334	340	355
BARRE	736	743	804	816	830	**837**	847.5	854	864	877
BLYTHE	56	57	58	59	59	**60**	60.3	61	61	61
CAMINO	2	2	2	2	2	**2**	2.0	2	2	2
CENTER	507	513	522	528	529	**527**	527.9	532	535	538
CHEVMAIN	130	130	130	130	130	**130**	130.0	130	130	130
CHINO	758	776	930	960	974	**993**	998.3	1010	1018	1049
CIMA	1	1	1	1	1	**1**	1.0	1	1	1
DEL AMO	513	520	477	485	484	**485**	486.3	497	499	497
DEVERS - MIRAGE	1026	474	488	500	516	**529**	542.3	553	565	578
EAGLE MT.	2	2	2	2	2	**2**	2.0	2	2	2
EAGLE ROCK	203	205	208	210	213	**215**	210.3	212	213	214
EL CASCO	0	182	195	206	214	**222**	228.2	234	241	248
ELLIS	656	670	682	696	701	**713**	720.6	730	738	747
EL NIDO	366	369	373	377	378	**378**	378.7	377	379	380
ETIWANDA	620	645	668	687	703	**720**	730.7	745	759	777
ETIWANDA "AMERON"	70	70	70	70	70	**70**	70.0	70	70	70
GOLETA	280	284	287	291	292	**292**	293.0	295	296	297
GOULD	122	124	126	129	130	**133**	134.5	138	140	142
HINSON	557	562	569	573	571	**570**	568.5	568	570	570
JOHANNA	454	468	475	529	524	**525**	526.0	528	532	542
JURUPA (city Riverside)	0	270	273	276	275	**276**	275.4	277	276	276
KRAMER	335	359	376	389	398	**407**	416.0	420	426	447
LA CIENEGA	497	504	510	516	517	**518**	528.5	531	534	537
LA FRESA	684	691	699	705	704	**703**	702.8	706	708	709
LAGUNA BELL	596	602	607	613	612	**612**	612.4	614	616	616
LEWIS	548	553	564	569	573	**577**	575.7	576	579	577
LIGHTHIPE	521	528	533	540	540	**541**	542.4	541	544	545
MESA	607	615	627	638	639	**642**	641.2	644	649	651
MIRAGE	0	503	527	549	565	**575**	584.3	596	609	622
MIRA LOMA	826	849	745	767	779	**785**	804.0	822	784	780
MOORPARK	800	828	888	883	892	**899**	905.8	914	925	940
OAK VALLEY	0	0	0	0	0	**0**	0.0	0	0	0
OLINDA	410	428	437	446	451	**456**	460.1	469	474	479
PADUA	696	703	707	716	715	**717**	725.2	733	742	745
RECTOR	735	769	797	820	843	**872**	884.5	514	526	537
RIO HONDO	719	733	745	753	754	**754**	758.4	761	767	771
SAN BERNARDINO	628	632	646	662	672	**682**	689.5	702	716	725
SAN JOAQUIN	0	0	0	0	0	**0**	0.0	392	402	410
SANTA CLARA	621	638	628	672	682	**692**	699.2	704	713	722
SANTIAGO	756	788	815	846	867	**881**	896.4	910	923	943
SAUGUS	773	793	812	834	850	**866**	881.4	901	919	937
SPRINGVILLE	229	233	241	255	262	**262**	275.2	281	288	295
VALLEY	1742	1833	1916	1995	1769	**1809**	1848.7	1878	1927	1951
ALBERHILL	0	0	0	0	271	**284**	296.5	323	334	340
VESTAL	146	148	151	153	153	**154**	154.5	156	157	158
VICTOR	627	656	676	706	715	**728**	750.8	761	776	799
VIEJO	358	366	377	382	385	**387**	389.6	393	396	400
VILLA PARK	760	768	779	745	745	**745**	741.4	737	739	737
VISTA 66 KV	1052	772	783	797	809	**819**	825.9	835	900	919
VISTA 115 KV	686	589	601	613	614	**614**	621.3	623	627	630
WALNUT	737	748	752	758	759	**758**	756.4	758	758	759
Total	**25,159**	**25,795**	**26,409**	**27,023**	**27,369**	**27,680**	**27,973**	**28,343**	**28,711**	**29,062**

Table 1-3

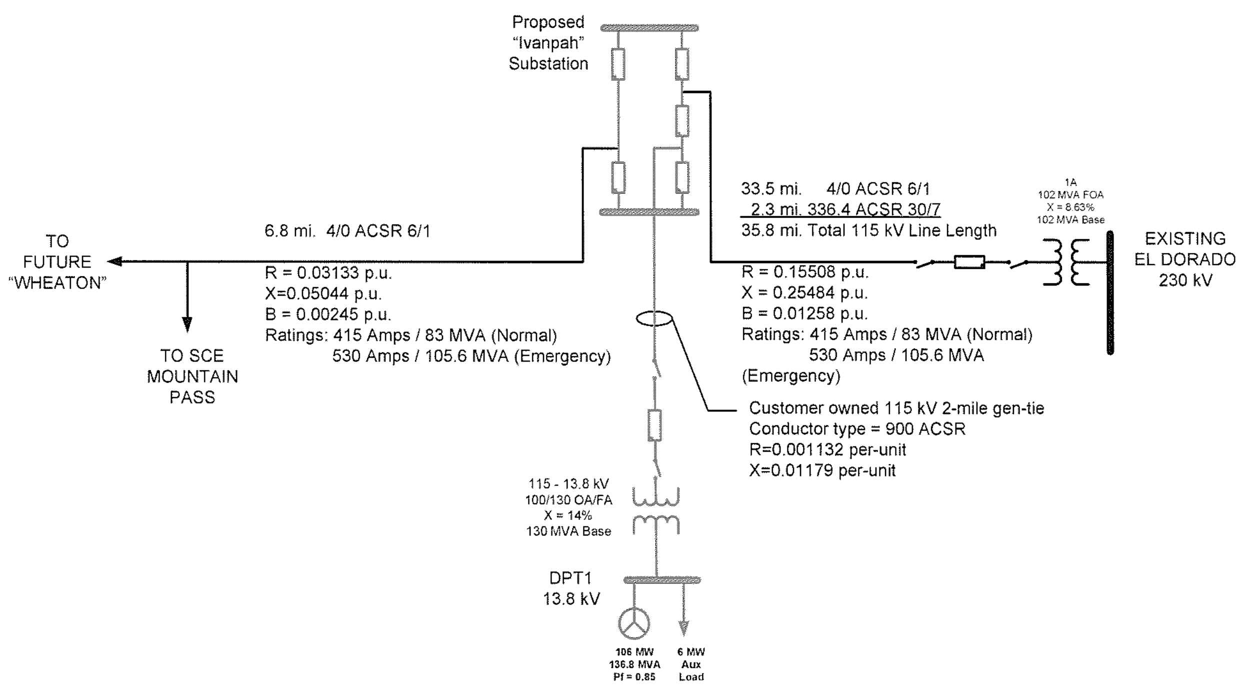
Light Spring Load (MW) Assumptions

SUBSTATION	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ALAMITOS	127	129	131	132	130	130	129	126	126	126
ANTELOPE-BAILEY	529	583	602	630	674	474	480	523	536	541
ANTELOPE EAST	0	0	0	0	0	217	217	217	221	231
BARRE	478	483	522	530	539	544	551	555	562	570
BLYTHE	36	37	38	38	39	39	39	40	39	40
CAMINO	1	1	1	1	1	1	1	1	1	1
CENTER	329	334	339	343	344	342	343	346	348	349
CHEVMAIN	85	85	85	85	85	85	85	85	85	85
CHINO	493	504	605	624	633	645	649	657	661	682
CIMA	1	1	1	1	1	1	1	1	1	1
DEL AMO	334	338	310	315	315	315	316	323	325	323
DEVERS - MIRAGE	667	308	317	325	336	344	352	360	367	376
EAGLE MT.	1	1	1	1	1	1	1	1	1	1
EAGLE ROCK	132	134	135	137	138	140	137	138	139	139
EL CASCO	0	119	127	134	139	144	148	152	157	161
ELLIS	426	435	443	452	455	464	468	475	480	486
EL NIDO	238	240	243	245	245	246	246	245	247	247
ETIWANDA	403	419	434	446	457	468	475	485	494	505
ETIWANDA "AMERON"	46	46	46	46	46	46	46	46	46	46
GOLETA	182	184	187	189	190	190	190	191	193	193
GOULD	79	81	82	84	85	86	87	90	91	92
HINSON	362	365	370	372	371	370	370	370	370	370
JOHANNA	295	304	309	344	341	341	342	343	346	352
JURUPA (city Riverside)	0	176	178	179	179	179	179	180	180	180
KRAMER	218	234	245	253	258	264	270	273	277	291
LA CIENEGA	323	327	331	335	336	337	344	345	347	349
LA FRESA	445	449	454	458	458	457	457	459	460	461
LAGUNA BELL	387	391	395	398	398	398	398	399	400	401
LEWIS	356	360	367	370	372	375	374	375	376	375
LIGHTHIPE	339	343	347	351	351	352	353	351	353	354
MESA	394	400	408	414	415	417	417	419	422	423
MIRAGE	0	327	343	357	367	373	380	388	396	404
MIRA LOMA	537	552	484	499	506	510	523	534	510	507
MOORPARK	520	538	577	574	580	584	589	594	601	611
OAK VALLEY	0	0	0	0	0	0	0	0	0	0
OLINDA	266	278	284	290	293	297	299	305	308	312
PADUA	452	457	460	466	464	466	471	476	483	484
RECTOR	478	500	518	533	548	567	575	334	342	349
RIO HONDO	467	476	485	489	490	490	493	495	499	501
SAN BERNARDINO	408	411	420	430	437	443	448	456	465	471
SAN JOAQUIN	0	0	0	0	0	0	0	255	261	267
SANTA CLARA	403	415	408	437	443	450	454	458	463	469
SANTIAGO	491	512	530	550	564	573	583	592	600	613
SAUGUS	503	516	528	542	553	563	573	586	598	609
SPRINGVILLE	149	152	156	166	171	170	179	183	187	192
VALLEY	1133	1192	1246	1297	1150	1176	1202	1221	1252	1268
ALBERHILL	0	0	0	0	176	185	193	210	217	221
VESTAL	95	96	98	100	99	100	100	101	102	103
VICTOR	407	426	439	459	464	473	488	494	505	519
VIEJO	233	238	245	249	250	252	253	255	258	260
VILLA PARK	494	499	506	484	484	484	482	479	480	479
VISTA 66 KV	684	502	509	518	526	532	537	543	585	597
VISTA 115 KV	446	383	390	398	399	399	404	405	408	410
WALNUT	479	486	489	493	494	493	492	493	493	493
Total	**16,353**	**16,767**	**17,166**	**17,565**	**17,790**	**17,992**	**18,182**	**18,423**	**18,662**	**18,890**

C. <u>BSE – DPT1 Project</u>

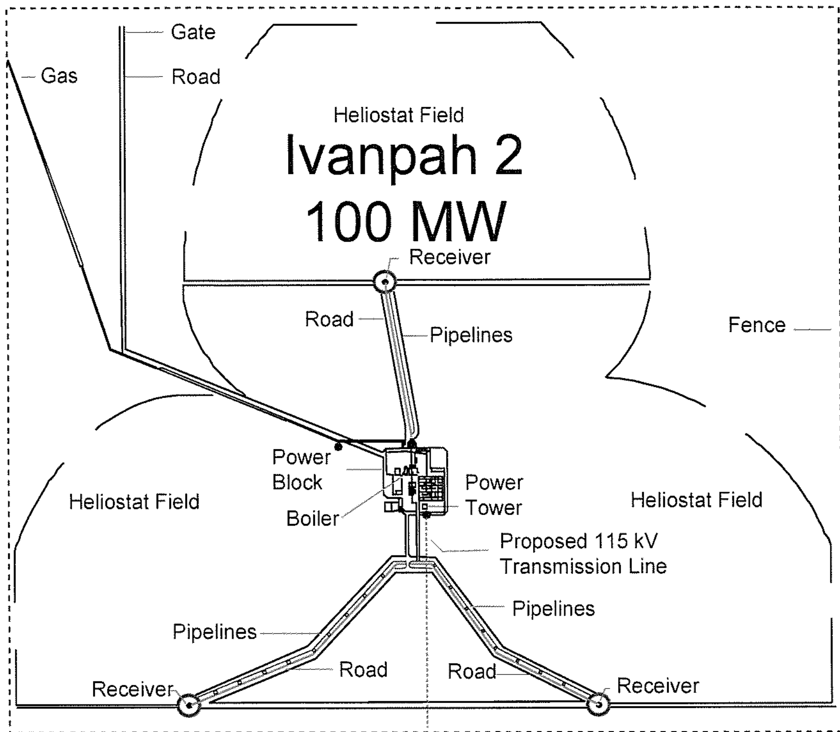
The DPT1 Project is geographically located in Southern California's Mojave Desert, near the Nevada border, to the west of the Ivanpah Dry Lake. Specifically, the project will be in San Bernardino County approximately 4.5 miles southwest of Primm, Nevada and 3.1 miles west of the California-Nevada border in Township 17N, Range 14E, Sections 33 and 34. The DPT1 Project will have a gross output of 106 MW, plant auxiliary load of 6 MW and a net output of 100 MW. The DPT1 requested interconnection to a new substation that would be used to loop the existing Eldorado- Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line as shown below in Figure 1-1. The DPT1 Project has requested an interconnection date of February 28, 2010 and commercial operating date of June 30, 2010.

Figure 1-1
DPT1 Project Proposed Interconnection



The DPT1 Project includes one solar concentrating thermal power plant, based on distributed power tower and heliostat mirror technology. The heliostat (mirror) fields focus solar energy on the power tower receiver near the center of each heliostat array. The heliostat mirrors would be arranged around each solar receiver boiler. Each mirror will track the sun throughout the day and reflect the solar energy to the receiver boiler. The heliostats would be 7.2-feet high by 10.5-feet wide (2.20-meters by 3.20-meters) yielding a reflecting surface of 75.6 square feet (7.04 square meters). The heliostats would be arranged in arcs around the solar boiler towers asymmetrically. Approximately 850-acres (2100 m x 1600 m) or 1.3 square miles would be required for the three tower receivers and arrays as associated with the DPT1 Project as shown below in Figure 1-2.

Figure 1-2
The DPT1 Project
Also Referred to as "Ivanpah 2"



The solar field and power generation equipment would be started each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to maintain the turbine connected. During the morning start-up cycle, a partial-load natural gas-fired steam boiler will be used as a thermal input to the turbine in order to assist the plant in coming up to operating temperature more quickly. The boiler would also be operated during transient cloudy conditions, in order to maintain the turbine online and ready to resume production from solar thermal input. Once the cloud cover passes or dissipates and solar thermal input resumes, the turbine would be returned to full solar production. The auxiliary equipment includes feed water heaters, a de-aerator, an emergency diesel generator, and a diesel fire pump.

One reheat steam turbine would be used to receive live steam from the solar boilers and reheat steam from the solar reheater located in the power block at the top of its distributed power tower. Electricity would be produced by each plant's Solar Receiver Boiler and the steam turbine generator. Dynamics data used to represent the steam turbine generator in the GE PSLF Dynamic Software, as provided by the project developer, are shown below in Table 1-4 (generator), Table 1-5 (excitation system), Table 1-6 (governor) and Table 1-7 (power system stabilizer).

An Application for Certification (AFC) with the California Energy Commission (CEC) has been filed for the DPT1 Project on August 31, 2007 (Docket 07-AFC-05). The DPT1 Project is included in the AFC as part of a larger project totaling 400 MW. The larger project is comprised of three requests for interconnection (the DPT1 Project and two additional projects queued after the DPT1 Project). The AFC indicates that the three plants would be developed in concert and are concurrently undergoing a joint environmental review by the Bureau of Land Management (BLM) and CEC. In addition to these three Bright Source Energy projects seeking an AFC from the CEC, three other generation projects have requested interconnection in the same general area increasing the total amount of generation interconnection requests in the area to 1,177 MW.

This study will limit the evaluation of impacts to the DPT1 Project. However, given that the DPT1 Project is part of a larger project seeking an AFC with the CEC and additional generation projects have requested interconnection in the same general area, any facility upgrade mitigations identified would be done in a manner that considers both the 400 MW project at the CEC and the additional generation projects seeking interconnection. Such upgrades will be subject to phasing to ensure that only those elements required for the DPT1 Project are assigned to the DPT1 Project. It should also be noted that State and Federal regulatory agencies may require SCE to permit the facilities needed to accommodate the full 400 MW seeking an AFC, which includes the DPT1 Project, and the three additional generation projects requesting transmission interconnection in the same general area in order to comply with the California Energy Quality Act (CEQA) and National Environmental Policy Act (NEPA). CEQA and NEPA do not allow for fragmenting of transmission upgrades needed to reliably interconnect generation projects seeking regulatory approval.

TABLE 1-4
STEAM TURBINE GENERATOR MODEL (GENTPF)

Variable	Value	Description
MVA	136.8	Generator MVA Base
Tpdo	10.02	D-axis transient rotor time constant, sec
Tppdo	0.044	D-axis sub-transient rotor time constant, sec
Tpqo	1.00	Q-axis transient rotor time constant, sec
Tppqo	0.05	Q-axis sub-transient rotor time constant, sec
H	3.67	Inertia constant, sec
D	0.0	Damping factor, per-unit
Ld	1.91	D-axis synchronous reactance, per-unit
Lq	1.68	Q-axis synchronous reactance, per-unit
Lpd	0.215	D-axis transient reactance, per-unit
Lpq	0.404	Q-axis transient reactance, per-unit
Lppd	0.139	D-axis sub-transient reactance, per-unit
Lppq	0.153	Q-axis sub-transient reactance, per-unit
Ll	0.136	Stator leakage reactance, per-unit
S1	0.111	Saturation factor at 1.0 per-unit flux
S12	0.534	Saturation factor at 1.2 per-unit flux
Ra	0.0	Stator resistance, per-unit
Rcomp	0.0	Compounding resistance for voltage control, per-unit
Xcomp	0.0	Compounding reactance for voltage control, per-unit

TABLE 1-5
STEAM TURBINE EXCITATION SYSTEM MODEL (EXST1)

Variable	Value	Description
Tr	0.0	Filter time constant, sec
Vimax	0.1	Maximum error, per-unit
Vimin	-0.1	Minimum error, per-unit
Tc	1.0	Lead time constant, sec
Tb	10.0	Lag time constant, sec
Ka	200.0	Gain, per-unit (> 0)
Ta	0.02	Time constant, sec
Vrmax	5.0	Maximum controller output, per-unit
Vrmin	-5.0	Minimum controller output, per-unit
Kc	0.05	Excitation system regulation factor, per-unit
Kf	0.0	Rate feedback gain, per-unit
Tf	1.0	Rate feedback time constant, sec
Tc1	1.0	Lead time constant, sec
Tb1	1.0	Lag time constant, sec
Vamax	5.0	Maximum control element output, per-unit
Vamin	-5.0	Minimum control element output, per-unit
Xe	0.04	Excitation xfmr effective reactance, per-unit
Ilr	2.8	Maximum field current, per-unit
Klr	5.0	Gain on field current limit, per-unit

TABLE 1-6
STEAM TURBINE GOVERNOR MODEL (IEEEG1)

Variable	Value	Description
MWcap	116.0	Maximum Turbine Output (MW)
K	20.0	Governor gain (reciprocal of droop), per-unit
T1	13.0	Governor lag time constant, sec
T2	3.0	Governor lead time constant, sec
T3	0.35	Valve positioner time constant, sec
Uo	0.286	Maximum valve opening velocity, per-unit / sec
Uc	-0.286	Minimum valve opening velocity, per-unit / sec
Pmax	1.0	Maximum valve opening, per-unit of mwcap
Pmin	0.0	Minimum valve opening, per-unit of mwcap
T4	0.1	Inlet piping/steam bowl time constant, sec
K1	1.0	Fraction of hp shaft power after first boiler pass
K2	0.0	Fraction of lp shaft power after first boiler pass
T5	0.0	Time constant of second boiler pass, sec
K3	0.0	Fraction of hp shaft power after second boiler pass
K4	0.0	Fraction of lp shaft power after second boiler pass
T6	0.0	Time constant of third boiler pass, sec
K5	0.0	Fraction of hp shaft power after third boiler pass
K6	0.0	Fraction of lp shaft power after third boiler pass
T7	0.0	Time constant of fourth boiler pass, sec
K7	0.0	Fraction of hp shaft power after fourth boiler pass
K8	0.0	Fraction of lp shaft power after fourth boiler pass
db1	0.0	Intentional deadband width, Hz
eps	0.0	Intentional deadband hysteresis, Hz
db2	0.0	Unintentional deadband, MW
GV1	0.0	Nonlinear gain point 1, per-unit gv
Pgv1	0.0	Nonlinear gain point 1, per-unit power
GV2	0.0	Nonlinear gain point 2, per-unit gv
Pgv2	0.0	Nonlinear gain point 2, per-unit power
GV3	0.0	Nonlinear gain point 3, per-unit gv
Pgv3	0.0	Nonlinear gain point 3, per-unit power
GV4	0.0	Nonlinear gain point 4, per-unit gv
Pgv4	0.0	Nonlinear gain point 4, per-unit power
GV5	0.0	Nonlinear gain point 5, per-unit gv
Pgv5	0.0	Nonlinear gain point 5, per-unit power
GV6	0.0	Nonlinear gain point 6, per-unit gv
Pgv6	0.0	Nonlinear gain point 6, per-unit power

TABLE 1-7
STEAM TURBINE POWER SYSTEM STABILIZER MODEL (PSS2A)

Variable	Value	Description
J1	2.0	Input signal #1 code
K1	0.0	Input signal #1 remote bus number
J2	3.0	Input signal #2 code
K2	0.0	Input signal #2 remote bus number
Tw1	2.0	First washout on signal #1, sec
Tw2	2.0	Second washout on signal #1, sec
Tw3	2.0	First washout on signal #2, sec
Tw4	0.0	Second washout on signal #2, sec
T6	0.0	Time constant on signal #1, sec
T7	2.0	Time constant on signal #2, sec
Ks2	0.272	Gain on signal #2
Ks3	1.0	Gain on signal #2
Ks4	1.0	Gain on signal #2
T8	0.5	Lead ramp tracking filter
T9	0.1	Lag ramp tracking filter
n	1.0	Order of ramp tracking filter
m	5.0	Order of ramp tracking filter
Ks1	10.0	Stabilizer gain
T1	0.25	Lead/lag time constant, sec
T2	0.04	Lead/lag time constant, sec
T3	0.20	Lead/lag time constant, sec
T4	0.03	Lead/lag time constant, sec
Vstmax	0.1	Stabilizer output max limit, per-unit
Vstmin	-0.1	Stabilizer output min limit, per-unit
a	1.0	Lead/lag num. gain (not in IEEE model)
Ta	0.0	Lead/lag time constant, sec (not in IEEE model)
Tb	0.0	Lead/lag time constant, sec (not in IEEE model)

D. Power Flow Study

The DPT1 Project System Impact Study considered two power flow study scenarios. Each case was derived from the most current CAISO Expansion Study base case. Each case was derived from the most current CAISO Expansion Study base cases. Further description of the case assumptions are provided below and summarized in Table 1-8:

a). SCE System with a 2013 Heavy Summer load forecast and all generation projects in queue ahead of the DPT1 Project and associated upgrades if known, Case 1

The study considered heavy load conditions with generation patterns and Path 46 imports maximized to identify the extent of potential congestion and fully stress the SCE system in the area where the DPT1 Project is interconnecting. Generation included: Regulatory must-take, all existing generation in the North and East of Lugo areas, and all other proposed generation projects in queue ahead of the DPT1 Project.

b). SCE System with a 2013 Heavy Summer load forecast and all generation projects in queue ahead of the DPT1 Project and associated upgrades, if known, and the inclusion of the DPT1 Project, Case 2

Case 1 modified to include the DPT1 Project with a net generation of 100 MW.

c). SCE System with a 2013 Light Spring load forecast and all generation projects in queue ahead of the DPT1 Project and associated upgrades if known, Case 3

The study considered light load conditions with generation patterns and Path 46 imports maximized to identify the extent of potential congestion and fully stress the SCE system in the area where the DPT1 Project is interconnecting. Generation included: Regulatory must-take, all existing generation in the North and East of Lugo areas, and all other proposed generation projects in queue ahead of the DPT1 Project

d). SCE System with a 2013 Light Spring load forecast and all generation projects in queue ahead of the DPT1 Project and associated upgrades, if known, and the inclusion of the DPT1 Project, Case 4

Case 3 modified to include the DPT1 with a net generation of 100 MW.

In addition to these base cases, a few sensitivity studies were examined to adequately identify the extent of potential congestion amount by the proposed in-service date.

Table 1-8
Summary of Base Cases (MW)

	2013 Heavy Summer		2013 Light Spring	
	Case 1 Pre-Project	Case 2 Post-Project	Case 3 Pre-Project	Case 4 Post-Project
Generation	17,364	17,467	11,762	11,866
Import	-10,947	-10,842	-6,987	-6,881
Load	27,555	27,555	18,154	18,154
Losses	756	754	596	593
Major Path Flows and Area Imports				
So.California Import Transfer	16,042	16,048	15,314	15,313
East-of-River (Path 49)	6,914	6,818	7,318	7,223
West-of-River (Path 46)	11,823	11,823	11,823	11,823

E. 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. The evaluation was conducted for the critical single and double contingencies affecting the area of interest listed below in Table 1-9. All outage cases were evaluated with the assumption that existing special protection systems (SPS) or remedial action schemes (RAS) would operate as designed where required. Tripping of the DPT1 Project will be included if stability studies indicated that an SPS for DPT1 is required. Study results were evaluated utilizing the applicable Planning Criteria as summarized in Table 1-10.

TABLE 1-9
TRANSIENT STABILITY CRITICAL STUDY CASES

Bus Fault Location	Fault	Duration	Outage
DPT1 115 kV	3θ	6 cycles	Full rejection of the DPT1 Project
Eldorado 115 kV	3θ	15 cycles	Eldorado-Ivanpah 115 kV Line
Ivanpah 115 kV	3θ	15 cycles	Eldorado-Ivanpah 115 kV Line
Ivanpah 115 kV	3θ	15 cycles	Ivanpah-Mountain Pass-Wheaton 115 kV Line
Wheaton 115 kV	3θ	15 cycles	Ivanpah-Mountain Pass-Wheaton 115 kV Line
Wheaton 115 kV	3θ	15 cycles	Cool Water-Baker-Dunn Siding-Wheaton 115 kV Line
Eldorado 500 kV	3θ	4 cycles	Eldorado-McCullogh 500 kV T/L

Table 1-10
WECC DISTURBANCE-PERFORMANCE TABLE
OF ALLOWABLE EFFECTS ON OTHER SYSTEMS
(in addition to NERC requirements)

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.

F. Post-Transient Voltage Study

The power flow study voltage results were used as a screen to identify those contingencies that may require additional post-transient voltage studies. Single and double contingencies identified in the power flow to have a voltage drop in excess of 5% were selected for post-transient voltage analysis. The Post-transient voltage studies compare voltage deviations to the NERC/WECC/CAISO reliability requirements including the SCE guidelines of 7% for single contingency outages and 10% for double contingency outages and identify those outages which result in a criteria violation. Mitigation measures will be recommended for any criteria violation identified.

G. Short-Circuit Duty Study

To determine the impact on short-circuit duty, within SCE's electrical system, after inclusion of the DPT1 Project, the study calculated the maximum symmetrical three-phase-to-ground short-circuit duties. Generation and transformer data represented in the generator and transformer data sheets provided by the customer were utilized. Bus locations where short-circuit duty is increased with the proposed DPT1 Project by at least 0.1 kA and the duty is in excess of 60% of the minimum breaker nameplate rating are flagged for further review. Upon completion of the detailed circuit breaker review, circuit breakers exposed to fault currents in excess of 100 percent of their interrupting capacities will need to be replaced or upgraded, whichever is appropriate. It should be noted that other WECC entities may request specific information within the WECC process to evaluate potential impact within their respective systems of this project addition.

H. Deliverability Assessment

In accordance with LGIP sections 3.3.2 and 3.3.3 of the LGIP, Deliverability Assessment will be performed to determine the qualified capacity of the project from a Resource Adequacy perspective. The study focuses on the ability of the system to accommodate output of the project to the aggregate of load under the conditions when resources are needed the most such as during summer peak conditions when resource shortage is likely to happen. For more details of Deliverability Assessment including methodology and modeling requirements for deliverability base case, please refer to http://www.caiso.com/181c/181c902120c80.html.

As required by LGIP tariff language, deliverability results need to provide the following information of this project regarding deliverability:

- The amount of capacity that can be deemed deliverable without additional upgrade(s)

- The upgrade(s) needed for this project to be deemed fully deliverable

Please note that upgrades identified through this deliverability assessment (delivery upgrades) are discretional upgrades implemented only for those customers who desire a higher level of service. Generation projects may proceed to interconnect to the CAISO control grid without delivery upgrades provided that all the required reliability upgrades have been implemented. However, a developer's decision to interconnect without the identified delivery upgrade(s) could result in the project losing its eligibility to receive capacity payments, as allowed under the CPUC Resource Adequacy program.

I. Cost Estimates

Non-binding cost estimates will be derived for the "phased" portion of facility upgrades identified as needed to reliably interconnect the DPT1 project. These estimates will be developed without the benefit of:

- Detailed substation site review,
- Detailed right-of-way review,
- Detailed telecommunication facility review,
- Detailed system protection review,
- Detailed weather studies,
- Detailed environmental assessments, and
- Preliminary engineering

These limitations could affect the scope of facilities, the phasing of the identified facilities, the cost, and the viability of the mitigation plans identified in this study.

J. Timelines for Implementing Facility Upgrades

Timelines for the completion of facility upgrades to accommodate new projects are based on a number of factors. For the most part, the driving factors include the following:

- Time requirements to prepare the Proponents Environmental Assessment (PEA) in support of an application for a Certificate of Public Convenience and Necessity (CPCN) or Permit to Construct (PTC)
- CPCN or PTC Application review and approval process (State and Federal Agencies)
- Estimated material acquisition lead times
- Construction of facilities

III. STUDY RESULTS

A. Power Flow Analysis

The study focused on identifying system thermal overload problems within SCE service territory and electrical system. Pre- and post-project power flow plots are provided in **Appendix A.**

Base Case

With the addition of the minimum set of facilities required to simply interconnect the DPT1 Project, the study determined that the system is inadequate to accommodate the full output of the DPT1 Project. The addition of the DPT1 project results in overloading a portion of the existing Eldorado leg of the Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line as well as overloading the existing 230/115 kV transformer at the Eldorado Substation, as shown below in Table 2-1.

Table 2-1
Base Case Thermal Overloads

Overloaded Facility	Rating	Heavy Summer		Light Spring	
		Pre	Post	Pre	Post
36-mile portion of existing Eldorado leg of Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line	83 MVA	46.8%	130.7%	53.3%	136.4%
Eldorado 230/115 kV Transformer	102 MVA	38.3%	109.0%	42.3%	109.7%

To mitigate these two base case overloads, upgrades to the facilities between the Eldorado Substation and the location of the new substation needed to loop the existing Eldorado leg of the Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line will be required. These upgrades involve the following:

- Removal of approximately 36 miles of a portion of the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line (the existing 115 kV infrastructure cannot support conductor of greater capacity)
- Construction of a new 36-mile higher capacity transmission line
- Replacement of the existing transformer bank at the Eldorado Substation

Because DPT1 is part of a larger project (400 MW) seeking an Application for Certification (AFC) from the California Energy Commission and the total amount of generation interconnection requests in the area exceed 1,170 MW, construction of the new higher capacity transmission line should be at 230 kV design standards[5]. This would minimize the overall cost to ratepayers as compared to the cost that would otherwise be incurred with multiple tear-down and rebuild activities. In addition, the use of 230 kV design standards could mostly be accommodated within the existing utility transmission corridor (except for areas containing transmission line crossing as well as near the Eldorado Substation) thereby minimize environmental impacts. Lastly, the use of 230 kV design standards would provide for the orderly, rational, and cost-effective transmission upgrade that would minimize future interruption to the DPT1 Project while allowing for an effective means to interconnect queued behind generation projects including the remaining portion of the 400 MW AFC, which includes the DPT1 Project. To minimize initial cost, such 230 kV design facility could be operated at 115 kV by maintaining the 230/115 kV transformation at Eldorado. This would defer the need to construct the 230 kV switchrack at the new Substation site until projects queued behind the DPT1 Project are placed in-service. However, in order for the initial 115 kV operation to effectively mitigate the identified base case overload triggered by the DPT1 Project, replacement of the Eldorado 230/115 kV transformer bank will be required.

Base Case Congestion Assessment

The total amount of generation in the Mountain Pass area for both the ahead queued project and the DPT1 Project is 163 MW. Congestion studies identified that the most likely amount of "available" transmission capacity on the existing Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115kV transmission line would range between 63 MW and 80 MW. Therefore, the amount of generation subject to congestion management is expected to be between 83 MW and 100 MW for both the queued ahead project in the Mountain Pass area and the DPT1 Project.

To determine the severity and frequency of congestion in the area, a production simulation was performed. The simulation assumed historical production data from existing wind resources with a capacity factor of 34% and solar resources with an annual capacity factor

[5] State and Federal regulatory agencies may likely require SCE to permit all facilities needed to accommodate not only the DPT1 project but also the full 400 MW seeking an AFC, which includes the DPT1 Project, in order to comply with the California Energy Quality Act (CEQA) and National Environmental Policy Act (NEPA).

of 18% and a summer capacity factor of 33% for the two projects in queue in the Mountain Pass area. This analysis is for informational purposes only as actual production profiles in this area may vary significantly from the production profiles used to conduct the evaluation and may therefore result in different levels of congestion.

Figure 2-1 below provides the energy production, both expected to be delivered and expected to be congested, on a monthly basis based on the two production profiles developed. On an annual basis, the estimated energy production between the queued ahead project and the DPT1 Project is approximately 350,000 MW-hours of which approximately 190,000 MW-hours corresponds to the queued ahead project and 150,000 MW-hours corresponds to the DPT1 Project. Total amount of congestion for both projects was found to be approximately 56,000 MW-hours which correspond to approximately 35% of total DPT1 Project production. The total number of hours subject to congestion management was estimated to be approximately 2,150 hours or approximately 25% of the year, as shown below in Figure 2-2 with a peak congestion amount of approximately 88 MW as shown below in Figure 2-3.

Figure 2-1
DPT1 Energy Production (MW-hours) on a Monthly Basis

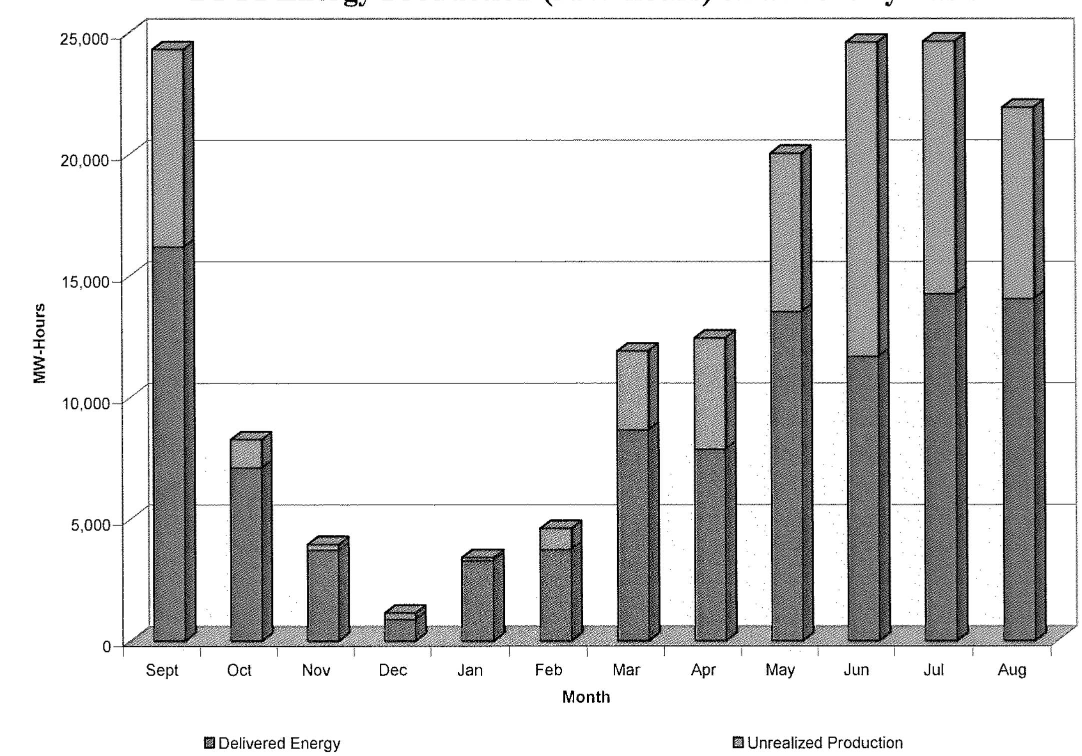


Figure 2-2
DPT1 Estimated Hours of Congestion on a Monthly Basis

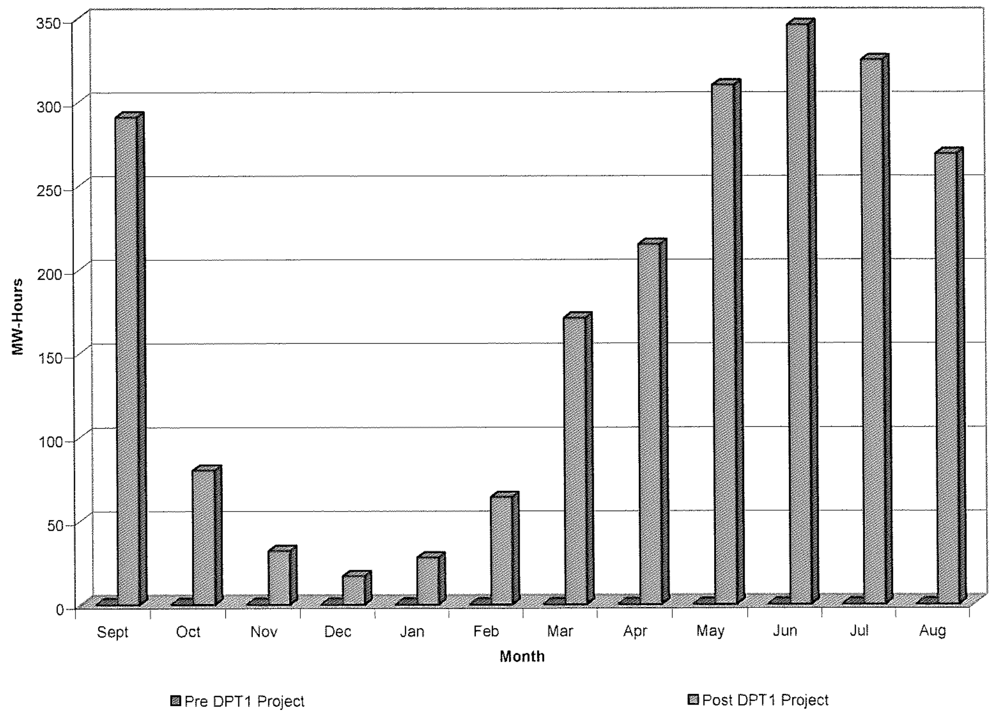
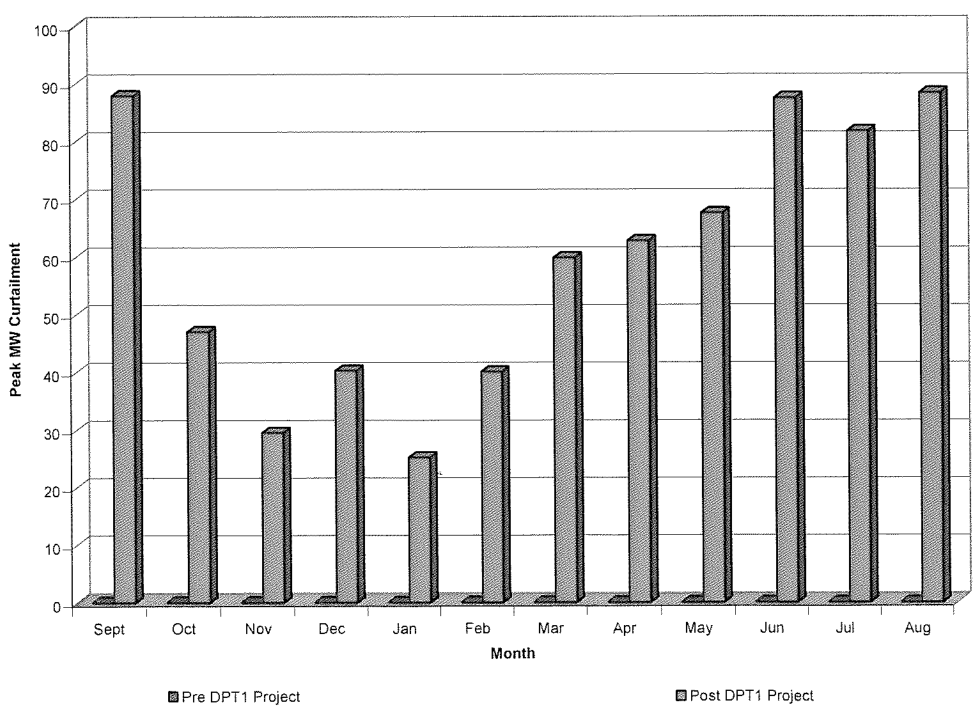


Figure 2-3
Estimated Peak MW Congestion on a Monthly Basis



Outage Conditions

The DPT1 Project resulted in a case non-convergence for any one of the following two outage conditions:

- loss of the Eldorado-Ivanpah 115 kV transmission line
- loss of the Eldorado 230/115 kV transformer bank

After detailed review of these contingencies, the Ivanpah and Mountain Pass areas are effectively disconnected from the Eldorado Substation thereby resulting in both a thermal overload problem as well as a voltage collapse problem. Under such contingencies, the combined 163 MW associated with the queued ahead project in the Mountain Pass area and the DPT1 Project would be connected in a radial fashion towards the Cool Water 115 kV Substation by a single 95-mile 115 kV line with a normal and emergency rating of 83 MVA and 105 MVA respectively. The voltage collapse problem is associated with the significant amount of reactive losses incurred with such high power flow transfers due to the distance and corresponding electrical impedance of the 115 kV line.

To mitigate these two criteria violations, an SPS (reliability upgrade) will be required to trip the entire DPT1 Project by opening the corresponding unit circuit breaker under either of these two contingencies. Design of the SPS will require the following facilities:

Telecommunication Upgrades

- Installation of optical ground wire (OPGW) on new transmission line between Eldorado and proposed Ivanpah Substation

- Digital Microwave communication circuits between Eldorado and proposed Ivanpah Substation

If it is determined by the CAISO in conjunction with SCE, as part of the Facilities Study, that the transmission upgrades can be classified as delivery upgrades and DPT1 Project chooses congestion management rather than construction of the delivery upgrades, a different method of providing a secondary telecommunication path will be needed. This need is attributed to the fact that the installation of optical ground wire (OPGW) cannot be accommodated on the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line. Such secondary telecommunication path could involve the construction of a 36-mile pole line to support optical ground wire or the development of a second digital microwave communication path between Eldorado and Ivanpah.

Protection Inputs

- Breaker status on both ends of the Eldorado-Ivanpah 115 kV transmission line
- Breaker status on Eldorado 230/115 kV transformer bank

B. Transient Stability Analysis

Transient stability studies identified that the DPT1 steam generator experiences transient instability under 15-cylce closed-in (three-phase-to-ground) system faults located at or near the proposed Ivanpah 115 kV substation as shown in the transient stability plots provided in **Attachment B**. The DPT1 steam generator was found to remain stable under fault conditions that are located further away from the proposed Ivanpah Substation. Such finding was determined by applying a closed-in fault at the Mountain Pass 115 kV and Wheaton 115 kV substations, which will be located approximately 7 miles west of the proposed Ivanpah Substation, and clearing the fault within the same 15-cylces.

Sensitivity studies were performed in order to evaluate the DPT1 steam generator transient stability response for fault durations which are cleared in less than 15-cycles. These studies concluded that it is possible to mitigate the identified transient instability by improving the 115 kV system protection and telecommunication thus reducing the overall fault clearing time requirements. To fully understand the required fault clearing timelines, several scenarios were considered which modeled possible system topology associated with the identified transmission upgrades required by the DPT1 to mitigate the base case overload criteria violations.

Scenario 1: Energize the new Ivanpah-Eldorado transmission line at 115 kV (built to 230 kV construction standards) and upgrade the Eldorado 230/115 kV transformer bank

Under this condition, the study determined that clearing faults at or near the new Ivanpah Substation prior to 10 cycles alleviates the instability problem. However, system performance does not comply with the required NERC and WECC Performance Guidelines shown in Table 1-10. In order to comply with the NERC and WECC Performance Guidelines, faults will need to be cleared within 8 cycles.

Scenario 2: Energize the new Ivanpah-Eldorado transmission line a t230 kV by installing 230/115 kV transformation at Ivanpah instead of upgrading the Eldorado transformer

Under this condition, the study determined that clearing faults at or near the new Ivanpah Substation prior to 13 cycles alleviates the instability problem. However, system performance does not comply with the required NERC and WECC Performance Guidelines shown in Table 1-10. In order to comply with the NERC and WECC Performance Guidelines, faults will also need to be cleared within 8 cycles.

Conclusion

As can be seen, both scenarios result in fault clearing requirements of 8 cycles to comply with the required NERC and WECC Performance Guidelines. This requirement does not provide sufficient time to mitigate for possible delayed clearing associated with a "stuck" breaker condition at the proposed Ivanpah Substation. To mitigate these transient stability criteria violations attributed solely by the DPT1 Project, the SPS will also require the following facilities:

Telecommunication Upgrades

- Installation of fiber cable on existing 33 kV distribution circuit from Mountain Pass / Wheaton Substation(s) to the proposed Ivanpah Substation

- Digital Microwave communication circuits between proposed Ivanpah Substation and Mountain Pass/Wheaton Substation(s)

Protection Inputs

- Adequate system protection to ensure primary fault clearing times to within 8-cycles

  The upgrade of the SCE 115 kV system protection will significantly reduce the possibility of tripping the DPT1 generation unit for fault conditions at or near the Ivanpah substation. Such reduction will ensure the DPT1 project remains connected when sufficient thermal capacity is still available upon clearing of the faulted transmission element.

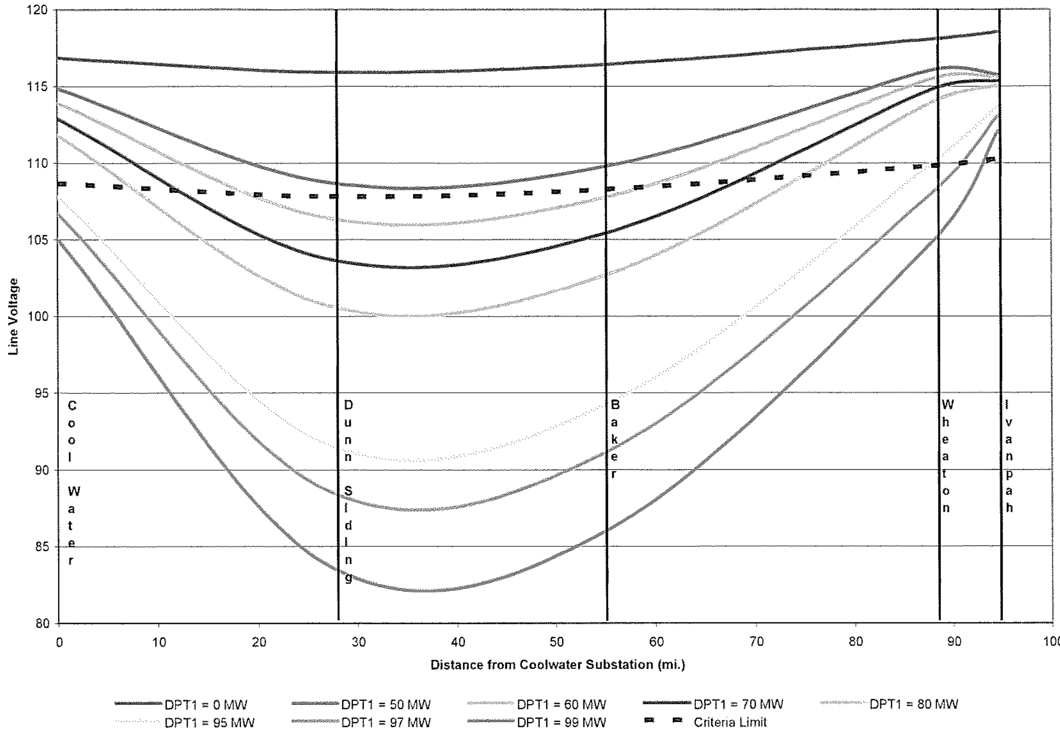
- Ensure project developer installs out-of-step protection on the DPT1 steam generator

  The installation of proper out-of-step unit protection is essential to ensure the unit is properly protected for system faults internal to the DPT1 Project or for conditions that result in a stuck breaker operation at Ivanpah.

C. Post-Transient Stability Analysis

As discussed above in the power flow section under outage conditions, two outages were identified to result in a voltage collapse. Depending on the amount of generation resource that is on-line, loss of either the Eldorado-Ivanpah transmission line or loss of the transformation at Eldorado results in a significant voltage deviation in the Dunn Siding and Baker substation areas. Such violation is the direct result of too much generation flowing on a single 115 kV transmission line of approximately 95 miles. Figure 2-5 graphically illustrates the voltage performance along the line which supports the conclusion that voltage collapse is triggered by the addition of the DPT1 Project. As can be seen, DPT1 generation output levels greater than 50 MW result in post-transient voltages that do not meet NERC and WECC Planning Guidelines.

Figure 2-5
Line Voltage Performance under Various DPT1 Project Output Conditions



D. Short Circuit Duty Study

Transmission System

The short-circuit duty analysis included all queued ahead generation projects based on their application date and modeled corresponding transmission upgrades, if known. As shown below in Table 2-2, the three-phase-to-ground short-circuit duty study identified one 500 kV, two 230 kV, and three 115 kV existing substation locations where duty was increased by more than 0.1 kA and duty at these locations was in excess of 60% of the minimum circuit breaker rating.

As shown below in Table 2-3, the single-phase-to-ground short-circuit duty study identified one 230 kV and one 115 kV existing substation locations where duty was increased by more than 0.1 kA and duty at these locations was in excess of 60% of the minimum circuit breaker rating.

Table 2-2
Three Phase (3PH)
Short Circuit Duty Study Results

		Pre-Project		Post-Project		DELTA
Bus Name	Bus KV	X/R	KA	X/R	KA	KA
ELDORADO	500	19.4	47	19.5	47.1	0.1
ELDORADO	230	18.8	61.1	19	61.7	0.6
LUGO	230	36.4	50.3	36.5	50.4	0.1
BAKER	115	2.3	1	2.2	1.4	0.4
DUNNSIDE	115	2.1	0.7	2	0.9	0.2
MTNPASS	115	3.6	1.9	8.5	4.9	3

Table 2-3
Single Line to Ground (SLG)
Short Circuit Duty Study Results

		Pre-Project		Post-Project		DELTA
Bus Name	Bus KV	X/R	KA	X/R	KA	KA
ELDORADO	230	14.2	56.3	14.4	56.9	0.6
MTNPASS	115	3.6	2.1	6.3	5.2	3.1

These substation locations were reviewed to determine need for replacement and to determine if the need was triggered by the DPT1 Project. Engineering review determined that three 230 kV 50 kA circuit breakers at the Lugo Substation will need to be replaced and that two 230 kV 50 kA circuit breakers also at the Lugo Substation will need to be upgraded to 63 kA rating by installing transient recovery voltage (TRV) capacitor banks. However, these reliability upgrades were not triggered by the DPT1 project.

Distribution System

The study determined that the DPT1 Project did not trigger or aggravated the need for any circuit breaker upgrade or replacement on SCE's distribution system.

E. Operational Study Sensitivity

An operation sensitivity study was performed to evaluate how much of the DPT1 project could be accommodated while the transmission upgrades identified above are implemented. Under such conditions, the 36-mile line section between the new Ivanpah and existing Eldorado Substation will be unavailable as it would be physically removed to allow for the upgrade to be put within the existing right-of-way. Consequently, the base case conditions modeled in this Operational Study Sensitivity assumed that the DPT1 project would be connected in a radial fashion on the Ivanpah-Mountain Pass-Wheaton 115 kV line. Under this arrangement, the future Wheaton Substation will also be connected in a radial fashion to the Cool Water-Baker-Dunn Siding-Wheaton 115 kV line. Therefore, any DPT1 output will be delivered to the Cool Water 115 kV Substation in a radial fashion. Under this arrangement, several system limitations exists that would need to be addressed.

The first such limitation is the thermal capability of the line. Because of the prolonged outage condition, loading on the line will be limited to the normal conductor rating which is 415 amps (approximately 83 MVA). Depending on the output of the queued ahead generation project and the amount of real-time load demand at Mountain Pass, DPT1 could be limited to no more than 22 MW. This limitation is based on the assumption that the Mountain Pass load is 4 MW (40% of peak load demand) and the queued ahead generation project is at full output (63 MW). Without the queued ahead generation project in-service, DPT1 can generate up to 82 MW. To ensure loading on the line is maintained to within allowable thermal limits, metering will be required to allow for close monitoring and coordination of generation output from the generation resources and load demand at Mountain Pass. Such metering will involve relays to properly monitor Mountain Pass load demand, relays to meter generation output of queued ahead project, and relays to monitor generation output DPT1 project. It is also recommended to transfer trip the Ivanpah-Wheaton 115 kV line under outage of the Cool Water-Baker-Dunn Siding-Wheaton 115 kV line to ensure load is not islanded with generation. In addition appropriate alarm settings should be implemented to signal when line conductor loading is approaching 95% of allowable thermal limits.

The second such limitation is the stability performance on the transmission South of Kramer. Currently, SCE has a special protection system (SPS) in place which trips generation resources injecting power in the Kramer Area. Under the radial configuration arrangement, the incremental power that is injected into the Cool Water Substation is ultimately delivered to the Kramer Substation because the Cool Water 115 kV Substation is connected to the rest of the system by two 115 kV lines to Kramer. Consequently, the existing Kramer SPS would be adversely impacted by the addition of the DPT1 project until such time that the upgrades discussed above are placed in service. To mitigate such impact, a temporary SPS will need to be implemented to trip the DPT1 project (as well as queued ahead project) under outage of the two Kramer-Lugo 230 kV transmission lines. Without such an SPS, the system would experience transient stability problems for which the SPS would not mitigate. Additional telecommunication facilities and protection equipment will be required that is not needed with the final upgrades in place in order to ensure the system remains stable under such outage conditions. Such equipment should conform to current WECC RAS Task Force Committee requirements (fully redundant). The protection equipment should monitor circuit breaker status at the Lugo and Kramer Substations and signal for trip under outage conditions of both Kramer-Lugo 230 kV No.1 and No.2 transmission lines. The other outages that are currently mitigated with and SPS (loss of one Kramer-Lugo 230 kV, loss of one or two Victor-Lugo 230 kV transmission lines, loss of one Lugo 500/230 kV transformer bank) will also be affected by increasing the arming threshold. Because the existing SPS in place are still sufficient to mitigate issues under such outages, the DPT1 project does not need to be added to the tripping algorithm under these other outage conditions given that the condition is temporary in nature and will disappear with the upgrades.

F. Deliverability Assessment

CAISO is in the process of performing the 2007Q3 Generation Deliverability Assessment, which will evaluate the deliverability of proposed generation projects including the DPT1 Project. Currently, the study results are anticipated to be available by the end of 2007. The study assumptions and the original study schedules can be found in the 2007Q3 Generation Deliverability Study Plan at http://www.caiso.com/1c44/1c44b5c31cce0.html.

In case additional network facilities are required for the Project to be deemed fully deliverable, the CAISO will communicate such needs to SCE and the network facilities will be evaluated in the Facilities Study.

IV. COST ESTIMATES

The cost estimates of facility upgrades that have been identified to mitigate planning criteria violations triggered by queued ahead projects or by the addition of the DPT1 Project are provided below in Table 2-4. ***All cost estimates are rough, order of magnitude estimates and are non-binding.***

Table 2-4
Cost Estimates Provided in Millions

Facility Upgrade	Triggered by Queued Ahead Project[6]	Triggered by the DPT1 Project[7]
Upgrade two 230 kV 50kA CB's at Lugo to 63kA by installing TRV caps and replace three 230kV 50kA CB's also at Lugo with new 63kA units	$2.9	-
New Ivanpah Substation including 115 kV line loop	-	$8.0
Tear down and rebuild approximately 36 miles of existing 115 kV line between the new substation site and Eldorado with new 230 kV transmission line (initially energized at 115 kV)	-	$80.0
Replace existing Eldorado 102 MVA transformer bank with 280 MVA bank		$7.2
New SPS (telecom and protection)		$5.4
Total	$2.9	$100.6

[6] Cost of such additional facilities may later be assigned to the DPT1 Project if modifications to queued ahead projects (consistent with LGIP) or project withdrawals result in the DPT1 Project triggering the need for the upgrade (as determined by a restudy).

[7] Exact cost allocation for these facilities will be identified at a later point in time

V. ESTIMATED PROJECT TIMELINES

A significant amount of transmission facilities are necessary to mitigate DPT1 Project triggered thermal overloads, transient stability, and post-transient voltage problems. These upgrades will require detailed environmental assessments sufficient to support filing for a Certificate of Public Convenience and Necessity (CPCN) at the California Public Utilities Commission (CPUC). The preliminary non-binding estimated timeframe to complete the facilities specified in Table 2-4 above is 66 months from the time SCE has been authorized to commence the work pursuant to a letter agreement or Large Generator Interconnection Agreement, assuming that any required subsequent agreements associated with the facilities have been executed and the associated required payments have been made in a timely manner. The preliminary estimated project completion date is SCE's best judgment based on past permitting requirements and may be different depending on timelines associated with activities outside of SCE's control.

Bright Source Energy has entered into an initial Letter Agreement allowing SCE to commence the weather studies, preliminary environmental studies, and specific land rights review activities. SCE commenced the work under such initial Letter Agreement on September 25, 2007, after receipt of the executed agreement and initial payment. The 66 month preliminary estimated project completion date is based upon the September 25th work commencement date. A second letter agreement is under development that is expected to encompass the activities required to file a CPCN Application and Proponents Environmental Assessment (PEA).

VI. CONCLUSIONS

Based on the study results, the existing SCE transmission facilities are not adequate to accommodate the DPT1 Project without facility upgrades.

<u>Power Flow</u>

Under base case conditions, a portion of the existing Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line as well as the existing 230/115 kV transformer at Eldorado were found to load beyond the maximum allowable limits. To mitigate these two base case overloads, the following upgrades are recommended:

- Removal of approximately 36 miles of a portion of the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line (the existing 115 kV infrastructure cannot support transmission of greater capacity)
- Construction of a new 36-mile higher capacity transmission line
- Replacement of the existing transformer bank at the Eldorado Substation

Classification for these facilities (reliability or delivery) will be determined by the CAISO in conjunction with SCE as part of the Facilities Study.

Base Case Congestion Assessment

The total amount of generation in the Mountain Pass area for both a queued ahead project and the DPT1 Project is 163 MW. Congestion studies identified that the most likely amount of "available" transmission capacity on the existing Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115kV transmission line would range between 63 MW and 80 MW. Therefore, the amount of generation subject to congestion management is expected to be between 83 MW and 100 MW for both the queued ahead project in the Mountain Pass area and the DPT1 Project.

Base Case Congestion Management

If it is determined that congestion management could mitigate the base case overloads caused by the DPT1 Project, the use of congestion may have an adverse impact on the operation of the DPT1 Project, especially as the DPT1 Project is part of a larger project seeking an AFC with the California Energy Commission. The network upgrades could become required reliability upgrades for one of the subsequent projects proposed to interconnect at the same location currently queued lower than the DPT1 Project. This includes the remainder of the 400 MW project, that includes the DPT1 project, for which an Application for Certification was filed at California Energy Commission. Therefore, if DPT1 Project chooses to use congestion management instead of constructing the network upgrades identified to mitigate the base case overloads, the DPT1 Project would be subject to extensive scheduled outage after its commercial operation during the period when such network upgrades are constructed. This extensive scheduled outage would be required upon lower queued projects opting to be fully deliverable or upon the determination that the upgrades are required to mitigate reliability criteria violations.

Transient Stability Results

Transient stability studies identified that the DPT1 steam generator experiences transient instability under 15-cylce closed-in (three-phase-to-ground) system faults located at or near the proposed Ivanpah 115 kV substation. To mitigate the transient stability problem, the following reliability upgrades are recommended:

- Upgrade SCE 115 kV system protection near the proposed Ivanpah substation to provide for primary protection fault clearing times of less than 8 cycles

- Ensure project developer installs out-of-step protection on the DPT1 steam generator

Post-Transient Voltage Results

Depending on the amount of generation resource that is on-line, loss of either the Eldorado-Ivanpah transmission line or loss of the transformation at Eldorado resulted in a significant voltage deviation including a voltage collapse, in the Dunn Siding and Baker substation areas. To mitigate this problem, the following reliability upgrades are recommended:

- Install a Special Protection System that trips the DPT1 Project under outages of transmission facilities connecting the proposed Ivanpah Substation to Eldorado (transmission line and transformer bank at Eldorado)

Short-Circuit Duty Study Results

Under a three-phase-to-ground short-circuit duty study, a total of one 500 kV, two 230 kV, and three 115 kV existing substation locations were identified to require detailed engineering review. Under a single-phase-to-ground short-circuit duty study, a total of one 230 kV and one 115 kV existing substation locations were identified to require detailed engineering review. The results of the detailed engineering review identified that three 230 kV 50 kA circuit breakers at the Lugo Substation will need to be replaced and that two 230 kV 50 kA circuit breakers also at the Lugo Substation will need to be upgraded to 63 kA rating by installing transient recovery voltage (TRV) capacitor banks.

Operational Study Sensitivity Results

This sensitivity study identified the need for additional telecommunication and system protection facilities to allow of early interconnection and delivery of the project output while facility upgrades are placed in service. The study determined that the maximum amount of generation that DPT1 can be expected to produce will be 82 MW provided the queued ahead generation project does not materialize prior to the in-service date of the identified transmission facility upgrades. If the queued ahead project does materialize, the DPT1 project could be limited to no more than 22 MW if the queued ahead project is at full output.

Facility Study

A Facilities Study will be required for the DPT1 Project. The Facilities Study will include detailed cost estimates for SCE upgrades and direct assignment facilities required to interconnect the DPT1 Project and should:

1. Develop cost estimates and schedule for the construction of a new substation to loop the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line and provide a line position for a 115 kV radial gen-tie required to connect the DPT1 Project

2. Develop cost estimates and schedule for the removal of approximately 36 miles of a portion of the Eldorado leg of the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV line

3. Develop cost estimates and schedule for the construction of a new 36-mile higher capacity transmission line built to 230 kV construction standards

4. Develop cost estimates and schedule for the replacement of the existing 102 MVA transformer bank at the Eldorado Substation with a new 280 MVA unit

5. Develop cost estimates and schedule for upgrading the SCE 115 kV system protection near the proposed Ivanpah substation to provide for primary protection fault clearing times of less than 8 cycles

6. Develop cost estimates and schedule for the installation of a special protection system to trip the DPT1 Project under outages of transmission facilities connecting the proposed Ivanpah Substation to Eldorado (transmission line and transformer bank at Eldorado)

7. Develop cost estimate and schedule for the upgrade of two and replacement of three 230 kV circuit breakers at the Lugo Substation

8. Review project developer out-of-step protection on the DPT1 steam generator to ensure it's sufficient to mitigate stability problems under an unlikely "stuck breaker" condition

9. Develop cost estimates and schedule for the delivery upgrades, if any, identified by the CAISO Deliverability Assessment

10. Develop cost estimates and schedule for the telecommunication and protection facilities required to allow for temporary interconnection in a radial fashion while upgrades are placed in service (radial connection to Cool Water)

    a. Metering at Mountain Pass (bank loading), Wheaton Sub (gen-tie flow) and Ivanpah (gen-tie) flow to allow for close monitoring and coordination of generation and load demand to ensure loadings are maintained within limits and to transfer trip Ivanpah-Wheaton under outage of Cool Water-Baker-Dunn Siding-Wheaton to ensure load at Mountain Pass is not islanded with generation under such outage condition.

    b. Telecommunication facilities and protection equipment (fully redundant) necessary to monitor circuit breaker status at the Lugo and Kramer Substations and signal for trip under simultaneous outage of both the Kramer-Lugo 230 kV No.1 and No.2 transmission lines.