ANAHEIM PUBLIC UTILITIES DEPARTMENT
SOUTHERN CALIFORNIA PUBLIC POWER AGENCY

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT

GENERATION INTERCONNECTION
SYSTEM IMPACT STUDY

February 15, 2008

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EXECUTIVE SUMMARY

Anaheim Public Utilities Department ("ANHM"), on behalf of the Southern California Public Power Agency ("SCPPA") applied to the California Independent System Operator ("CAISO") for interconnection of the proposed Anaheim Municipal Power Station ("AMPS") pursuant to section 3.5 of the Large Generator Interconnection Procedures ("LGIP") issued under the CAISO Tariff. The AMPS Project, a generating facility to be located in the city of Anaheim (County of Orange), will have a maximum net plant output of 194.1 MW. The project is to consist of four (4) GE LM6000 simple cycle natural gas combustion turbines. ANHM proposes to interconnect the AMPS Project into Anaheim's own 69 kV electrical system and deliver energy and/or ancillary services to the California Independent System Operator ("CAISO") Controlled Grid utilizing the existing Lewis 230 kV jointly owned Substation (SCE/ANHM). To interconnect the AMPS Project into the existing Anaheim 69 kV system, Anaheim will be looping in two (2) 69 kV lines to form four (4) lines out of the newly constructed AMPS Project switchyard. The requested in-service date shown in Appendix 1 of the LGIP as submitted by ANHM is June 1, 2010 with a commercial operation date of July 1, 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 AMPS 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 AMPS 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 ANHM.* 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

The impacts of the additional generation has aggravated N-2 overloads on five (5) SCE 230 kV transmission lines. The addition of the AMPS Project significantly impacts SCE's Short Circuit Duty at multiple 500 kV and 230 kV substations. Additional information on Power Flow or Short Circuit Duty can be found in the sections below or in the main report.

Power Flow

Without implementing any of the transmission upgrades identified to be triggered by the queued ahead projects, the existing system does not have sufficient transmission capability to deliver the total output of all queued generation projects up to and including the AMPS Project.

The study focused on identifying system thermal overload problems within SCE service territory and electrical system.

BASE CASE CONDITIONS

There were no base case overloads that were triggered or aggravated by the addition of the AMPS Project for both Peak and Off-Peak conditions..

SINGLE OUTAGE CONTINGENCY (N-1)

There were no Single Contingency (N-1) overloads that were triggered or aggravated by the addition of the AMPS Project for both Peak and Off-Peak conditions.

DOUBLE OUTAGE CONTINGENCY (N-2)

There were a total of five (5) lines which had pre-existing overloads and were aggravated by the addition of the AMPS project. Of the five (5) lines, only four (4) have aggravated overloads in the peak conditions.

The lines are as follows:

Lighthipe – Mesa 230 kV
Mesa – Redondo 230 kV
Del Amo – Hinson 230 kV
Long Beach – Lighthipe 230 kV
Hinson – Lighthipe 230 kV

As some of the overloads are triggered by queued ahead projects, and without their mitigations included in the study, the addition of the AMPS project does not trigger any transmission line upgrades. CAISO Congestion Management is being recommended for all thermal overloads listed above.

For more detailed information on these overloads please refer to the Power Flow section in the Report.

Transient Stability

No significant impacts on transient stability system responses were identified for the AMPS Project.

Post-Transient Voltage

No significant impacts on post-transient stability system responses were identified for the AMPS Project.

Short-Circuit Duty

The short-circuit duty studies identified the following for three phase Short Circuit Duty:
Four (4) 500 kV substations and eighteen (18) 230 kV substations where three phase Short Circuit Duty increased by 0.1 kA or more.

In addition, the short-circuit duty studies identified the following for Single Line-to-Ground Short Circuit Duty:
Two (2) 500 kV substations and twelve (12) 230 kV substations where Single Line-to-Ground Short Circuit Duty increased by 0.1 kA or more.

Engineering has not reviewed these results and will identify specific upgrades required in the facilities study. Given the results, it is known that multiple circuit breakers throughout the SCE system will need to be replaced and that Serrano 230 kV Substation will need to be upgraded to 80 kA rating. For more information on Short Circuit Duty, Please refer to the Short Circuit Duty section in the report.

Deliverability Assessment

Separate studies entitled "Deliverability Assessments" will be performed by the CAISO 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

Given the fact that the AMPS Project will be part of the City of Anaheim's electric system, there are no interconnection costs required other than what may be necessary for metering and communications for any Special Protection Schemes required for the project.
Therefore, The *Nonbinding* Cost Estimate for the interconnection facilities and reliability network upgrades triggered by the AMPS Project will be determined in the facilities study phase for these incidental items, such as metering and communications. The *Nonbinding* Cost Estimate for the maximum exposure for network upgrades triggered by queued ahead projects is $66 million. These estimates have been developed without detailed cost engineering and will be refined in the Facilities Study.

Facilities Study

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

1. Develop cost estimates and schedule for any required upgrades required throughout the SCE Transmission System (Case B)

As projects in the queue materialize, an Operational Study will be performed to determine the timing of any Case B facilities as they become necessary.

NOTE: As of the issue date of this study report, a project with a higher queue position than the AMPS Project has withdrawn. This will require a restudy of both Short Circuit Duty and Power Flow, for the AMPS Project.

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ANAHEIM PUBLIC UTILITIES DEPARTMENT
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ANAHEIM MUNICIPAL POWER STATION PROJECT

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February 15, 2008

I. INTRODUCTION

Anaheim Public Utilities Department ("ANHM"), on behalf of the Southern California Public Power Agency ("SCPPA") applied to the California Independent System Operator ("CAISO") for interconnection of the proposed Anaheim Municipal Power Station ("AMPS") pursuant to section 3.5 of the Large Generator Interconnection Procedures ("LGIP") issued under the CAISO Tariff. The AMPS Project, a generating facility to be located in the city of Anaheim (County of Orange), will have a maximum net plant output of 194.1 MW. The project is to consist of four (4) GE LM6000 simple cycle natural gas combustion turbines. ANHM proposes to interconnect the AMPS Project into Anaheim's own 69 kV electrical system and deliver energy and/or ancillary services to the California Independent System Operator ("CAISO") Controlled Grid utilizing the existing Lewis 230 kV jointly owned Substation (SCE/ANHM). To interconnect the AMPS Project into the existing Anaheim 69 kV system, Anaheim will be looping in two (2) 69 kV lines to form four (4) lines out of the newly constructed AMPS Project switchyard. The requested in-service date shown in Appendix 1 of the LGIP as submitted by ANHM is June 1, 2010 with a commercial operation date of July 1, 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 AMPS 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 AMPS 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 ANHM.* 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.

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:

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 were 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 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 AMPS 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 AMPS Project. The AMPS 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 AMPS 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 AMPS 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 AMPS Project

c) if base case overloads are triggered in the area after the addition of the AMPS Project

The range of base case congestion for the AMPS Project will be determined by reducing market generation in the area including the AMPS 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 loadings in the SCE Main System/Basin area. This included all pertinent queued ahead generation projects in the vicinity of the AMPS Project. This was done in order to develop loading scenarios that would stress the transmission system in the area of the AMPS Project. 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 2-1
Active Queued Generation Projects Modeled In The Study

Los Angeles Basin Area Interconnection Projects		
Project ID	Area of Interconnection	Project Size (MW)
CAISO-7	El Segundo 230	630
CAISO-23	San Bernardino 230	72
WDT-179	66 kV line tap between Colton and Bloomington	49.9
CAISO-66	Walnut 230	500.5
CAISO-80	Laguna Bell 230	610
CAISO-88	Hinson 230	613.5
CAISO-104	Laguna Bell 230	304
WDT-233	Mandalay 66	47.21
WDT-231	Mira Loma 66	45.03
WDT-229	Center 66	47.13
WDT-240	Brea 66	27.6
CAISO-161	Harborgen 230	202
WDT-251	Crater 66kV Substation	12
CAISO-181	Chino-Serrano 230kV line	404
CAISO-207	Long Beach 230kV Switchyard	557.3
CAISO-252	Redondo Beach 230	25.96
TOT255	Lewis 230 kV	194.1

Table 2-2
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

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Table 2-3
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

Southern California Edison Protected Materials, Confidential: Contains Critical Energy Infrastructure Information (CEII)

C. AMPS – Anaheim Municipal Power Station Project

The Anaheim Municipal Power Station (AMPS) Project is geographically located in the city of Anaheim, California, County of Orange. It is electrically connected to the City of Anaheim, Public Utilities Department's electric system. It will be owned by the Southern California Public Power Agency and operated by the City of Anaheim Public Utilities Department.

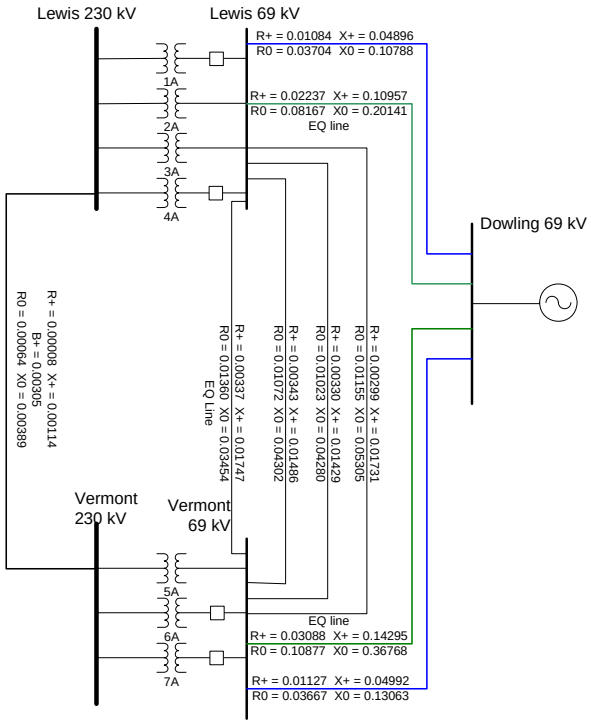
The AMPS Project will consist of 4 individual GE LM6000 simple cycle natural gas turbines for a total net output of 194.1 MW. Anaheim proposes to interconnect the AMPS Project into Anaheim's own 69 kV electrical system and deliver energy and/or ancillary services to the California Independent System Operator ("CAISO") Controlled Grid utilizing the existing Lewis 230 kV jointly owned Substation (SCE/ANHM). To interconnect the AMPS Project into the existing Anaheim 69 kV system, Anaheim will be looping in two (2) 69 kV lines to form four (4) lines out of the newly constructed AMPS Project switchyard.

The requested in-service date shown in Appendix 1 of the LGIP as submitted by ANHM is June 1, 2010 with a commercial operation date of July 1, 2010.

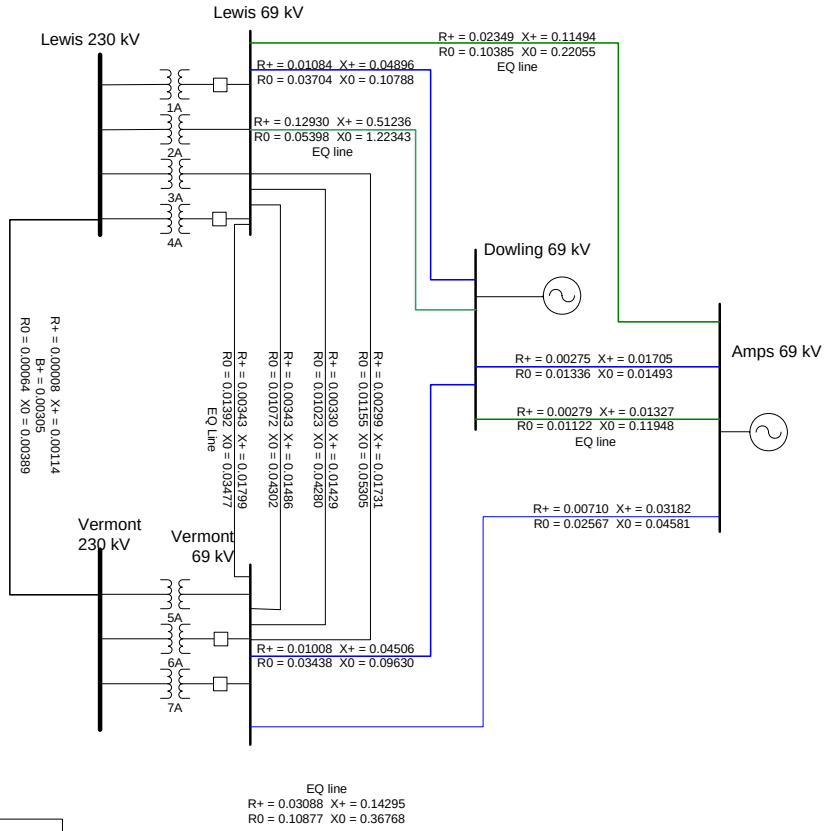
Figure 2-1
Anaheim Municipal Power Station Project Interconnection

Anaheim New Generation
Connected to AMPS substation
Power Flow Model
From data received 9/19/2007

Pre Case



Post Case



100 MVA base

Transformer	Lewis 1A	Lewis 2A	Lewis 3A	Lewis 4A	Vermont 5A	Vermont 6A	Vermont 7A
R+	0.00164	0.00189	0.00189	0.00189	0.00189	0.00163	0.00167
X+	0.10066	0.11539	0.11536	0.11536	0.11536	0.0999	0.10266
R0	0.00164	0.00189	0.00189	0.00189	0.00189	0.00163	0.00167
X0	0.10066	0.11536	0.11536	0.11536	0.11536	0.0999	0.10266

D. Transmission Upgrades Included in the Base Cases

A number of transmission upgrades are needed to support queued ahead generation projects in the Main System. Many of the higher queued projects do not have mitigations for their overloads currently. A restudy may be required once mitigations are developed. None of the mitigations for higher queued projects are expected to be required to support the addition of the AMPS Project.

E. Existing Special Protection Systems

SPS Requirements

This project may need to be included into any SPS which is used to mitigate overloads triggered by higher queued projects. This is only to mitigate overloads on transmission lines which the addition of the AMPS Project contributes to.

F. Power Flow Study

The AMPS Project System Impact Study considered two power flow study scenarios. Each case was derived from the most current CAISO Expansion Study base case. Further description of the case assumptions are provided below and summarized in Table 1-7:

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

The study considered heavy load conditions with generation patterns and imports dispatched in a manner that would stress the SCE system in the area of interconnection of the AMPS Project. This was done in order to identify the extent of potential congestion. Generation included: Regulatory must-take, all existing generation in the Main System / Basin areas, and other proposed generation and transmission projects in queue ahead of the AMPS Project.

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

Case 1 modified to include the AMPS Project with a net generation of 194.1 MW.

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

The study considered light load conditions with generation patterns and imports dispatched in a manner that would stress the SCE system in the area of interconnection of the AMPS Project. This was done in order to identify the extent of potential congestion. Generation included: Regulatory must-take, all existing generation in the Main System / Basin areas, and other proposed generation and transmission projects in queue ahead of the AMPS Project.

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

Case 3 modified to include the AMPS with a net generation of 194.1 MW.

Table 2-4
Power Flow Study Assumptions (MW)

	2013 Heavy Summer		2013 Light Spring	
Area Assumptions	Case 1 Pre-Project	Case 2 Post-Project	Case 3 Pre-Project	Case 4 Post-Project
Generation	20,812	20,815	11,609	11,613
Import	8,800	8,800	7,717	7,716
Load	29,150	29,150	19,007	19,007
Losses	463	465	318	322
Path Flows and Area Imports				
East-of-River (Path 49)	6,182	6,180	5,310	5,308
West-of-River (Path 46)	6,496	6,496	5,101	5,101
Midway-Vincent (Path 26)	3,975	3,977	3,669	3,670
South of Lugo	2,804	2,728	2,017	1,940
So. California Import Transfer	13,553	13,550	11,411	11,408

G. Transient Stability Study

For transient stability evaluation, three-phase faults with normal clearing are studied for single contingencies; single-line-to-ground faults with delayed clearing are studied for double contingencies according to NERC/WECC planning criteria. The evaluation was conducted for the critical single and double contingencies affecting the area of interest listed below in Table 1-8. 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 AMPS Project will be included if stability studies indicated that an SPS for AMPS Project is required. Study results were evaluated utilizing the applicable Planning Criteria as summarized in Table 1-9.

Table 2-5
Transient Stability Critical Study Cases

Outage Switch Files
ERockMesa-GdrLBell-dlo
HINSON-LITEHIPE-DELAMO-DLO
LAGUBELL-RIOHON-MESA-REDONDO-DLO
Lugo-Miraloma-dlo-12slg
lugo-ranchovista-slo
Midway-Vincent-dlo
No-fault
PVDevers-slo
SONGS-Santiago-dlo

Table 2-6
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.

H. 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.

I. Short-Circuit Duty Study

To determine the impact on short-circuit duty, within SCE's electrical system, after inclusion of the AMPS 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 AMPS 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.

J. 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.

K. Cost Estimates

Non-binding cost estimates will be derived for the "phased" portion of facility upgrades identified as needed to reliably interconnect the AMPS 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.

L. 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. GENERATOR ELECTRIC GRID FAULT RIDE-THROUGH CAPABILITY CRITERIA AND POWER FACTOR CRITERIA

WECC has adopted a Generator Electrical Grid Fault Ride-Through Capability Criteria. SCE currently supports a Low Voltage Ride-Through Criteria to ensure continued reliable service. The Criteria is summarized as follows:

1. Generator is to remain in-service during system faults (three phase faults with normal clearing and single-line-to-ground with delayed clearing) unless clearing the fault effectively disconnects the generator from the system.
2. During the transient period, generator is required to remain in-service for the low voltage and frequency excursions specified in WECC Table W-1 (provided below) as applied to load bus constraint. These performance criteria are applied to the generator interconnection point, not the generator terminals.
3. Generators may be tripped after the fault period if this action is intended as part of a SPS.
4. This Standard will not apply to individual units or to a site where the sum of the installed capabilities of all machines is less than 10MVA, unless it can be proven that reliability concerns exist.
5. The performance criteria of this Standard may be satisfied with performance of the generators or by installing equipment to satisfy the performance criteria.
6. The performance criterion of this Standard applies to any generation independent of the interconnected voltage level.
7. No exemption from this Standard will be given because of minor impact to the interconnected system.
8. Existing generators that go through any refurbishments or any replacements are then required to meet this Standard.

IV. STUDY RESULTS

A. Power Flow Analysis

The study focused on identifying system thermal overload problems within SCE service territory and electrical system.

BASE CASE CONDITIONS

There were no base case overloads that were triggered or aggravated by the addition of the AMPS Project for both Peak and Off-Peak conditions..

SINGLE OUTAGE CONTINGENCY (N-1)

There were no Single Contingency (N-1) overloads that were triggered or aggravated by the addition of the AMPS Project for both Peak and Off-Peak conditions.

DOUBLE OUTAGE CONTINGENCY (N-2)

There were a total of five (5) lines which had pre-existing overloads and were aggravated by the addition of the AMPS project. Of the five (5) lines, only four (4) have aggravated overloads in the peak conditions.

The lines are as follows:

Lighthipe – Mesa 230 kV
Mesa – Redondo 230 kV
Del Amo – Hinson 230 kV
Long Beach – Lighthipe 230 kV
Hinson – Lighthipe 230 kV

Table 4-1
2013 Off Peak Overloads
Pre and Post AMPS Project

Bus Name	Bus Name	kV	ID (T)	Normal Rating Amps/MVA	Emergency Rating Amps/MVA	Off Peak Pre AMPS Project	%	Off Peak Post AMPS Project	%	Amps / % Contribution	% Change	Contingency Description
HINSON	DELAMO	230	1	2400	2540	2427.1	101	2445.9	102	19 Amps / 1 %	1%	line ALMITOSE - CENTER S 230.0 kV #1 ,line BARRE - ELLIS 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2668.7	111	2679.7	112	11 Amps / 1 %	1%	line ALMITOSE - CENTER S 230.0 kV #1 ,line LA FRESA - LAGUBELL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2764.4	115	2783	116	19 Amps / 1 %	1%	line ALMITOSE - CENTER S 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2698	112	2707.9	113	10 Amps / 1 %	1%	line BARRE - ELLIS 230.0 kV #1 ,line LA FRESA - LAGUBELL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2715.2	113	2728.9	114	14 Amps / 1 %	1%	line BARRE - ELLIS 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2577	107	2581.6	108	5 Amps / 1 %	1%	line ELLIS - SANTIAGO 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2433.4	101	2437.3	102	4 Amps / 1 %	1%	line HARBOR - HINSON 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2603.6	108	2613.6	109	10 Amps / 1 %	1%	line LA FRESA - HINSON 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	3145.4	131	3157.9	132	13 Amps / 1 %	1%	line LA FRESA - LAGUBELL 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2504.6	104	2512.4	105	7 Amps / 1 %	1%	line LITEHIPE - MESA CAL 230.0 kV #1 ,line REDONDO - LITEHIPE 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2601.6	108	2606.6	109	5 Amps / 1 %	1%	line LITEHIPE - MESA CAL 230.0 kV #1 ,line S.ONOFRE - SERRANO 230.0 kV #1

HINSON	DELAMO	230	1	2400	2540	2575.7	107	2580.4	108	4 Amps / 1 %	1%	line LITEHIPE - MESA CAL 230.0 kV #1 ,line LEELAKE - LEAPS-MP 500.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2602.7	108	2607.9	109	5 Amps / 1 %	1%	line LITEHIPE - MESA CAL 230.0 kV #1 ,line CHINO - TOT217 230.0 kV #1
LBEACH	LITEHIPE	230	1	1150	1185	1549	135	1558	136	9 Amps / 1 %	1%	line ALMITOSW - LITEHIPE 230.0 kV #1 ,line LITEHIPE - HINSON 230.0 kV #1
LBEACH	LITEHIPE	230	1	1150	1185	1971.3	171	1972.4	172	1 Amps / 1 %	1%	line LA FRESA - HINSON 230.0 kV #1 ,line LITEHIPE - HINSON 230.0 kV #1
LITEHIPE	HINSON	230	1	1501	2031	1981.8	132	1996.2	133	14 Amps / 1 %	1%	line ALMITOSW - LITEHIPE 230.0 kV #1 ,line LBEACH - LITEHIPE 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2445.9	102	2472.7	103	27 Amps / 1 %	1%	line ALMITOSE - BARRE 230.0 kV #1 ,line HINSON - DELAMO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2437.8	102	2483.7	103	46 Amps / 1 %	1%	line ALMITOSE - CENTER S 230.0 kV #1 ,line HINSON - DELAMO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2380.5	99	2409.3	100	28 Amps / 1 %	1%	line ALMITOSW - BARRE 230.0 kV #2 ,line HINSON - DELAMO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2383.3	99	2399.4	100	16 Amps / 1 %	1%	line ALMITOSW - LITEHIPE 230.0 kV #1 ,line LAGUBELL - RIOHONDO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2831.2	118	2846.2	119	15 Amps / 1 %	1%	line ALMITOSW - LITEHIPE 230.0 kV #1 ,line MESA CAL - REDONDO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2789.1	116	2826.4	118	37 Amps / 2 %	2%	line HINSON - DELAMO 230.0 kV #1 ,line LA FRESA - LAGUBELL 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2380.7	99	2416.9	101	36 Amps / 2 %	2%	line HINSON - DELAMO 230.0 kV #1 ,line LAGUBELL - RIOHONDO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2922.7	122	2960	123	37 Amps / 1 %	1%	line HINSON - DELAMO 230.0 kV #1 ,line MESA CAL - REDONDO 230.0 kV #1

LITEHIPE	MESA CAL	230	1	2400	2540	2600.3	108	2644.3	110	44 Amps / 2 %	2%	line LA FRESA - LAGUBELL 230.0 kV #1 ,line MESA CAL - REDONDO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2432	101	2475.6	103	44 Amps / 2 %	2%	line LAGUBELL - RIOHONDO 230.0 kV #1 ,line MESA CAL - REDONDO 230.0 kV #1
[redacted]												
MESA CAL	REDONDO	230	1	2001	2199	2064.6	103	2078.2	104	13 Amps / 1 %	1%	line HINSON - DELAMO 230.0 kV #1 ,line LA FRESA - LAGUBELL 230.0 kV #1
MESA CAL	REDONDO	230	1	2001	2199	2155.1	108	2174.3	109	19 Amps / 1 %	1%	line HINSON - DELAMO 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
MESA CAL	REDONDO	230	1	2001	2199	2088.8	104	2113.2	106	24 Amps / 2 %	2%	line LA FRESA - LAGUBELL 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1

Table 4-2
2013 Peak Overloads
Pre and Post AMPS Project

Bus Name	Bus Name	kV	ID (T)	Normal Rating Amps/MVA	Emergency Rating Amps/MVA	Peak Pre AMPS Project	%	Peak Post AMPS Project	%	Amps / % Contribution	% Change	Contingency Description
HINSON	DELAMO	230	1	2400	2540	2502.4	104	2510.3	105	8 Amps / 1 %	1%	line BARRE - ELLIS 230.0 kV #1 ,line LA FRESA - LAGUBELL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	2651.5	110	2664.7	111	13 Amps / 1 %	1%	line BARRE - ELLIS 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
HINSON	DELAMO	230	1	2400	2540	3034.9	126	3047.8	127	13 Amps / 1 %	1%	line LA FRESA - LAGUBELL 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1
LITEHIPE	HINSON	230	1	1501	2031	1906.2	127	1920.9	128	15 Amps / 1 %	1%	line ALMITOSW - LITEHIPE 230.0 kV #1 ,line LBEACH - LITEHIPE 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2507.1	104	2517.4	105	10 Amps / 1 %	1%	line ALMITOSW - BARRE 230.0 kV #2 ,line DELAMO - CENTER S 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2616.3	109	2630.7	110	15 Amps / 1 %	1%	line ALMITOSW - BARRE 230.0 kV #2 ,line LA FRESA - LAGUBELL 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2453	102	2469.1	103	16 Amps / 1 %	1%	line ALMITOSW - BARRE 230.0 kV #2 ,line LAGUBELL - RIOHONDO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2403.8	100	2421.7	101	18 Amps / 1 %	1%	line ALMITOSW - BARRE 230.0 kV #2 ,line GOODRICH - LAGUBELL 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2396.4	100	2422.6	101	27 Amps / 1 %	1%	line DELAMO - LAGUBELL 230.0 kV #1 ,line HINSON - DELAMO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2455.6	102	2489.2	104	33 Amps / 2 %	2%	line HINSON - DELAMO 230.0 kV #1 ,line LA FRESA - HINSON 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2826.2	118	2861.9	119	36 Amps / 1 %	1%	line HINSON - DELAMO 230.0 kV #1 ,line LA FRESA - LAGUBELL 230.0 kV #1

LITEHIPE	MESA CAL	230	1	2400	2540	**2881.5**	120	**2916.9**	122	**35 Amps / 2 %**	2%	line HINSON - DELAMO 230.0 kV #1 ,line MESA CAL - REDONDO 230.0 kV #1
LITEHIPE	MESA CAL	230	1	2400	2540	2394.6	100	**2438.5**	102	**44 Amps / 2 %**	2%	line LA FRESA - LAGUBELL 230.0 kV #1 ,line MESA CAL - REDONDO 230.0 kV #1
[redacted]												
MESA CAL	REDONDO	230	1	2001	2199	1989.6	99	1998.1	100	**8 Amps / 1 %**	1%	line ALMITOSW - BARRE 230.0 kV #2 ,line LITEHIPE - MESA CAL 230.0 kV #1
MESA CAL	REDONDO	230	1	2001	2199	**2077.6**	104	**2096.9**	105	**19 Amps / 1 %**	1%	line HINSON - DELAMO 230.0 kV #1 ,line LITEHIPE - MESA CAL 230.0 kV #1

As some of the overloads are triggered by queued ahead projects, and without their mitigations included in the study, the addition of the AMPS project does not trigger any transmission line upgrades. CAISO Congestion Management is being recommended for all thermal overloads listed above.

B. Transient Stability Analysis

Transient stability studies were performed for the outages specified in Table 1-8. The studies determined that the system remained stable under both single and double contingency outage conditions and the addition of the AMPS Project. Transient stability plots are provided in Appendix A (pre-project) and Appendix B (post-project).

C. Post-Transient Stability Analysis

Post-Transient stability studies were performed for the outages specified in Table 1-8. The studies determined that the system remained stable under both single and double contingency outage conditions and the addition of the AMPS Project. Post-Transient stability plots are provided in Appendix A (pre-project) and Appendix B (post-project).

D. Short Circuit Duty Study

The short-circuit duty analysis included all queued ahead generation projects based on their application date but did not model corresponding transmission upgrades. As shown below in Table 2-3, the three-phase-to-ground, and Table 2-4, the single phase-to-ground, short circuit duty studies identified multiple substations where duty was increased by more than 0.1 kA and duty was in excess of 60% of the minimum circuit breaker rating.

Three Phase Short Circuit Duty:
Four (4) 500 kV substations and eighteen (18) 230 kV substations where three phase Short Circuit Duty increased by 0.1 kA or more.

Single Line-to-Ground Short Circuit Duty:
Two (2) 500 kV substations and twelve (12) 230 kV substations where Single Line-to-Ground Short Circuit Duty increased by 0.1 kA or more.

Engineering has not reviewed these results and will identify specific upgrades required in the facilities study. Given the results, it is known that multiple circuit breakers throughout the SCE system will need to be replaced and that Serrano 230 kV Substation will need to be upgraded to 80 kA rating. For more information on Short Circuit Duty, Please refer to the Short Circuit Duty section in the report.

Due to incomplete data or timeliness of modeling of projects from data that is forthcoming, certain projects were not modeled that are part of the queue ahead. A reasonable assumption was made that these projects will not affect the SCD in the immediate area where the AMPS Project is connected to. A restudy may be required at a later date for Short Circuit Duty.

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

		PRE CASE		POST CASE		
Bus Name	Bus KV	X/R	KA	X/R	KA	DELTA KA
MIRALOMA	500	23.6	44.9	23.7	45	0.1
SERRANO	500	24.2	37.4	24.3	37.6	0.2
VALLEYSC	500	19.5	30.5	19.5	30.6	0.1
ALMITOSE	230	16.7	31.3	16.6	31.4	0.1
ALMITOSW	230	23.4	35.9	23.3	36	0.1
BARRE	230	18.5	53.9	18.6	54.4	0.5
CENTER S	230	15.9	43.6	15.9	43.7	0.1
CHINO	230	16.9	57.6	16.9	57.7	0.1
ELLIS	230	17.4	42.6	17.3	42.7	0.1
HUNTGBCH	230	14.5	30.7	14.4	30.8	0.1
LEWIS	230	20.8	49.6	21	50.6	1
MESA CAL	230	16.6	53.5	16.6	53.6	0.1
MRLOMA E	230	24.1	73.2	24.1	73.3	0.1
MRLOMA W	230	19.6	58.4	19.5	58.5	0.1
R VISTA	230	30.1	70.9	30.1	71	0.1
REDONDO	230	25.9	48.9	25.9	49	0.1
SERRANO	230	24.8	62	24.9	62.8	0.8
SYLMAR S	230	18.8	61	18.8	61.1	0.1
VILLA PK	230	21.9	52.4	21.9	53.1	0.7

Table 4-4
Single Line to Ground (SLG)
Short Circuit Duty Study Results

		PRE CASE		POST CASE		
Bus Name	Bus KV	X/R	KA	X/R	KA	DELTA KA
Lugo	500	11.5	53.9	11.5	54	0.1
Mira Loma	500	9.2	39.7	9.2	39.8	0.1
Serrano	500	12.8	31.2	12.8	31.3	0.1
Barre	230	13.9	47.3	13.9	47.6	0.3
Chino	230	12.8	47.9	12.8	48	0.1
Lewis	230	15.9	45.6	15.9	46.2	0.6
Mira Loma A	230	11.9	60.4	11.9	60.5	0.1
Mira Loma B	230	11.1	69.3	11.1	69.4	0.1
Santiago	230	18	25.5	18	25.6	0.1
Serrano	230	19	62.8	18.9	63.4	0.6
Villa Park	230	15.8	47.3	15.8	47.7	0.4

E. Deliverability Assessment

Separate studies entitled "Deliverability Assessments" will be performed by the CAISO 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.

V. 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 AMPS Project are provided below in Table 2-5. *All cost estimates are rough, order of magnitude estimates and are non-binding.* The *Nonbinding* Cost Estimate for the AMPS Project Facilities will be determined in the facilities studies for incidental items such as: metering and telecommunications. The *Nonbinding* Cost Estimate for upgrades triggered by queued ahead projects is $66.0 million, in 2010 dollars (the ITCC component will be collected via a Letter of Credit).

Table 4-5
Cost Estimates[1] Provided in Millions

Facility Upgrade	Triggered by Queued Ahead Project[2]	Triggered by the AMPS Project
Serrano 230 kV 80 kA Substation Upgrade	$20.0	-
SCE Circuit Breaker Upgrades at Multiple 230 kV & 500 kV Substations	$45.0	-
Protection, Telecom, and Special Protection System (if required)	$1.0	TBD
Total	$66.0	TBD[3]

VI. OPERATIONAL STUDY

This SIS was performed based on the latest in-service date of all queued ahead projects as requested by the project developers.

As a result of the supplemental information outlining exact phasing of queued ahead projects, an Operational Study will be required to evaluate the AMPS Project impacts

Such Operational Study will identify the minimum subset of the facility upgrades required to interconnect the AMPS Project, if any. It is important to note several complexities associated with the minimum subset of the facility upgrades that are anticipated to be required.

[1] Shown in 2010 Year Dollars and does not include any ITCC Tax
[2] Cost of such additional facilities may later be assigned to the AMPS Project if modifications to queued ahead projects (consistent with LGIP) or project withdrawals result in the AMPS Project triggering the need for the upgrade (as determined by a restudy).
[3] Facility classification, interconnection or reliability, will be done as part of the Facilities Study

VII. CONCLUSIONS

The impact of additional generation has aggravated N-2 overloads on five (5) SCE 230 kV transmission lines. The addition of the AMPS Project significantly impacts SCE's Short Circuit Duty at multiple 500 kV and 230 kV substations. Additional information on Power Flow or Short Circuit Duty can be found in the sections below or in the main report.

Power Flow

The study focused on identifying system thermal overload problems within SCE service territory and electrical system.

BASE CASE CONDITIONS

There were no base case overloads that were triggered or aggravated by the addition of the AMPS Project for both Peak and Off-Peak conditions..

SINGLE OUTAGE CONTINGENCY (N-1)

There were no Single Contingency (N-1) overloads that were triggered or aggravated by the addition of the AMPS Project for both Peak and Off-Peak conditions.

DOUBLE OUTAGE CONTINGENCY (N-2)

There were a total of five (5) lines which had pre-existing overloads and were aggravated by the addition of the AMPS project. Of the five (5) lines, only three (3) have aggravated overloads in the peak conditions.

The lines are as follows:

Lighthipe – Mesa 230 kV
Mesa – Redondo 230 kV
Del Amo – Hinson 230 kV
Long Beach – Lighthipe 230 kV
Hinson – Lighthipe 230 kV

As some of the overloads are triggered by queued ahead projects, and without their mitigations included in the study, the addition of the AMPS project does not trigger any transmission line upgrades. CAISO Congestion Management is being recommended for all thermal overloads listed above.

Transient Stability

No significant impacts on transient stability system responses were identified for the AMPS Project.

Post-Transient Voltage

No significant impacts on Post-Transient stability system responses were identified for the AMPS Project.

Short-Circuit Duty

The short-circuit duty studies identified the following for three phase Short Circuit Duty:
Four (4) 500 kV substations and eighteen (18) 230 kV substations where three phase Short Circuit Duty increased by 0.1 kA or more.

In addition, the short-circuit duty studies identified the following for Single Line-to-Ground Short Circuit Duty:
Two (2) 500 kV substations and twelve (12) 230 kV substations where Single Line-to-Ground Short Circuit Duty increased by 0.1 kA or more.

Engineering has not reviewed these results and will identify specific upgrades required in the facilities study. Given the results, it is known that multiple circuit breakers throughout the SCE system will need to be replaced and that Serrano 230 kV Substation will need to be upgraded to 80 kA rating. For more information on Short Circuit Duty, Please refer to the Short Circuit Duty section in the report.

Deliverability Assessment

Separate studies entitled "Deliverability Assessments" will be performed by the CAISO 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

Given the fact that the AMPS Project will be part of the City of Anaheim's electric system, there are no interconnection costs required other than what may be necessary for metering and communications for any Special Protection Schemes required for the project.

Therefore, The *Nonbinding* Cost Estimate for the interconnection facilities and reliability network upgrades triggered by the AMPS Project will be determined in the facilities study phase for these incidental items, such as metering and communications. The *Nonbinding* Cost Estimate for the maximum exposure for network upgrades triggered by queued ahead projects is $66 million. These estimates have been developed without detailed cost engineering and will be refined in the Facilities Study.

Facilities Study

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

1. Develop cost estimates and schedule for any required upgrades required throughout the SCE Transmission System (Case B)

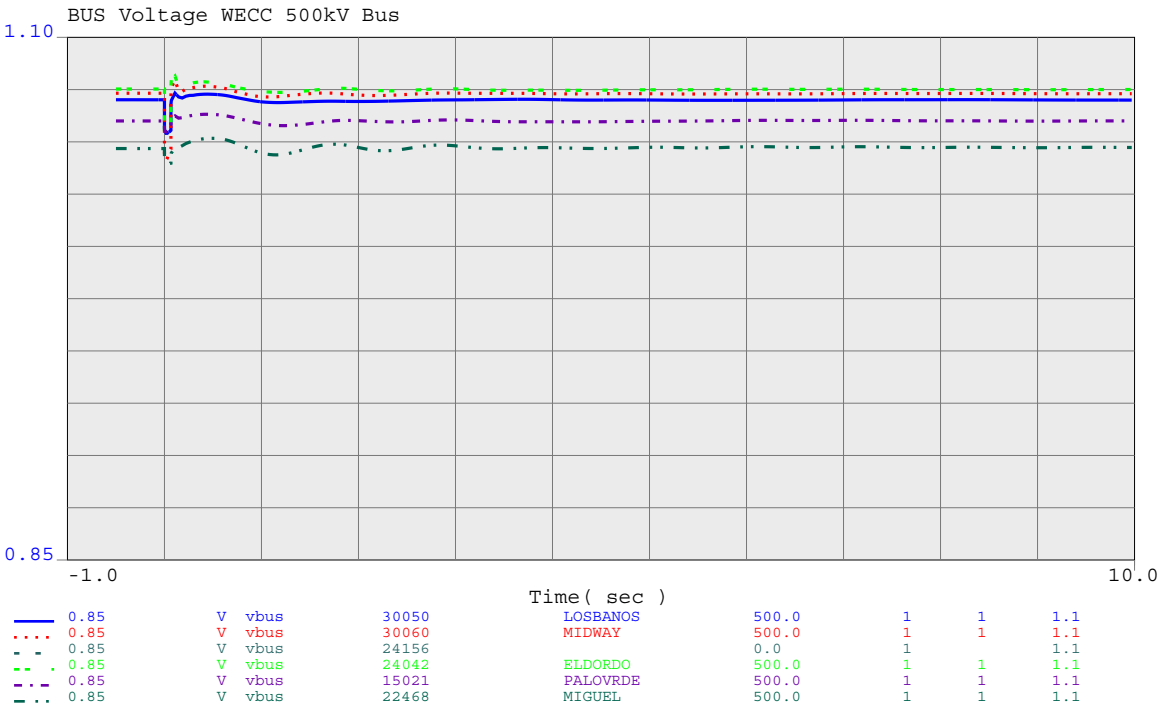
As projects in the queue materialize, an Operational Study will be performed to determine the timing of any Case B facilities as they become necessary.

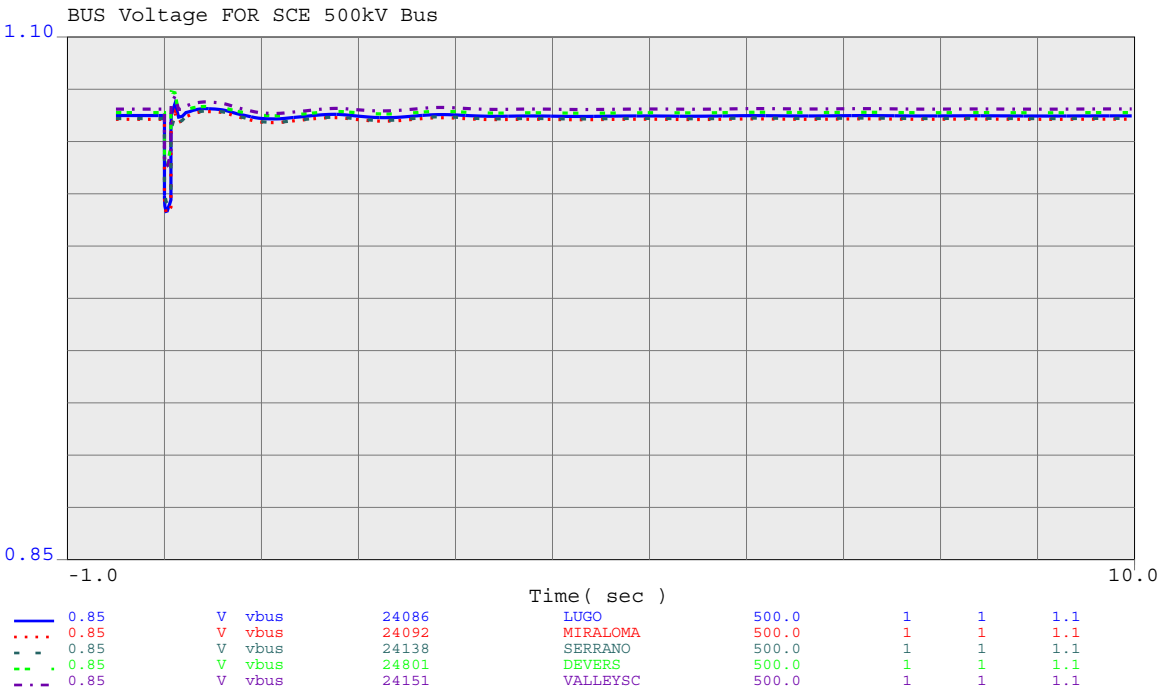
NOTE: As of the issue date of this study report, a project with a higher queue position than the AMPS Project has withdrawn. This will require a restudy of both Short Circuit Duty and Power Flow, for the AMPS Project.

APPENDIX A

Heavy Summer Stability Plots Pre - Project

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

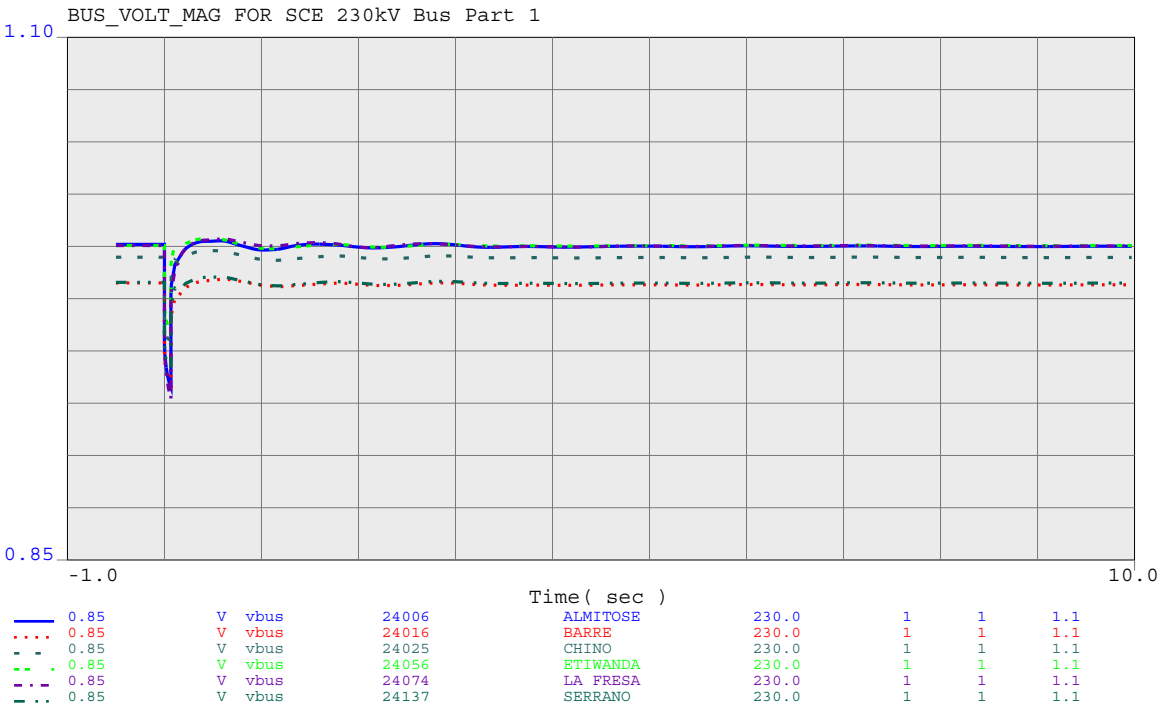
PRE PROJECT

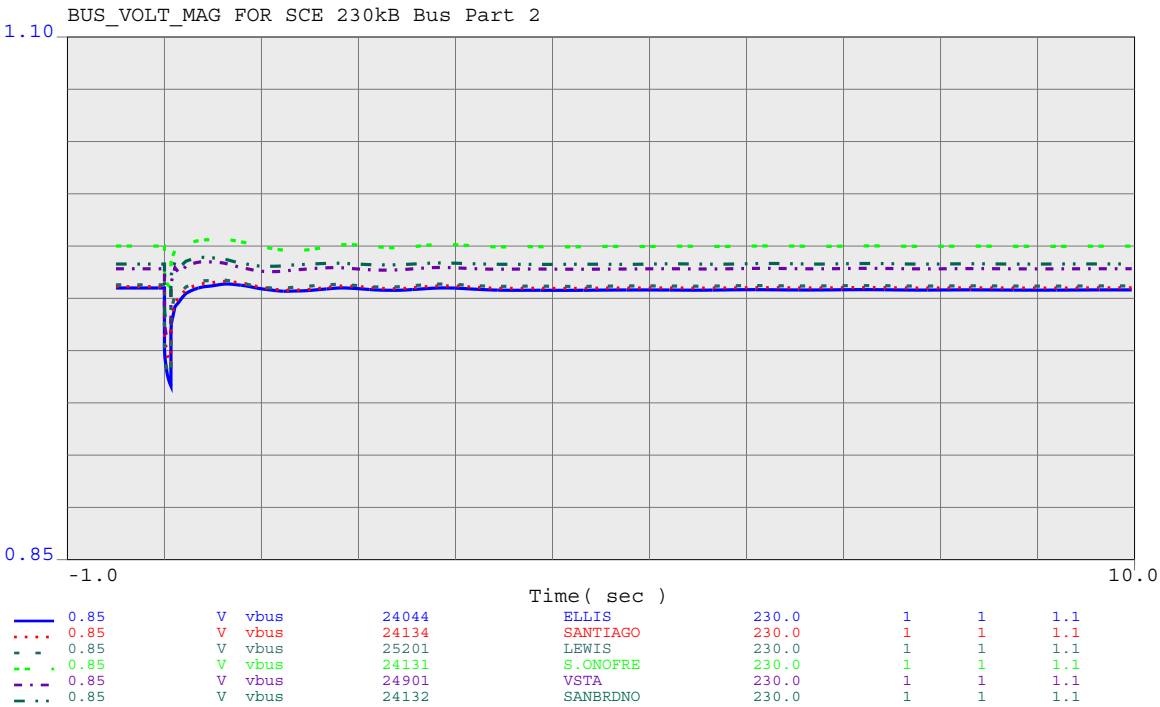
2013 Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





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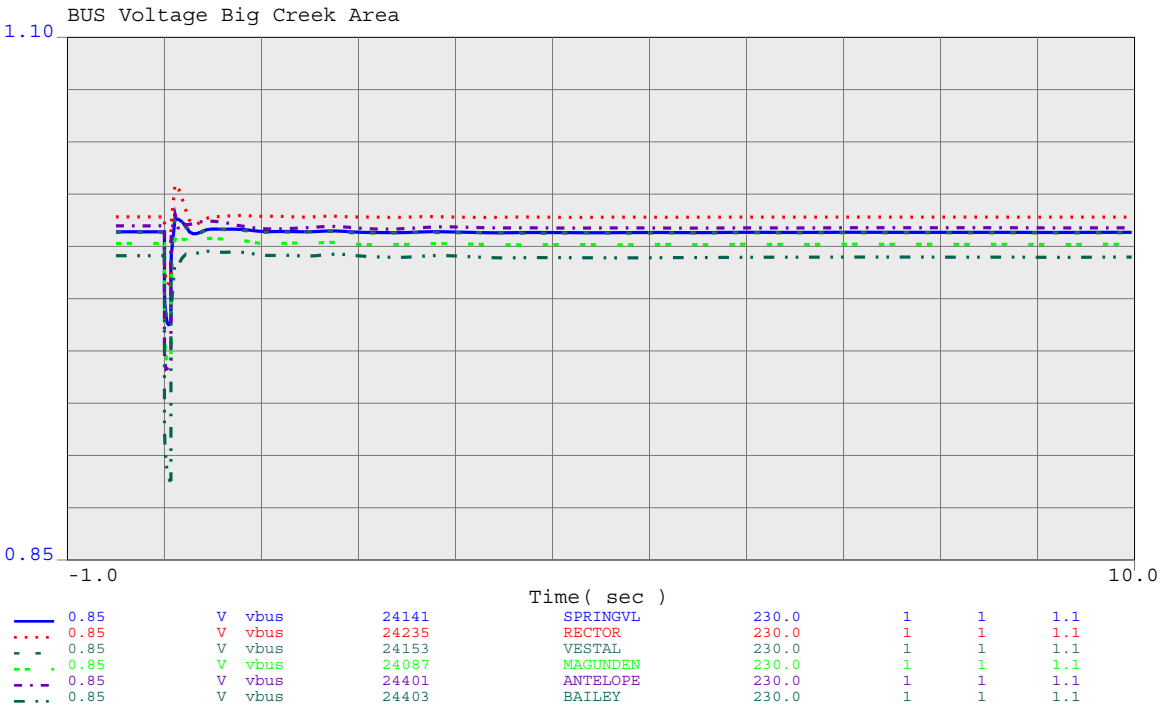

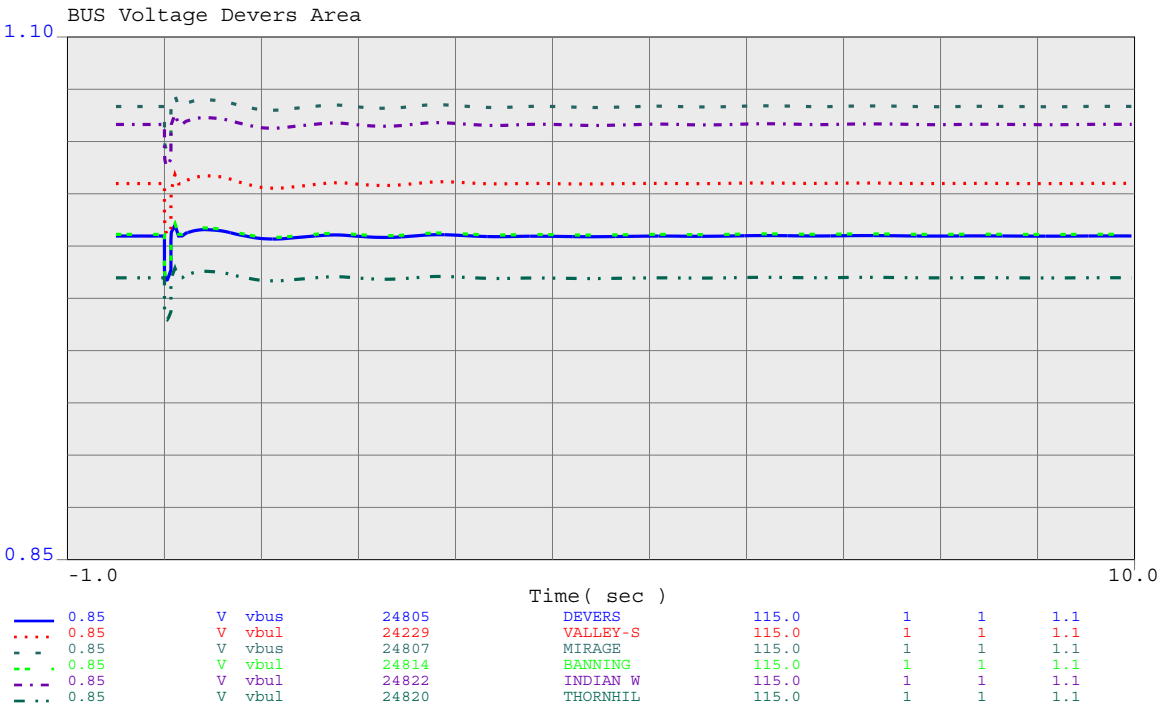

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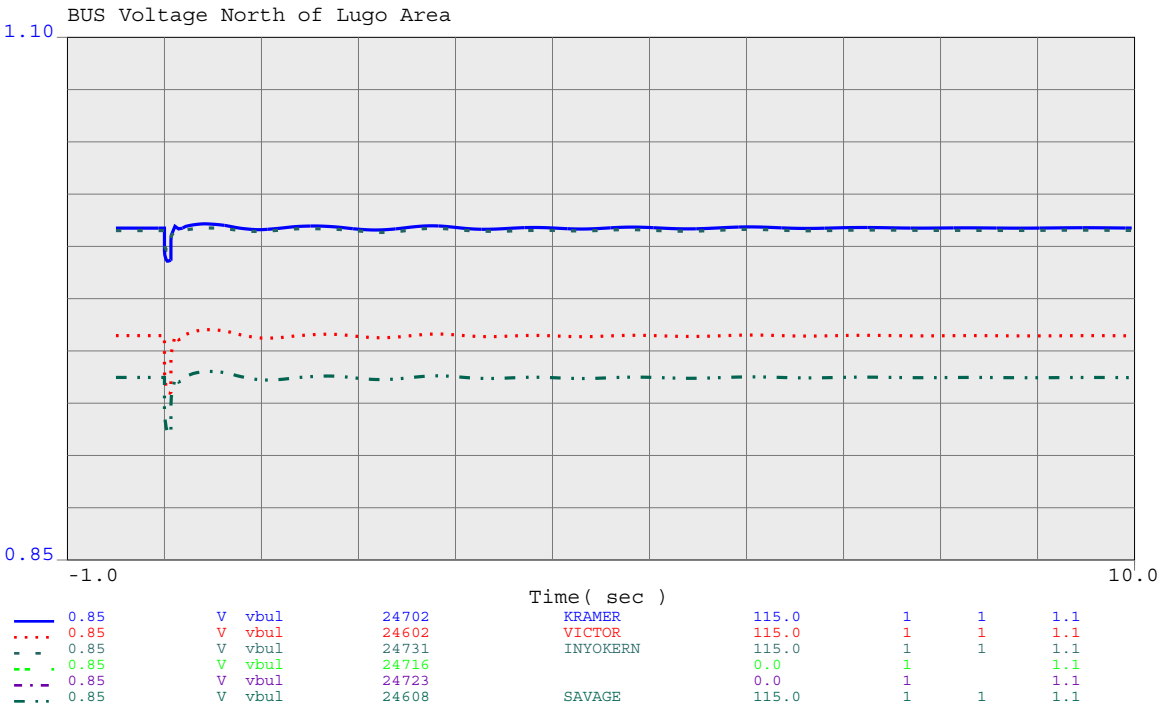

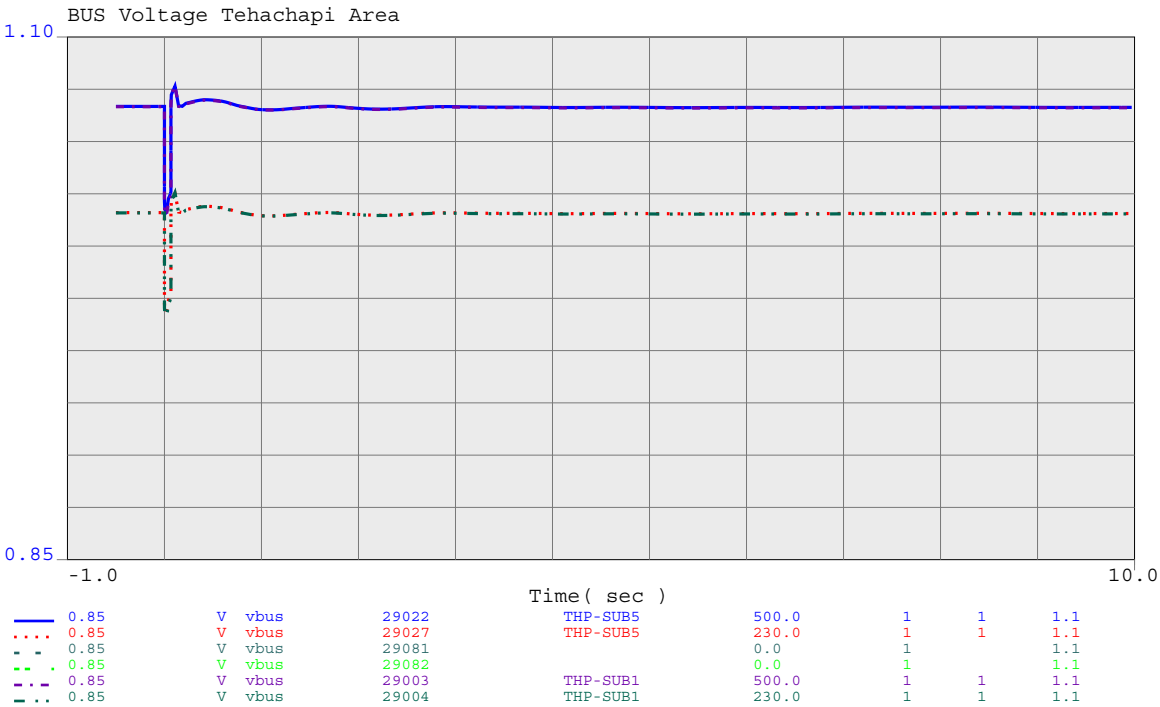

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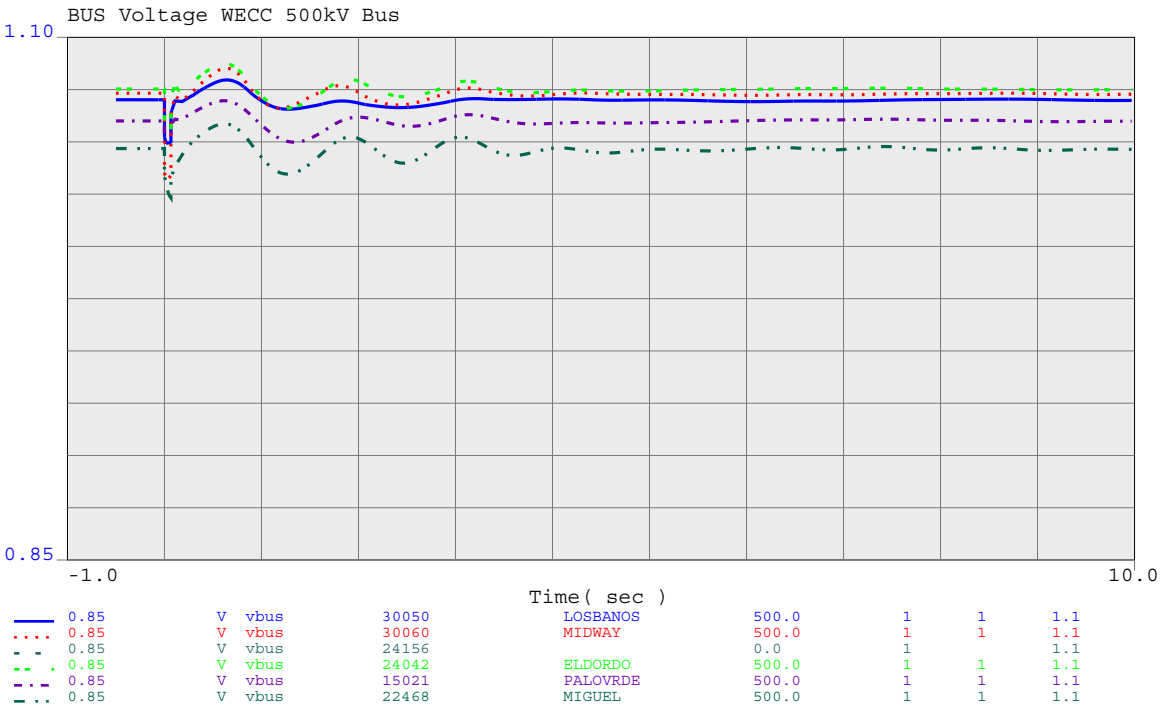

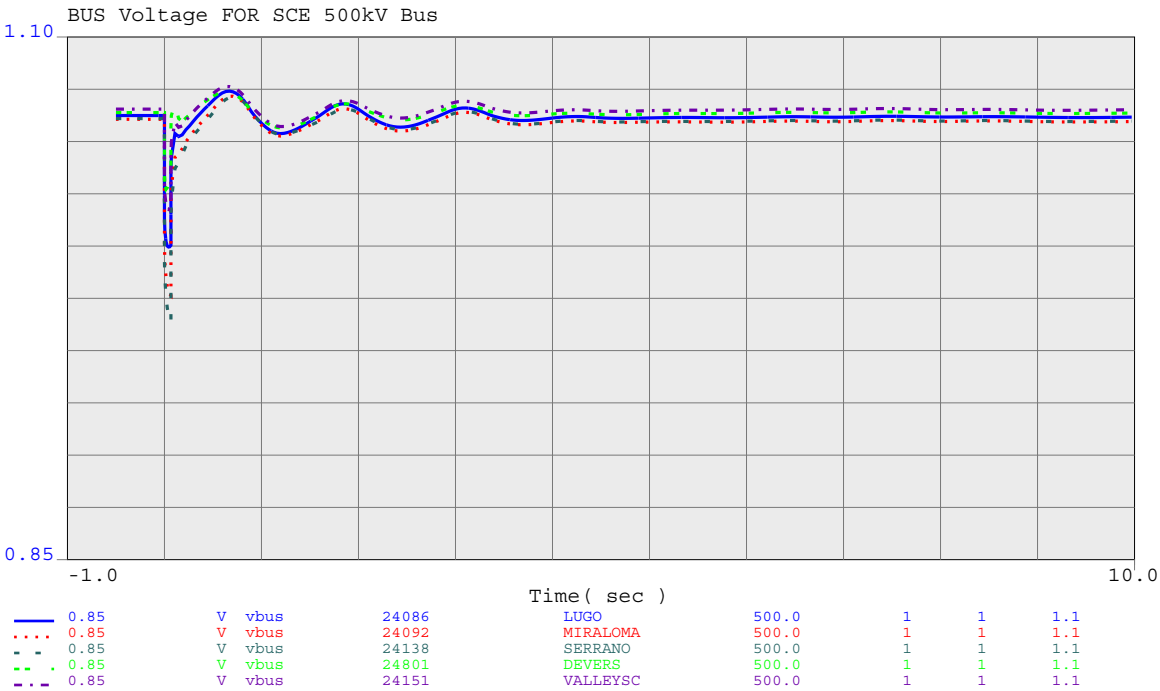

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

PRE PROJECT

2013 Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

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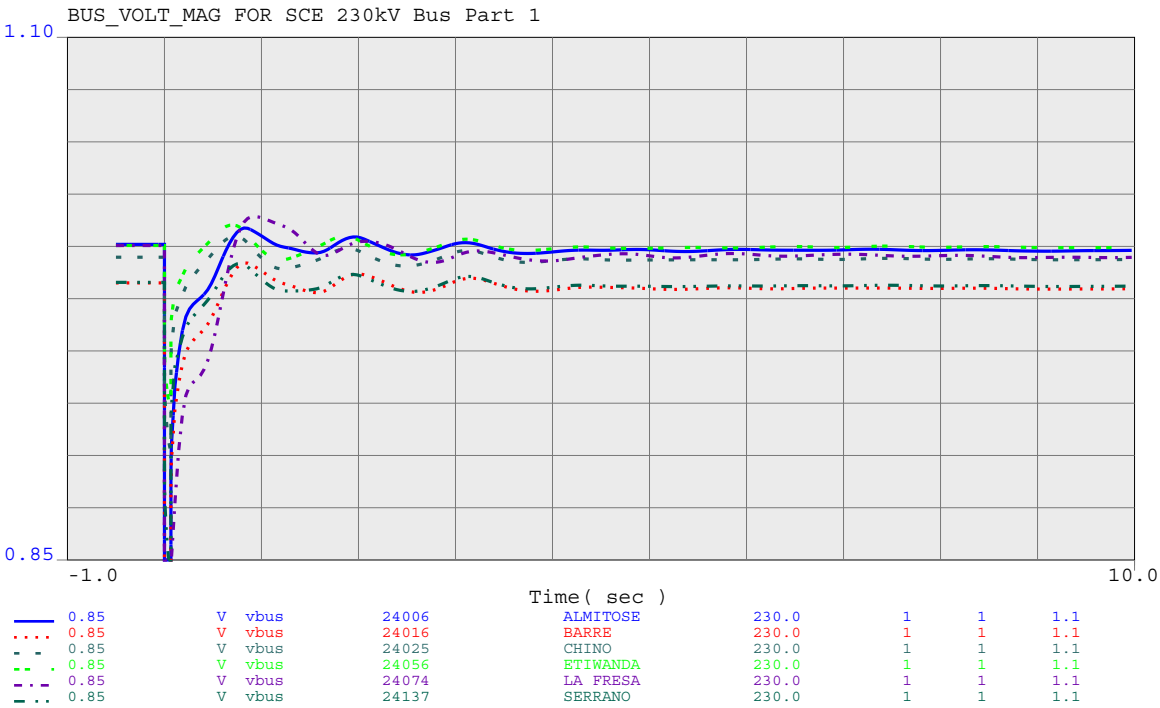

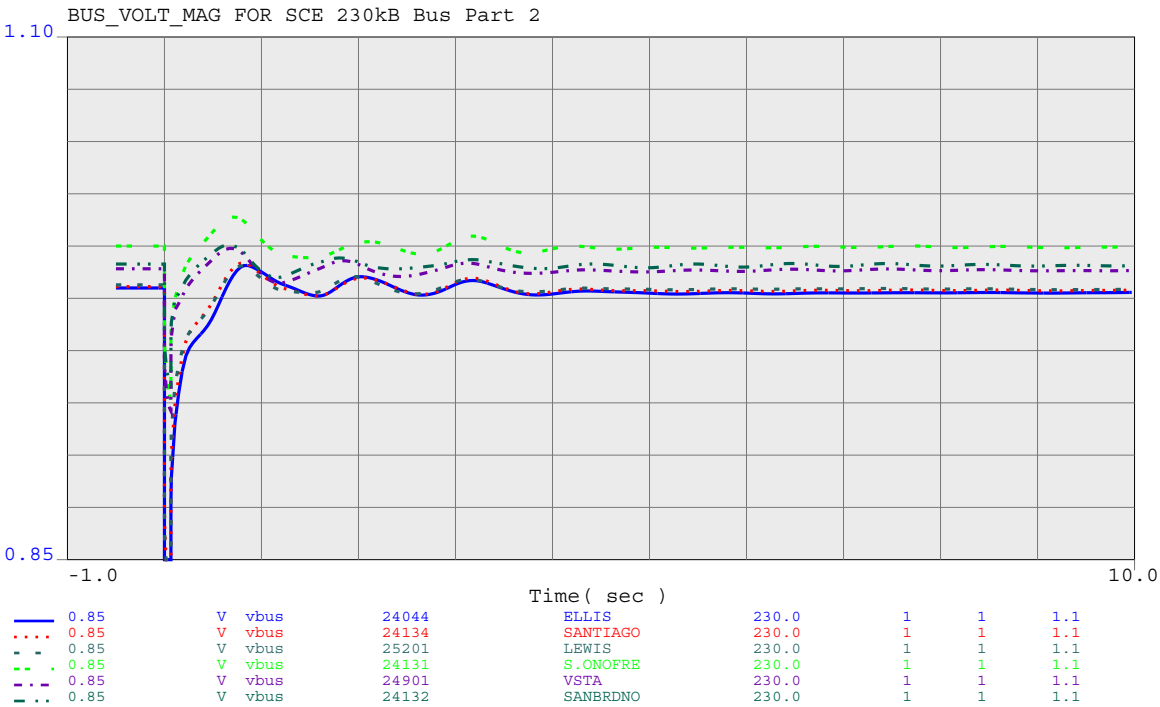

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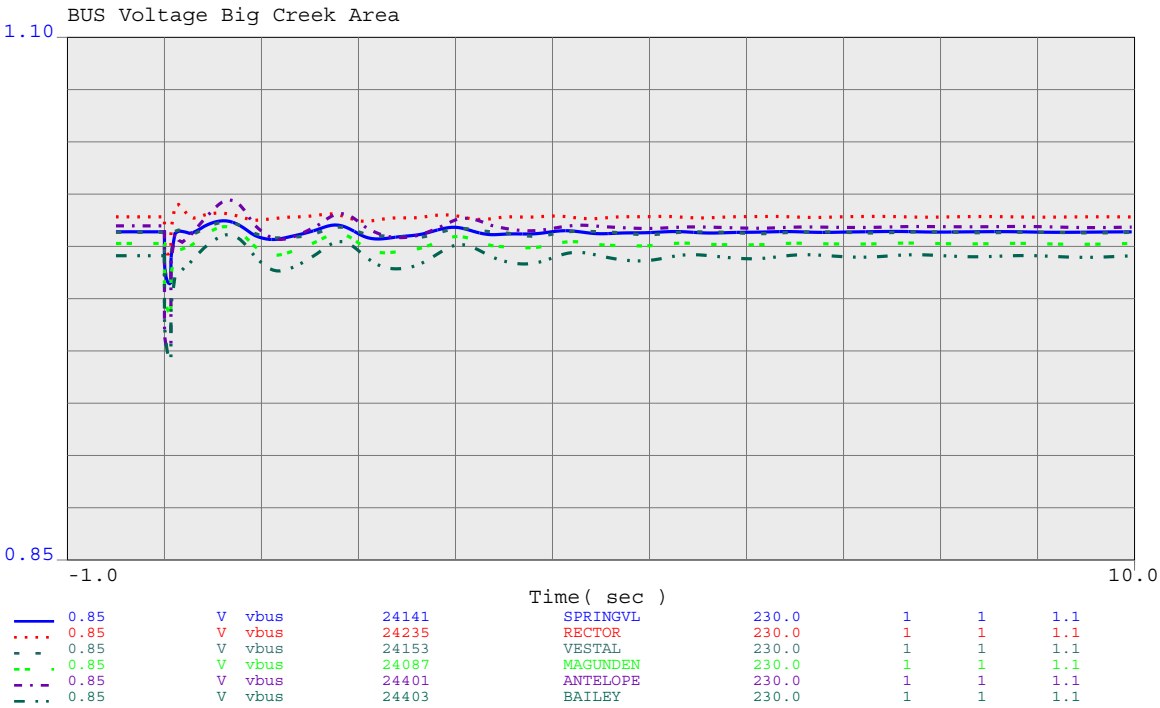

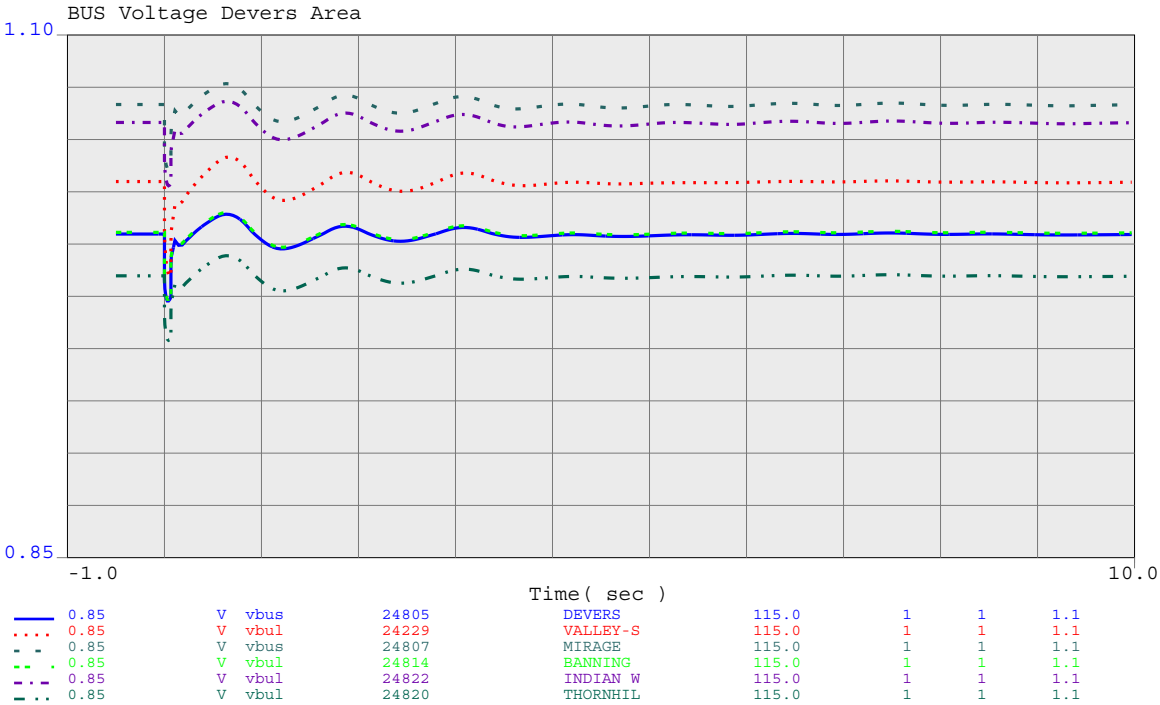

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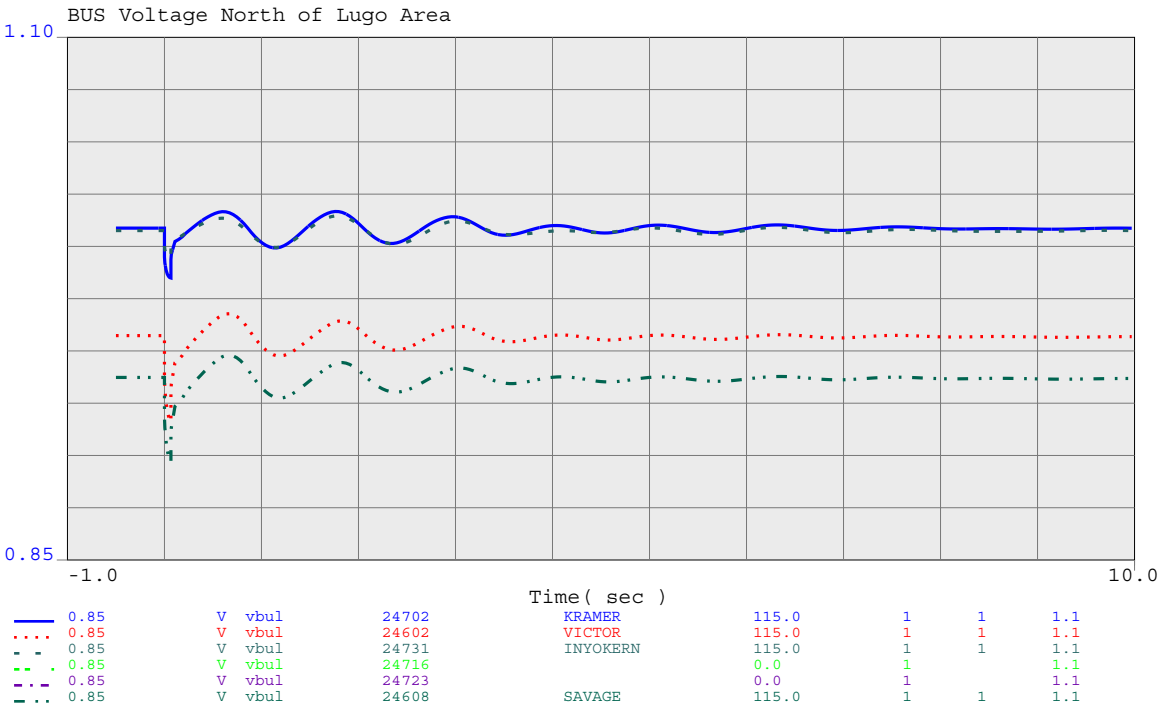

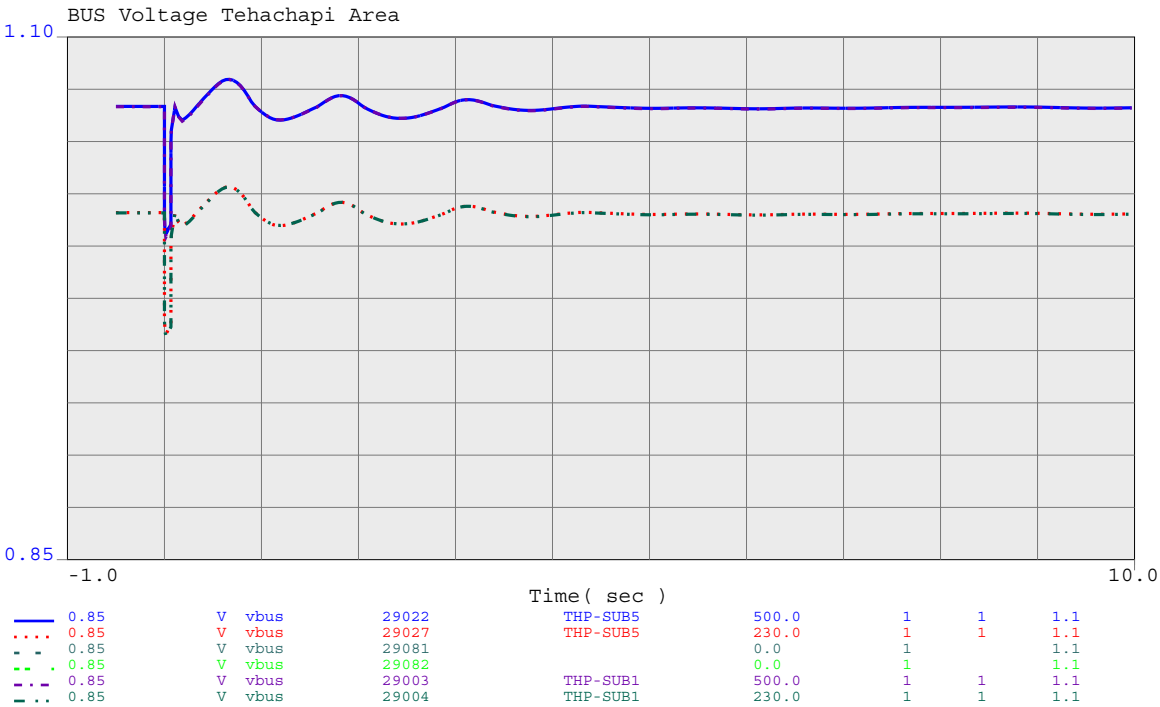

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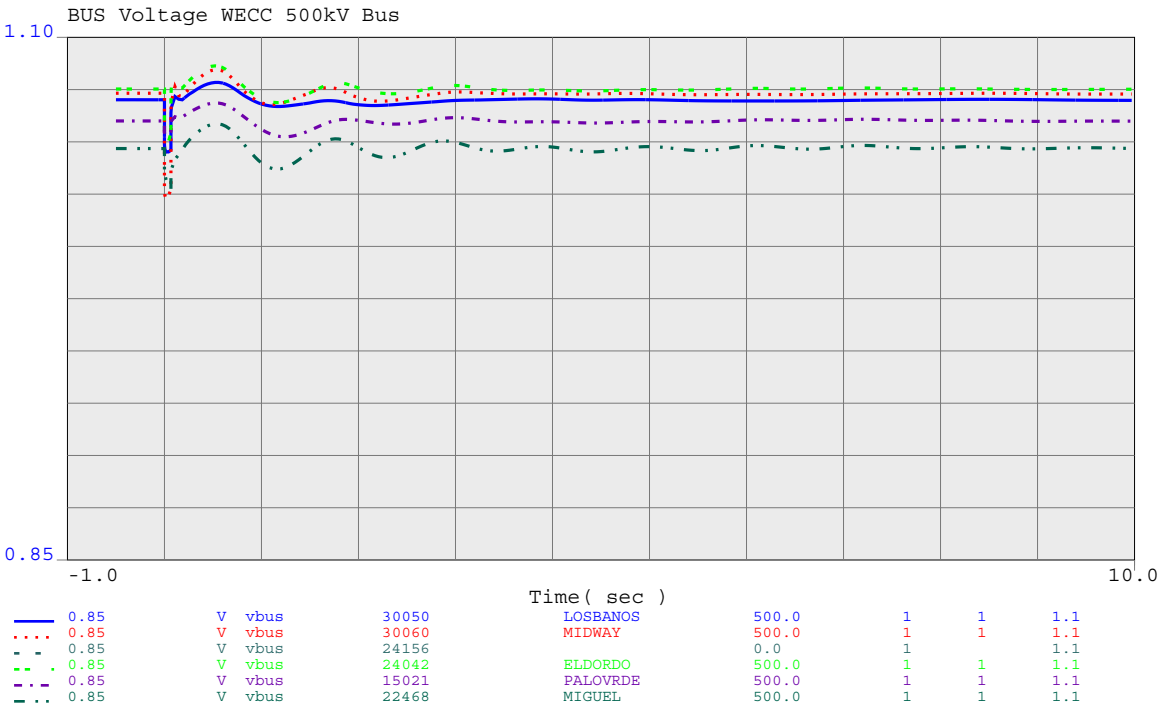

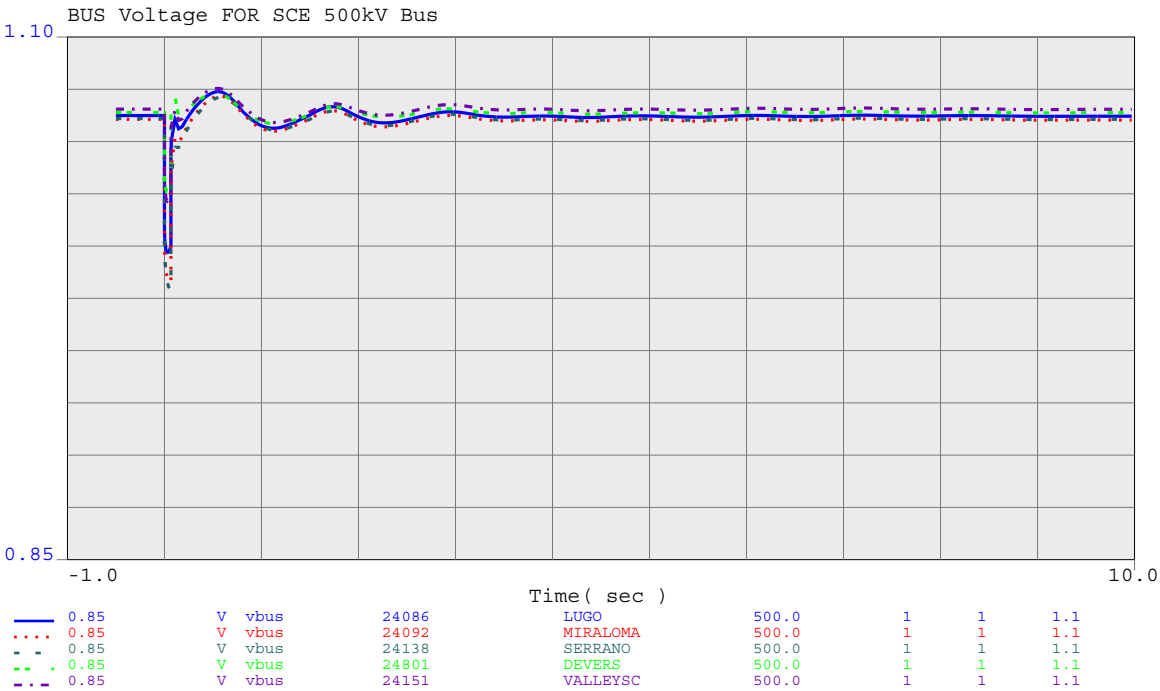

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

PRE PROJECT

2013 Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

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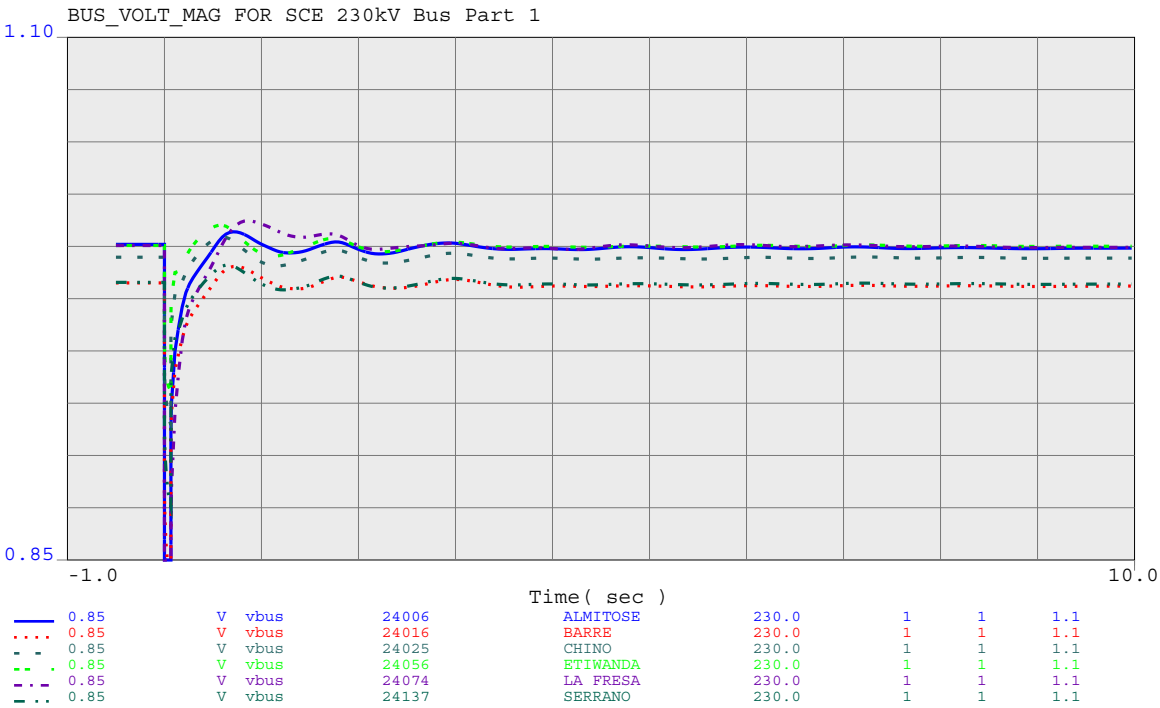

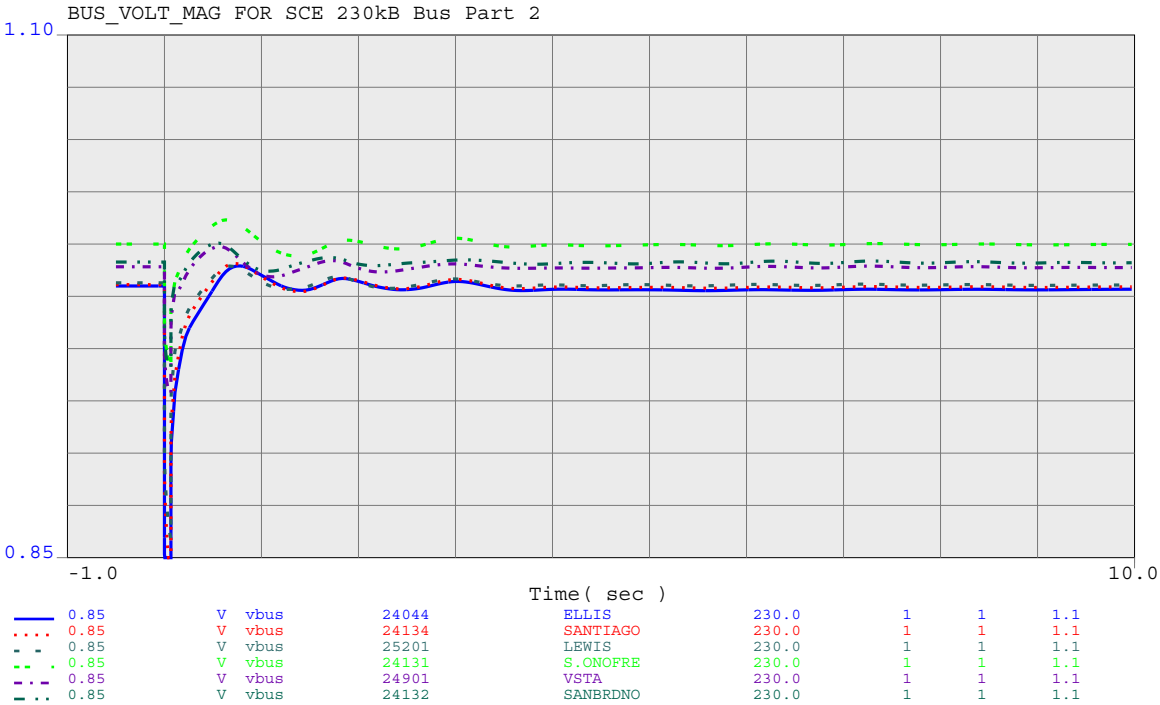

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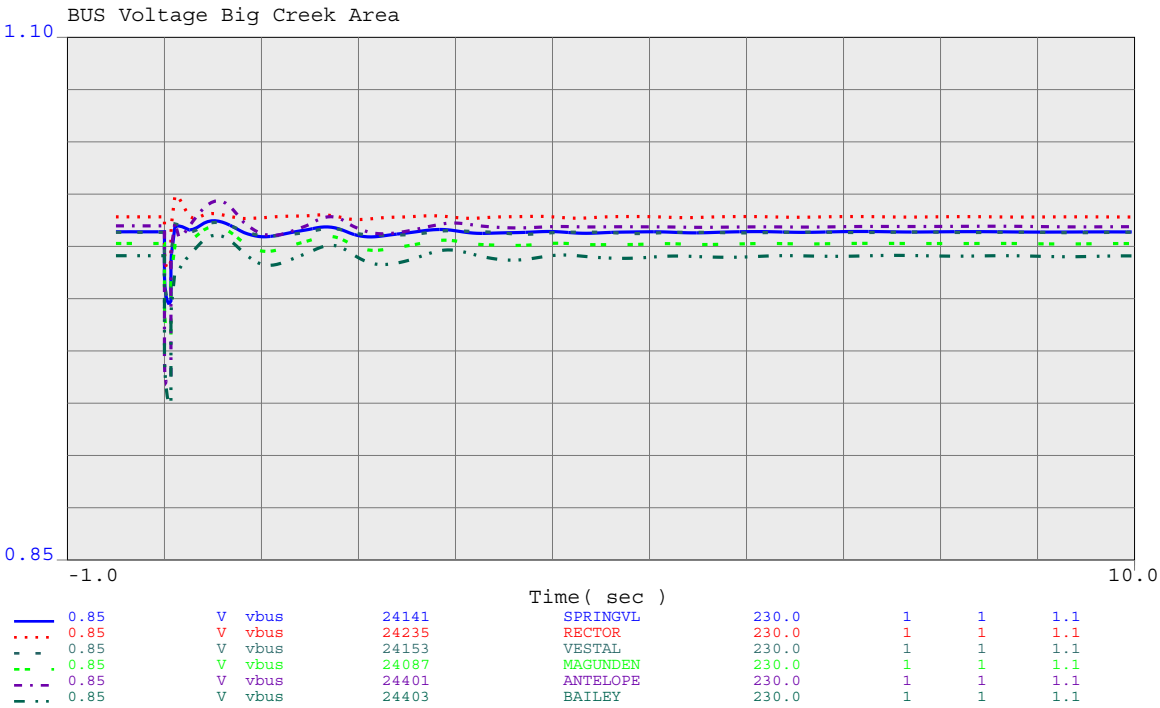

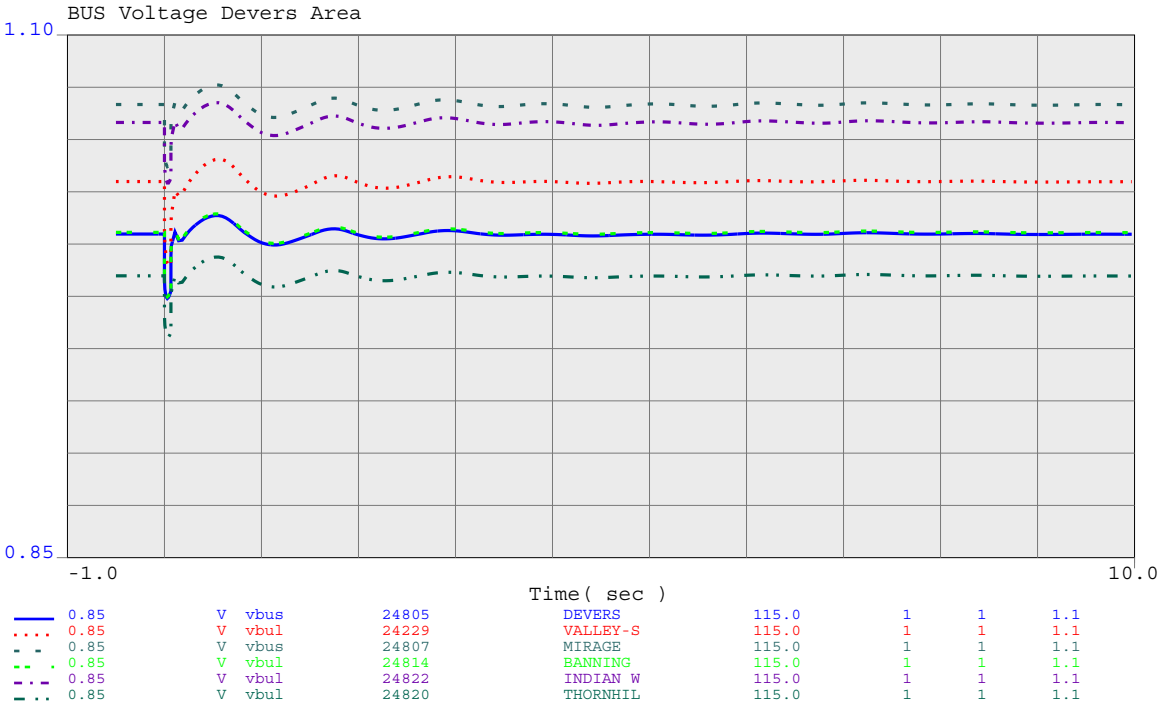

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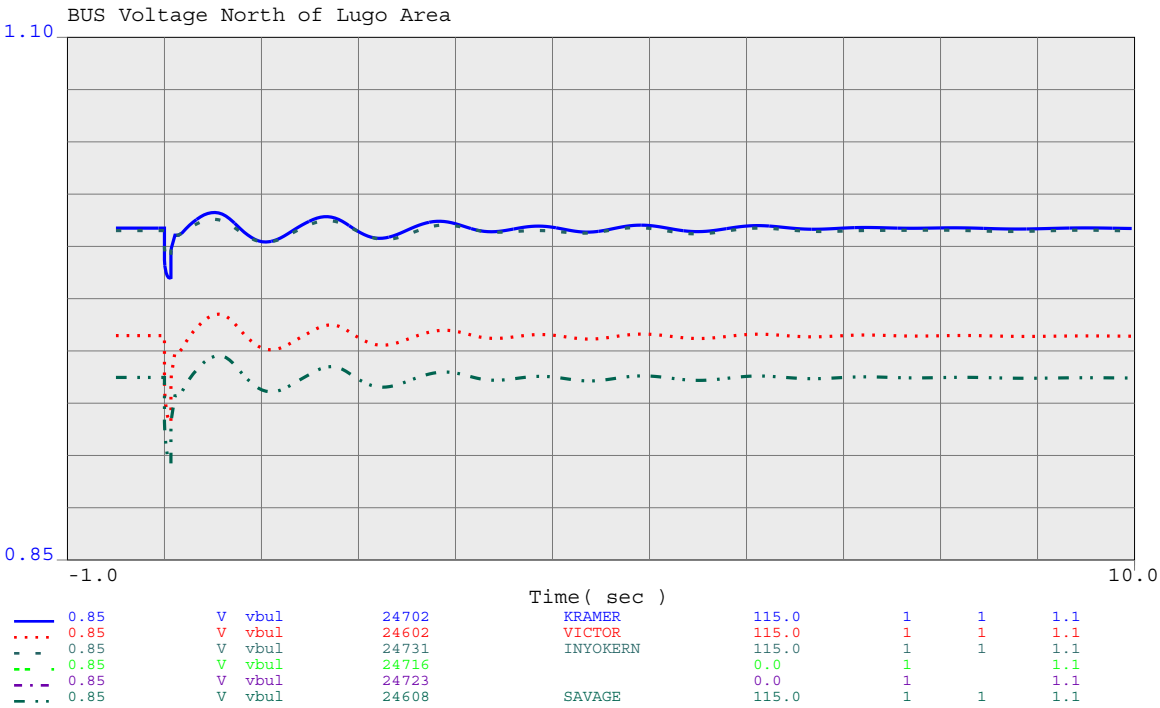

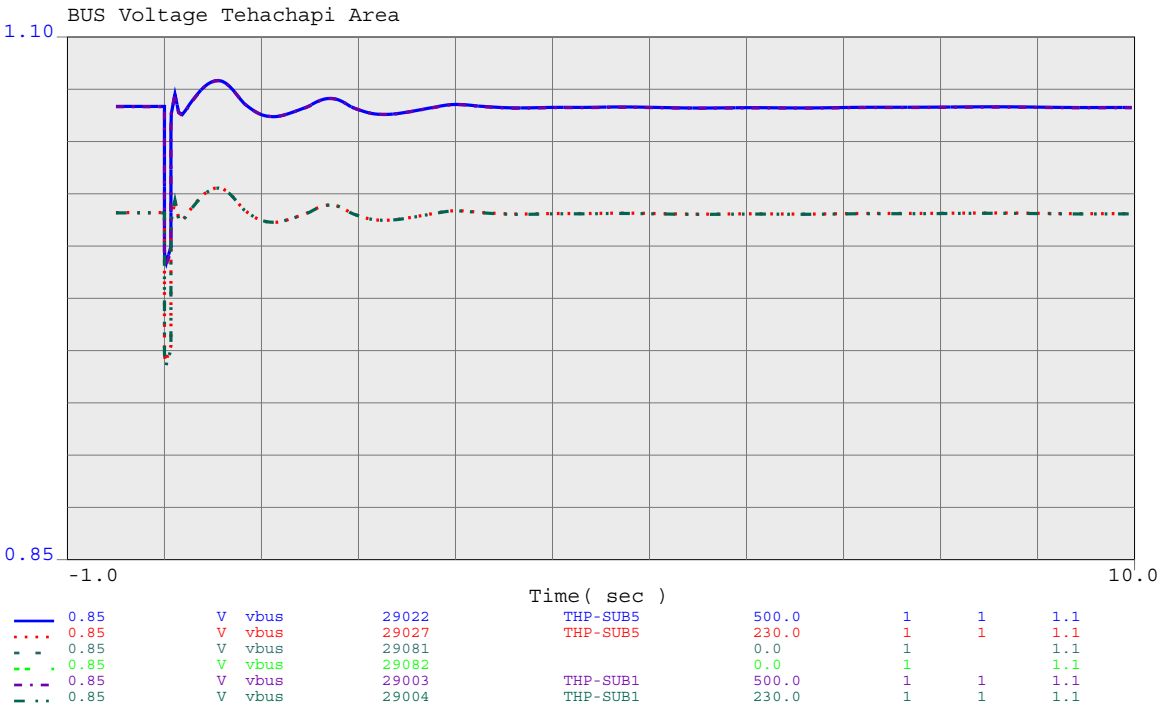

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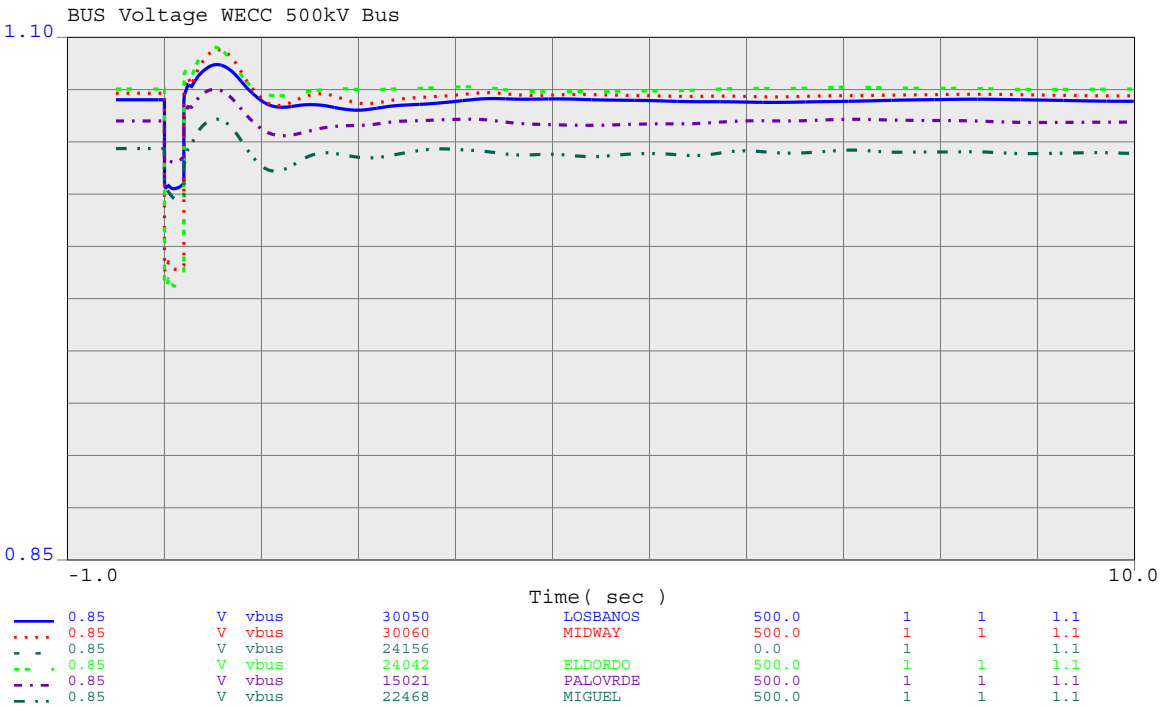
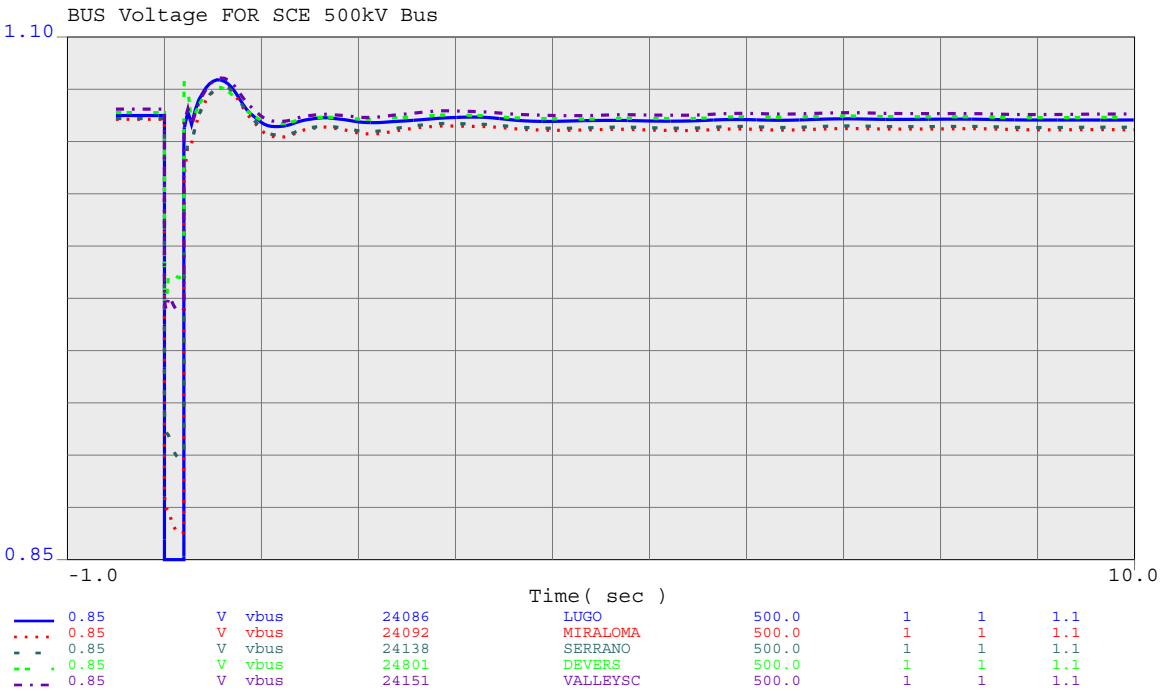




ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

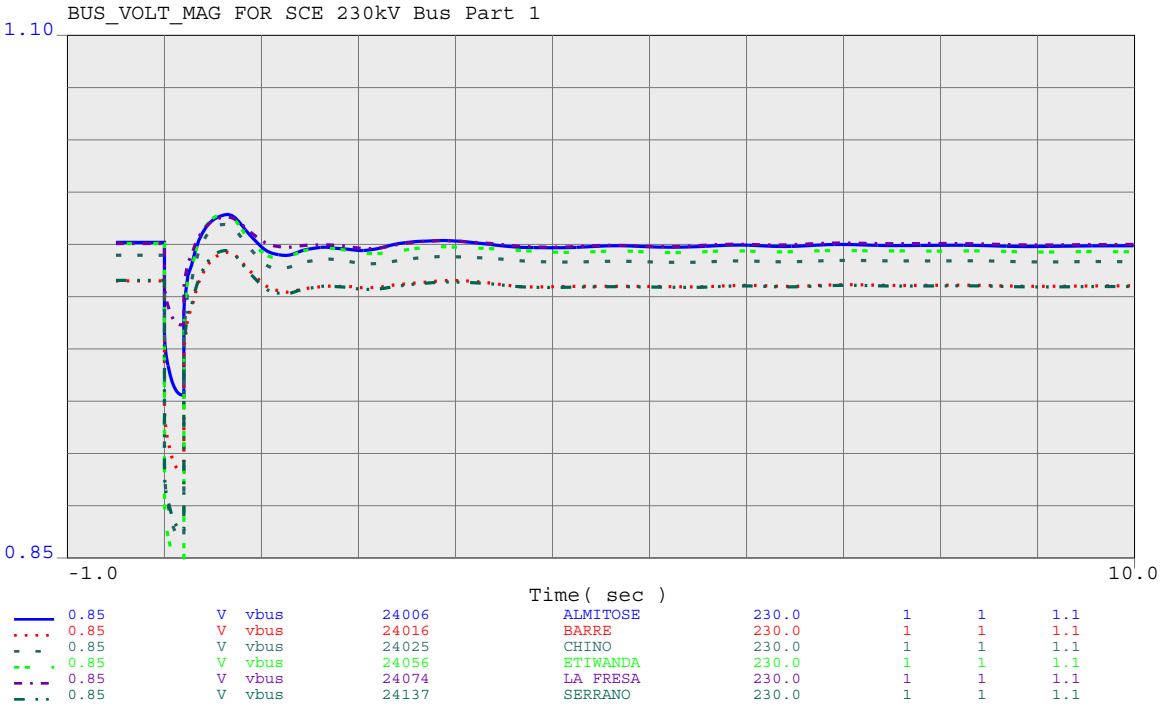
PRE PROJECT

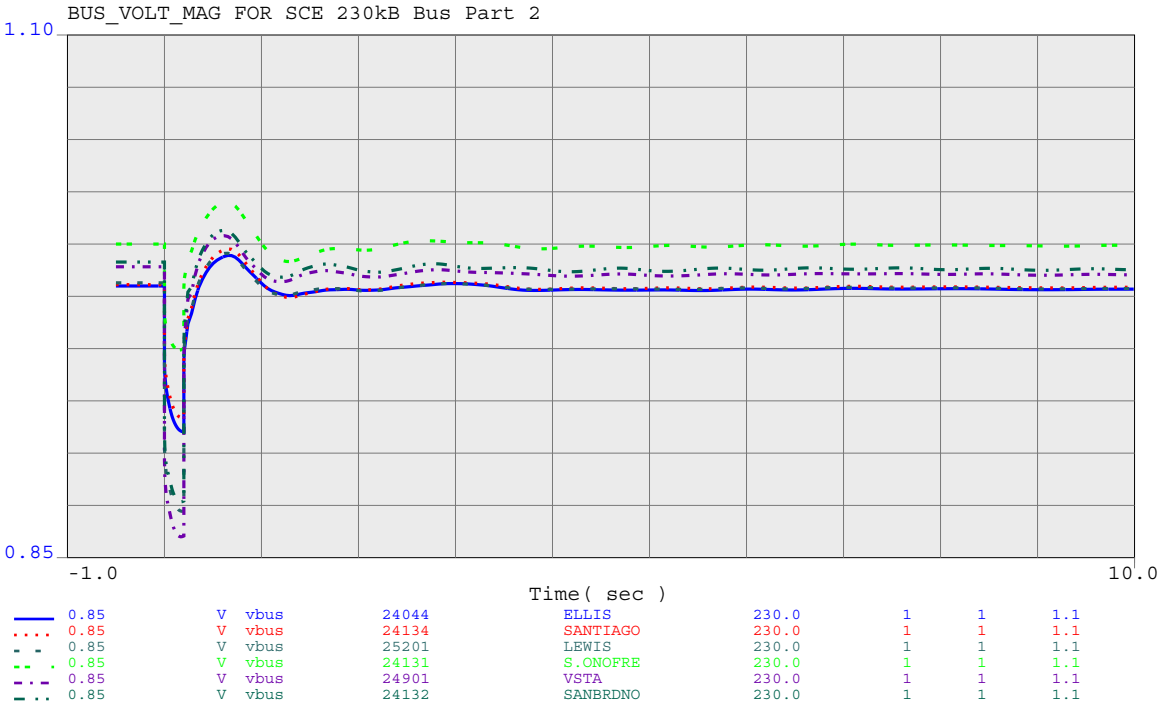
2013 Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





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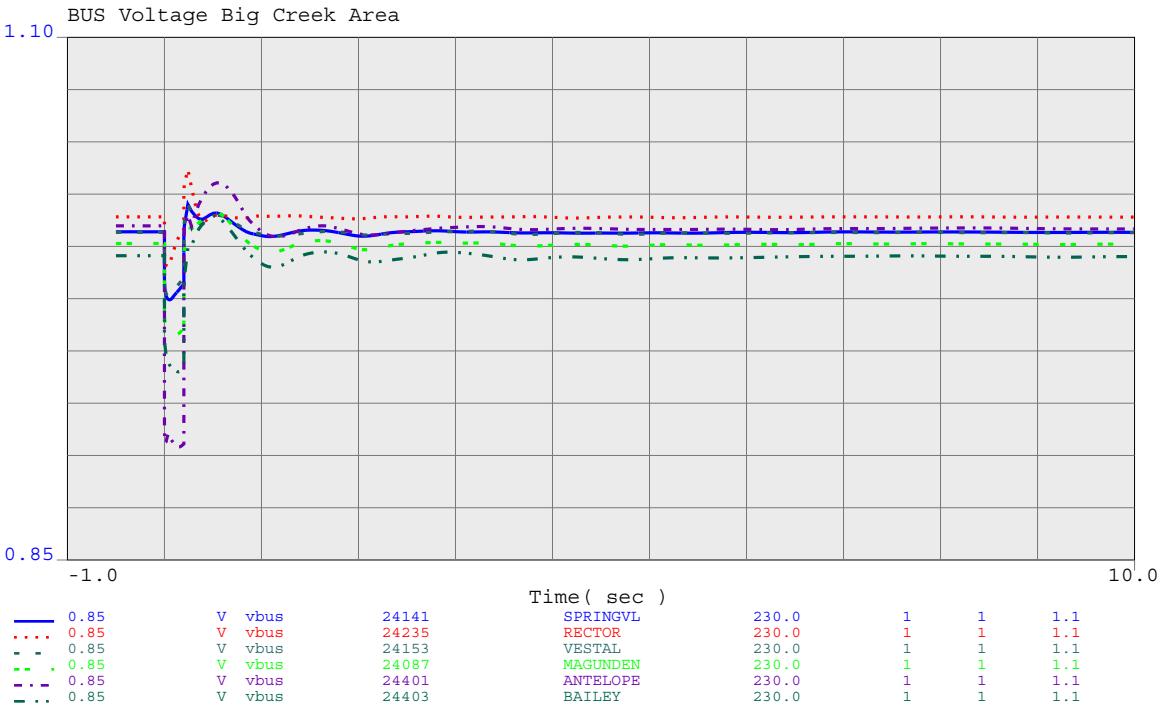

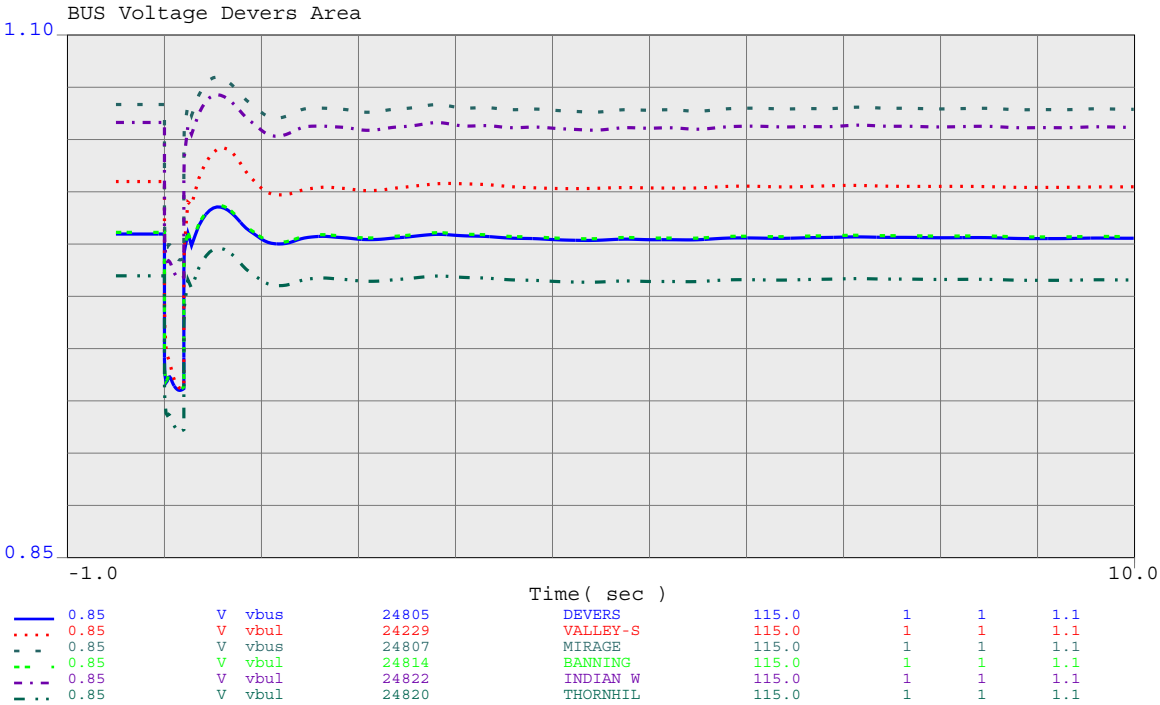

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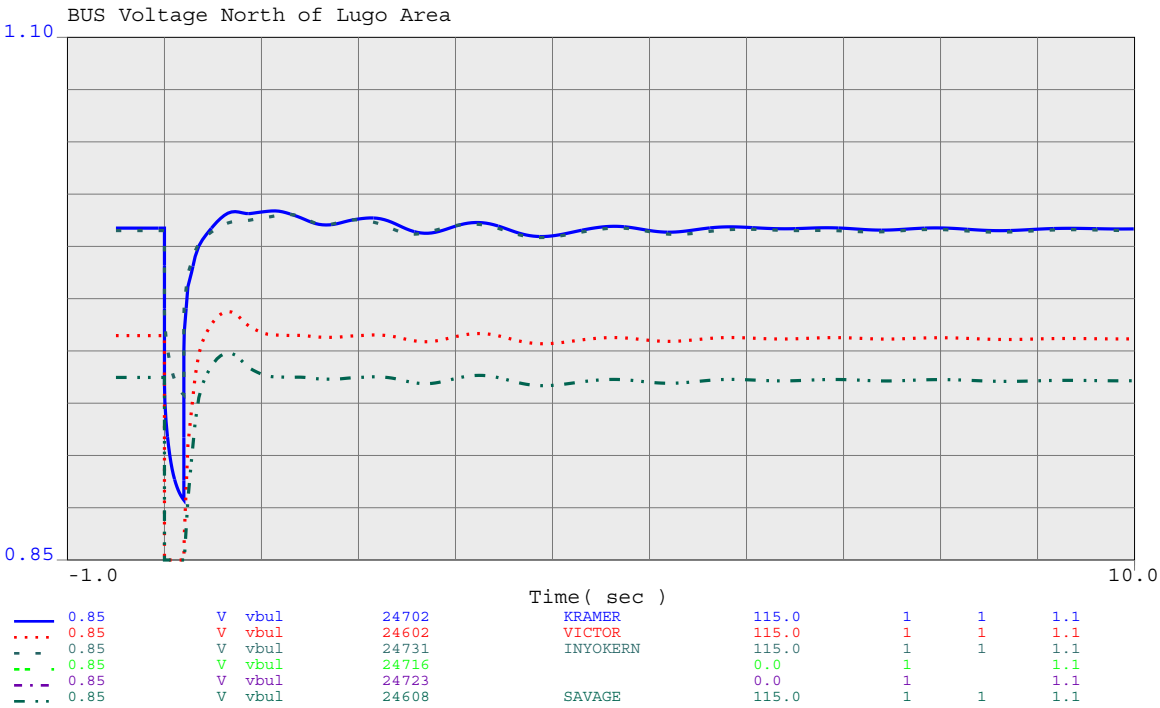

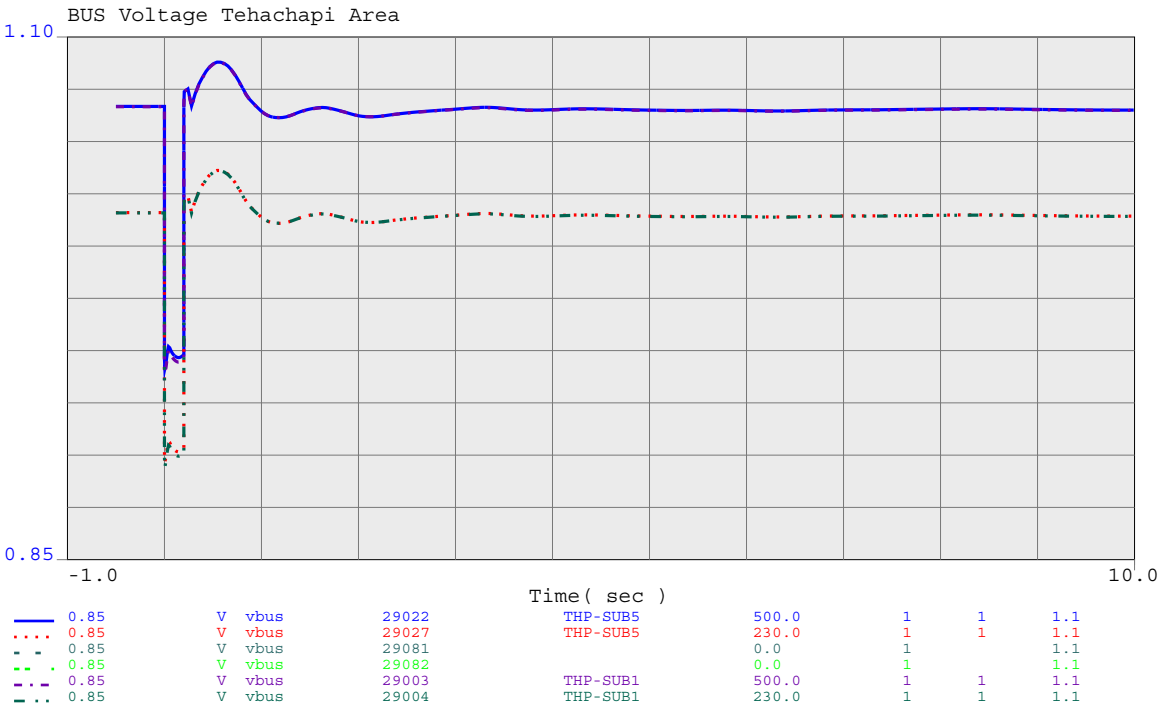

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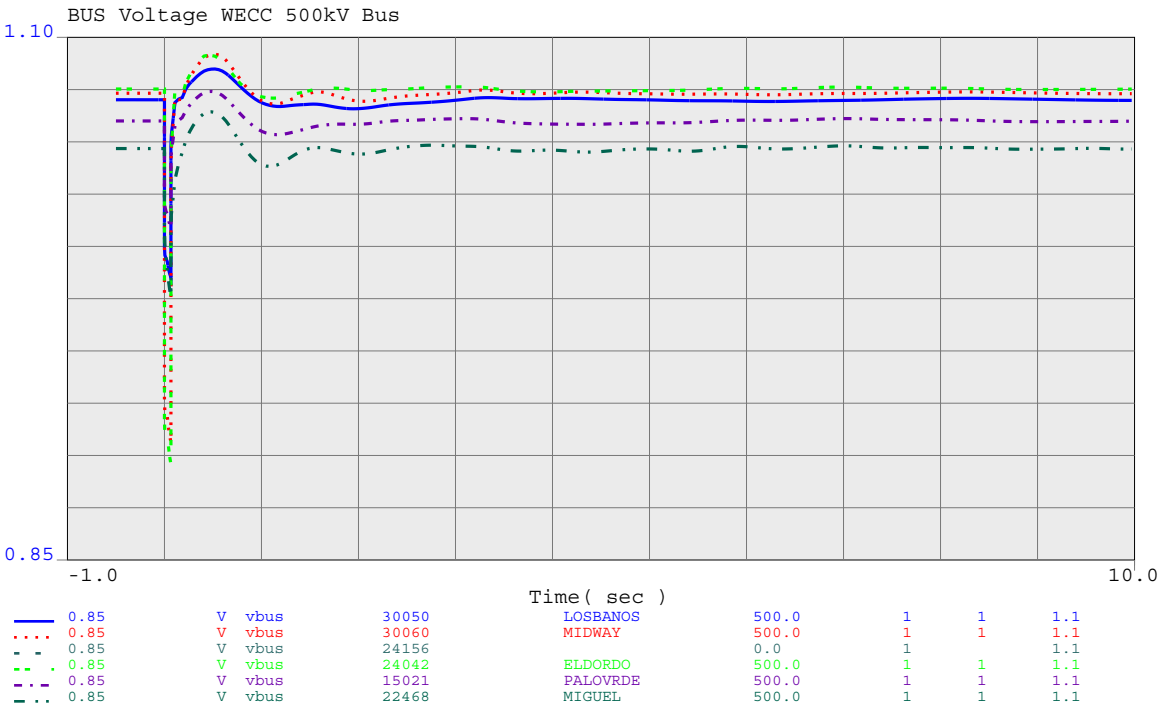
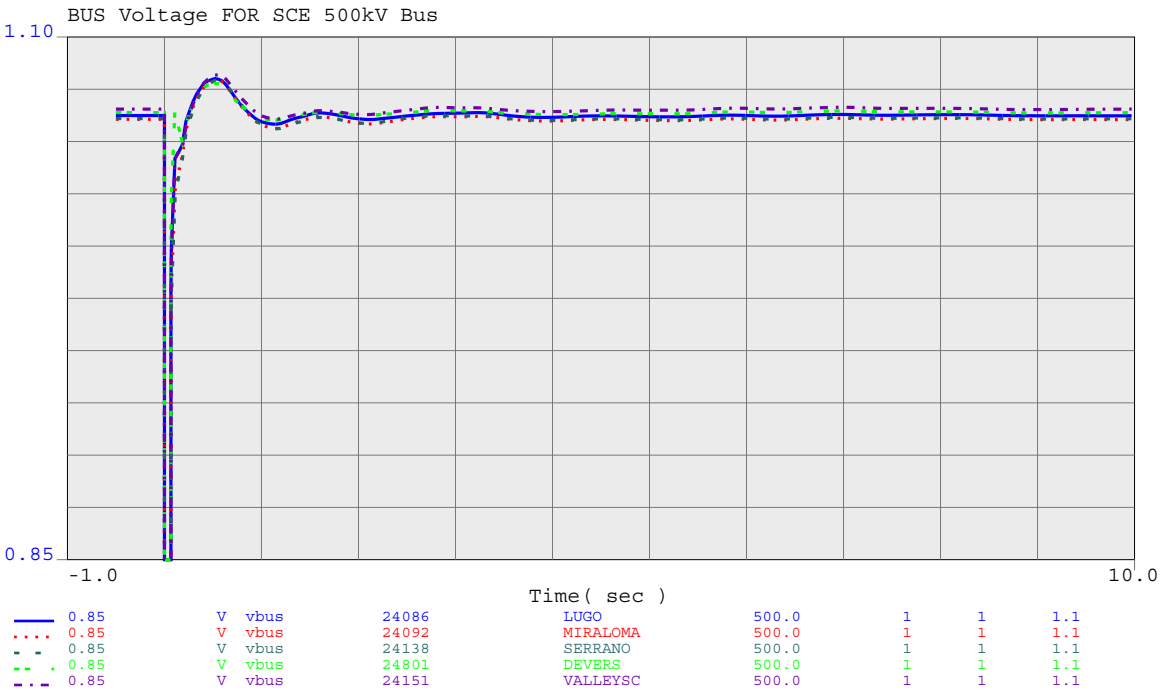
[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

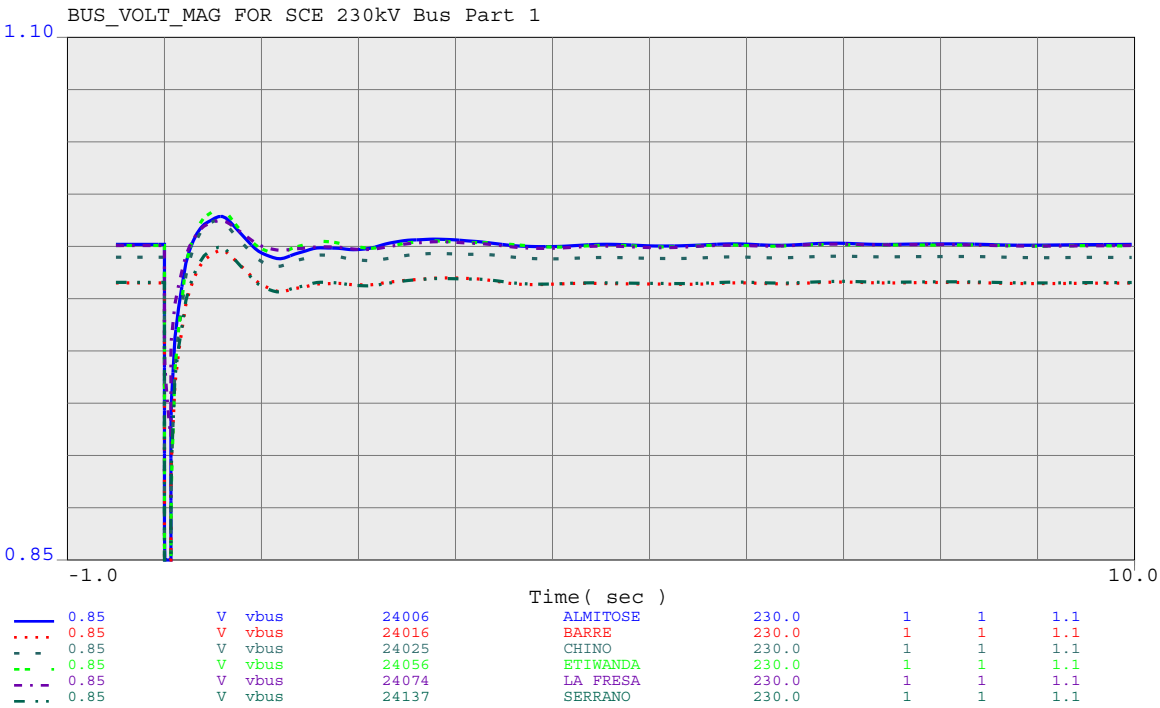
PRE PROJECT

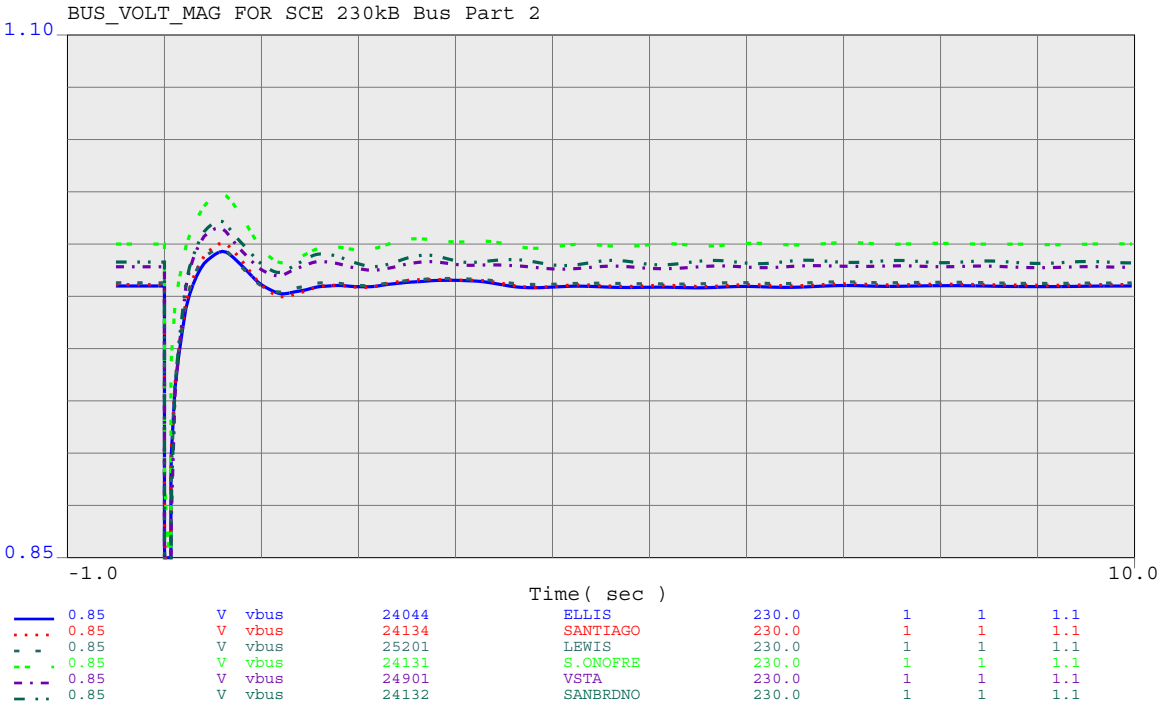
2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

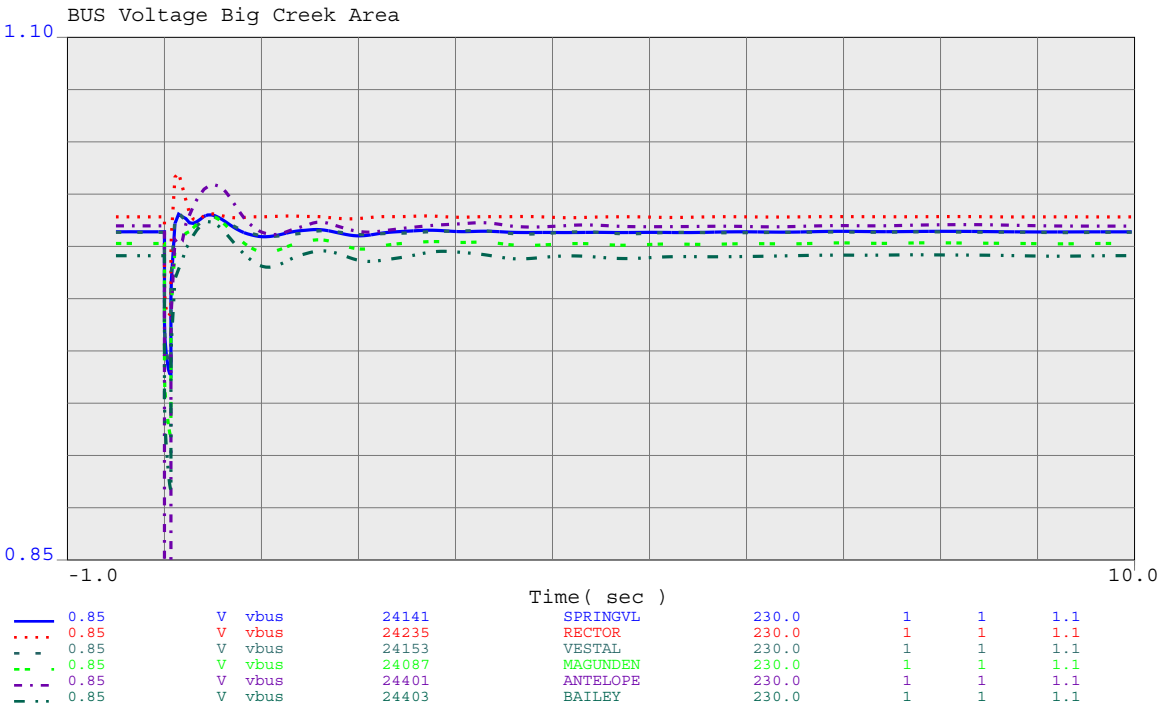
PRE PROJECT

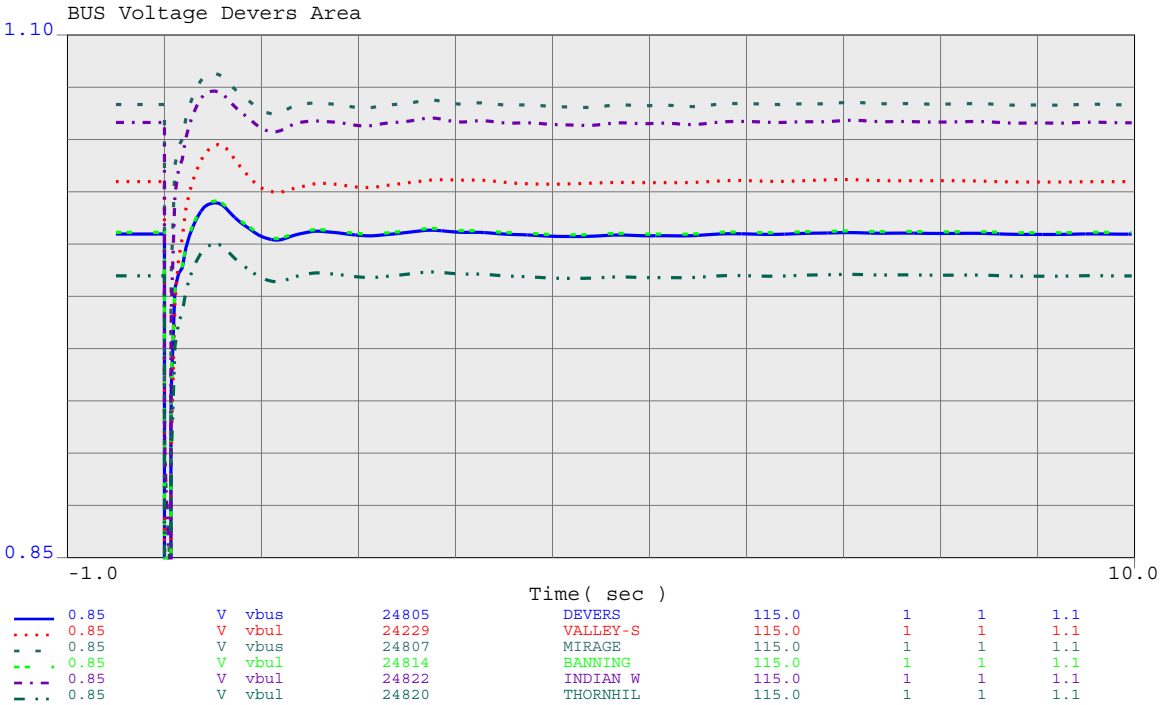
2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

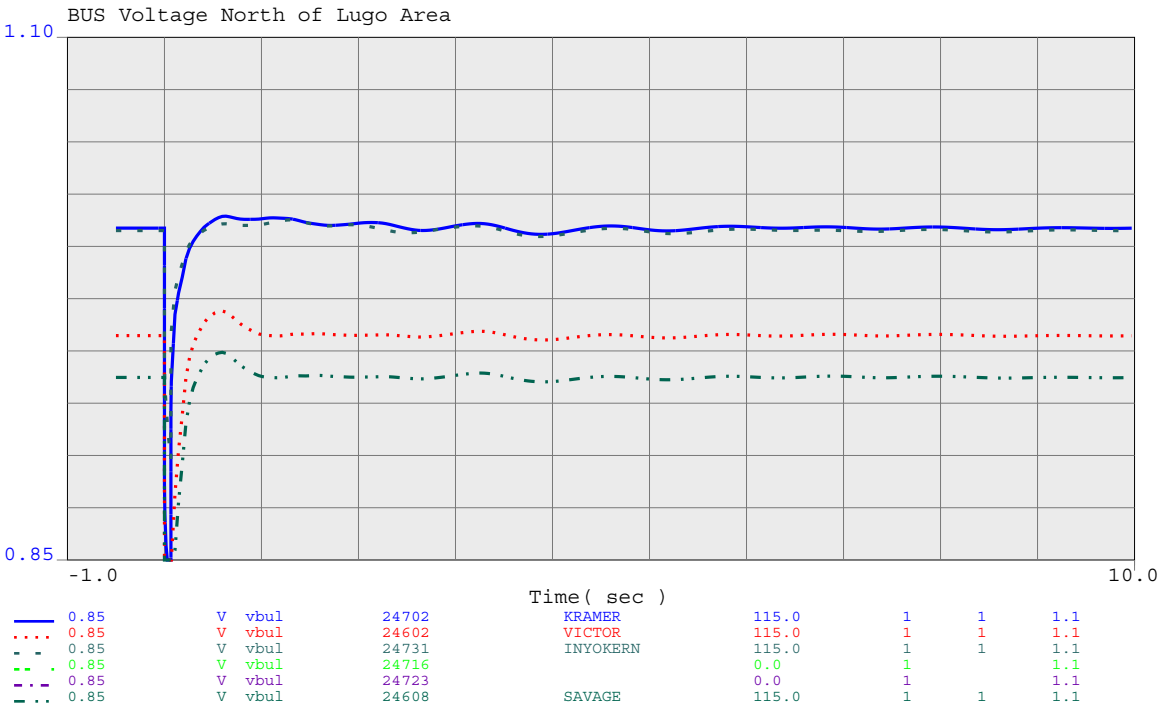
PRE PROJECT

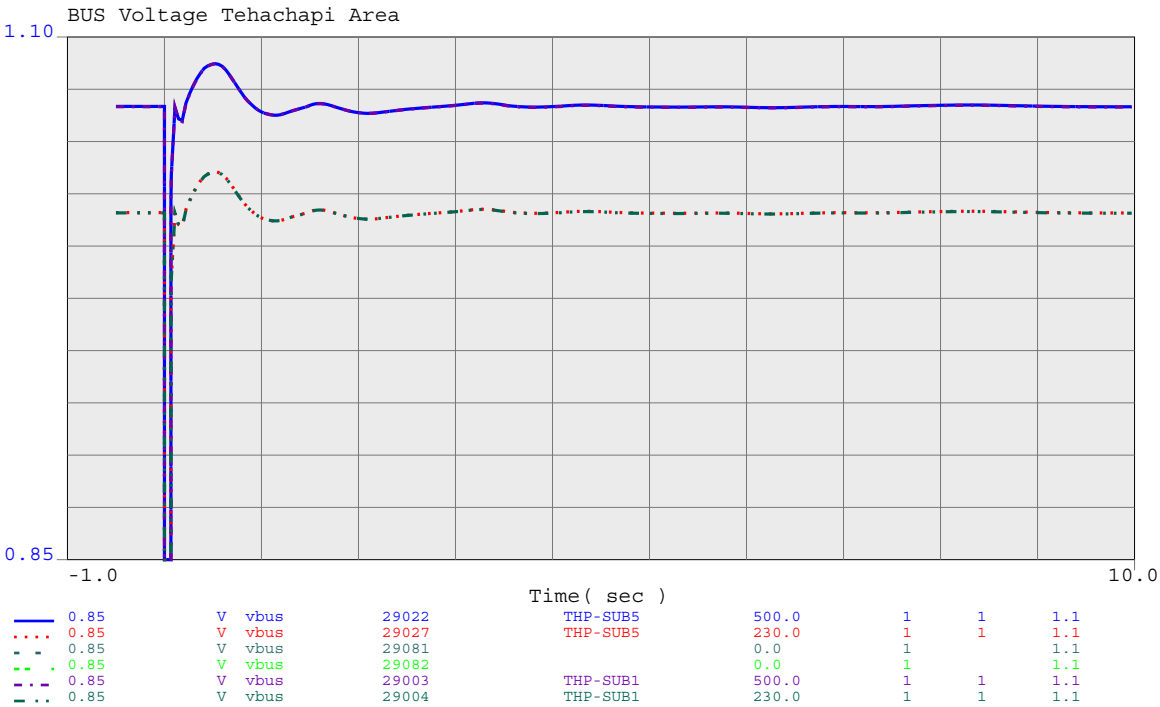
2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

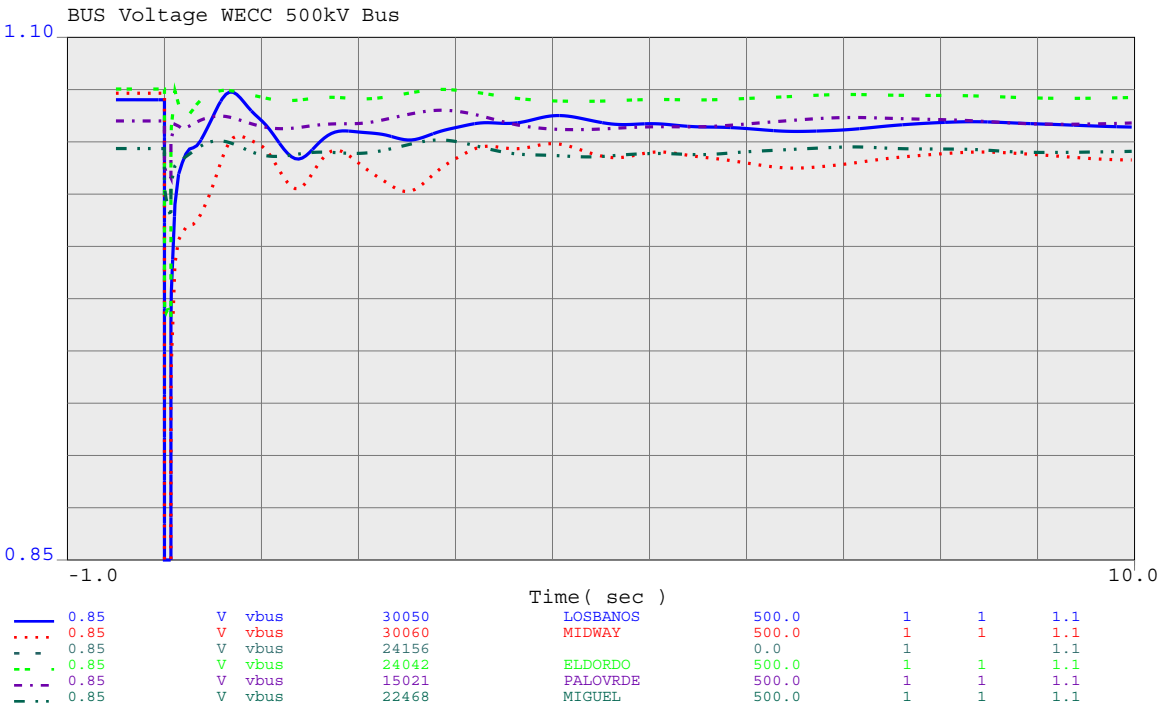
PRE PROJECT

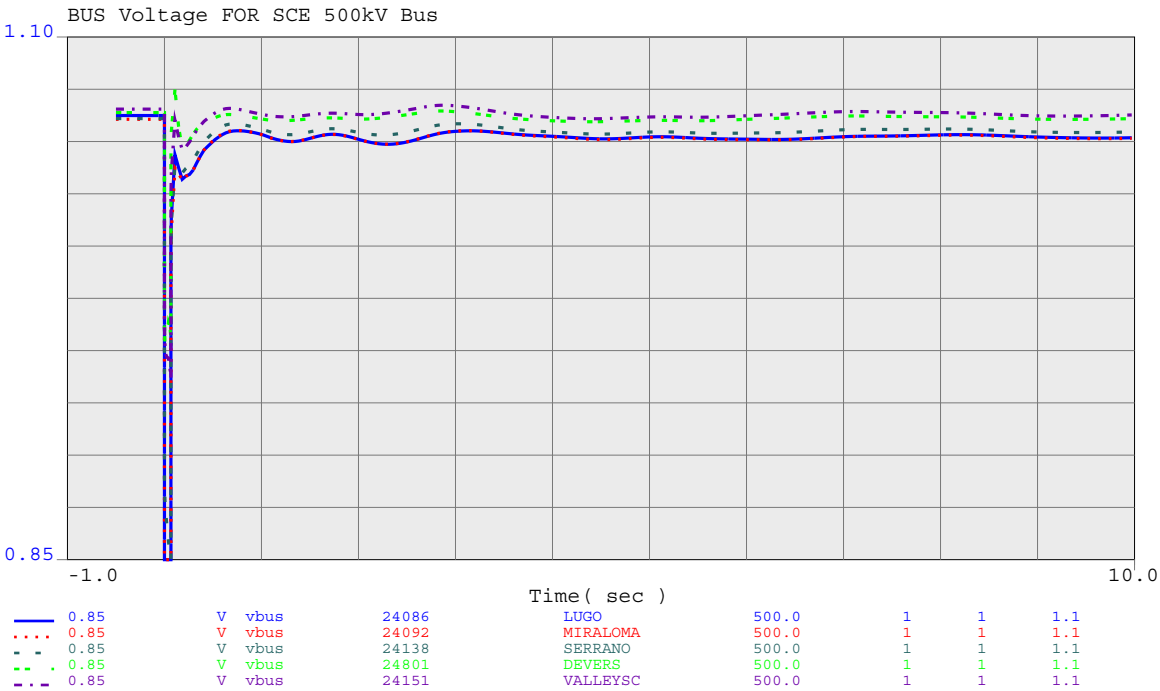
2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

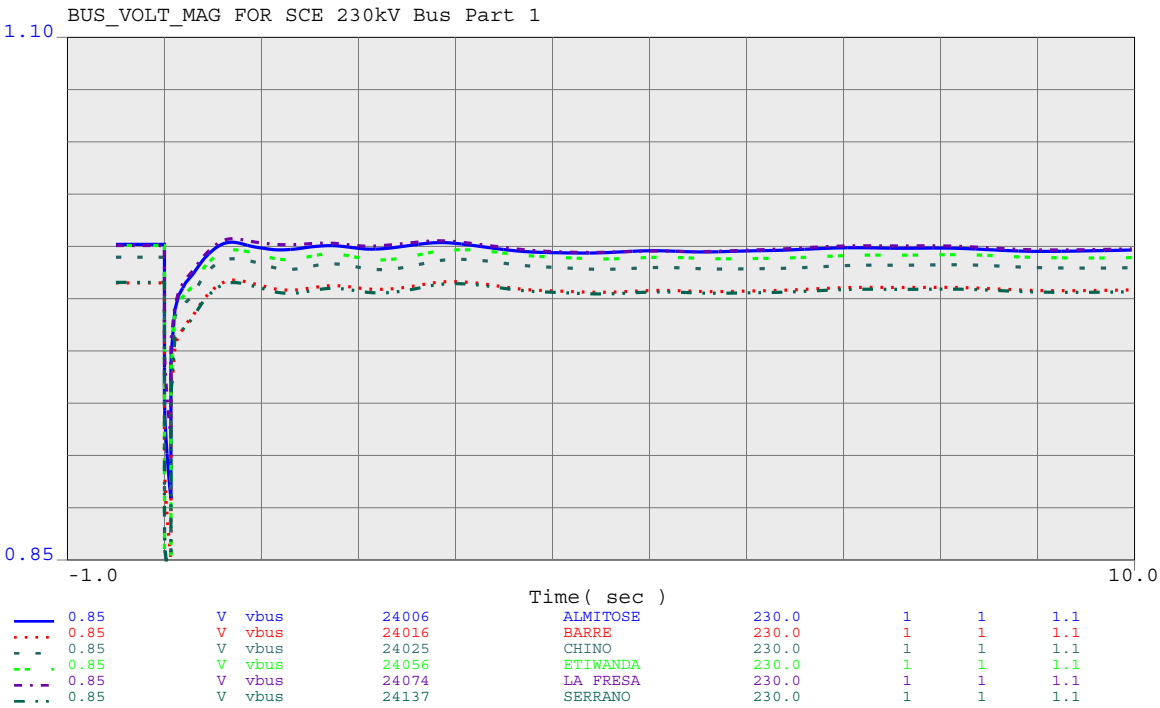
PRE PROJECT

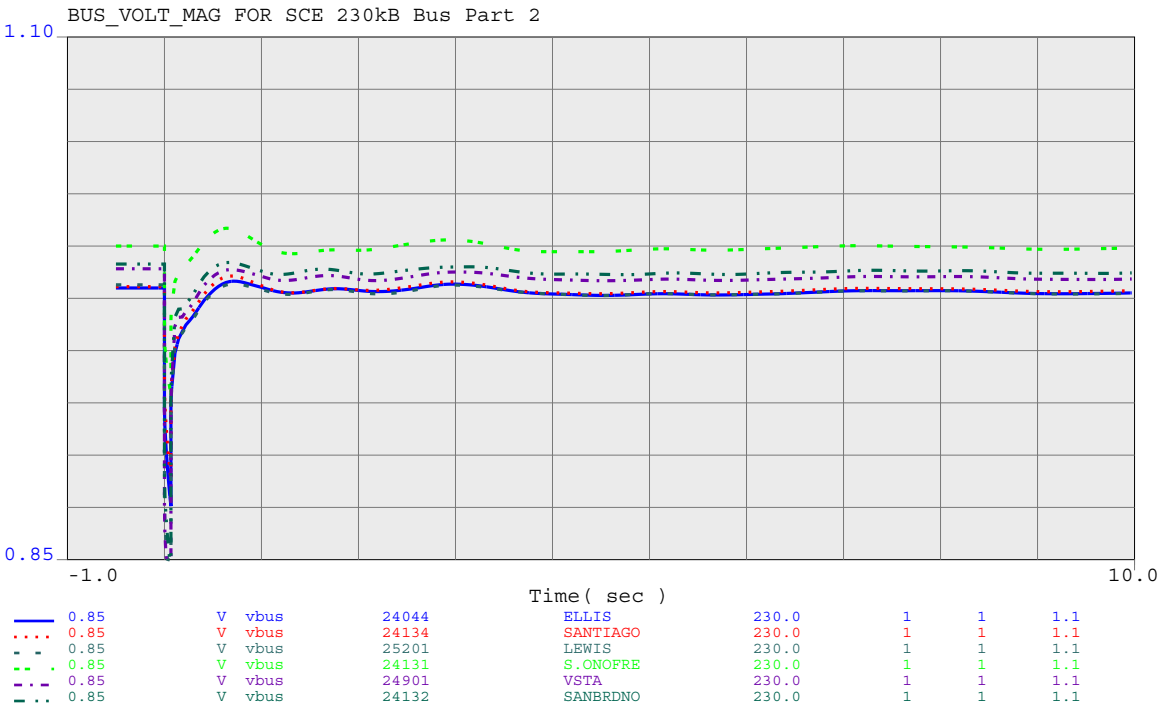
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

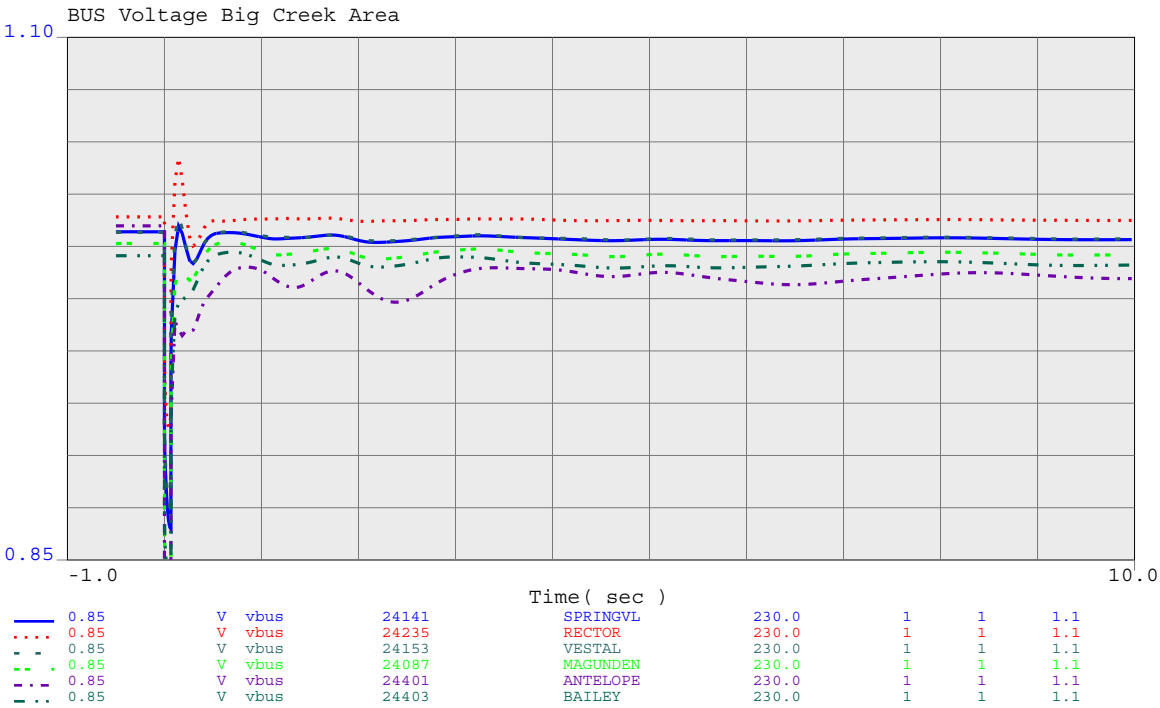
PRE PROJECT

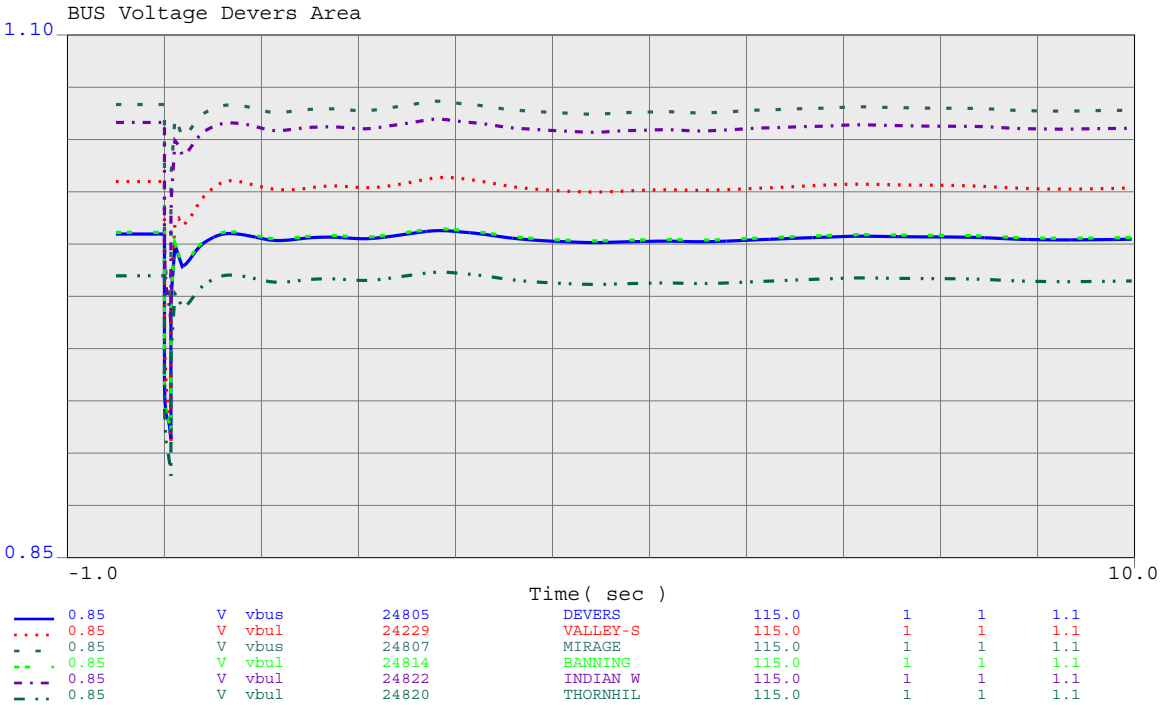
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

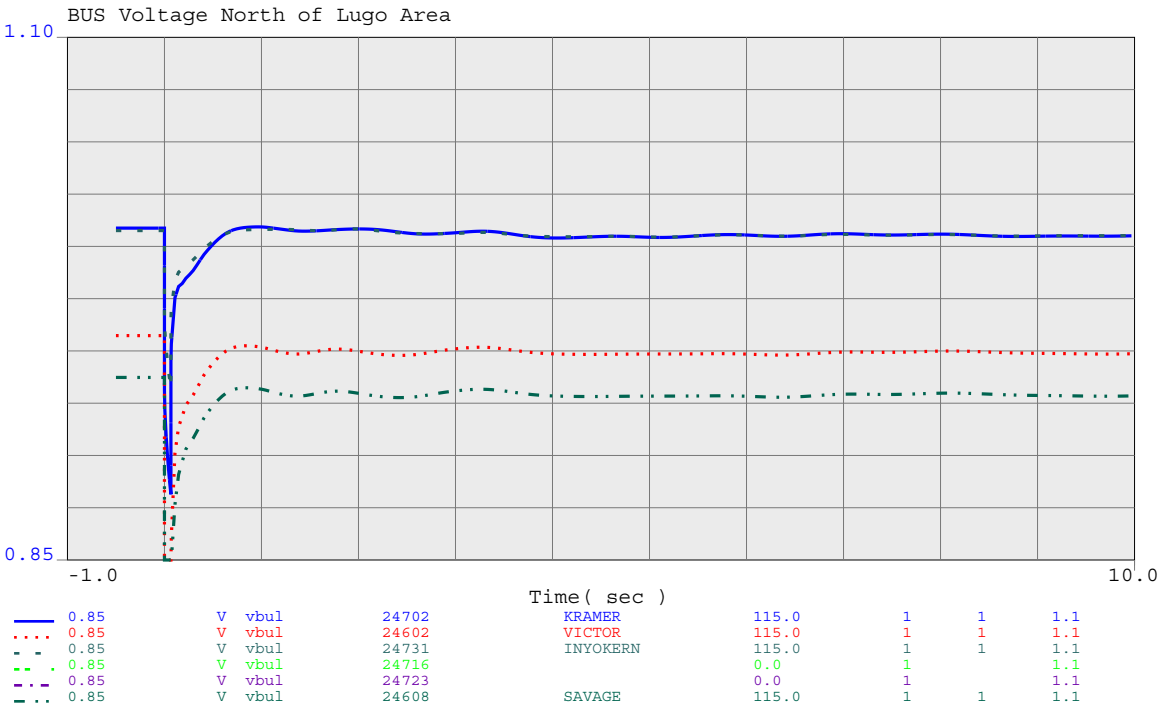
PRE PROJECT

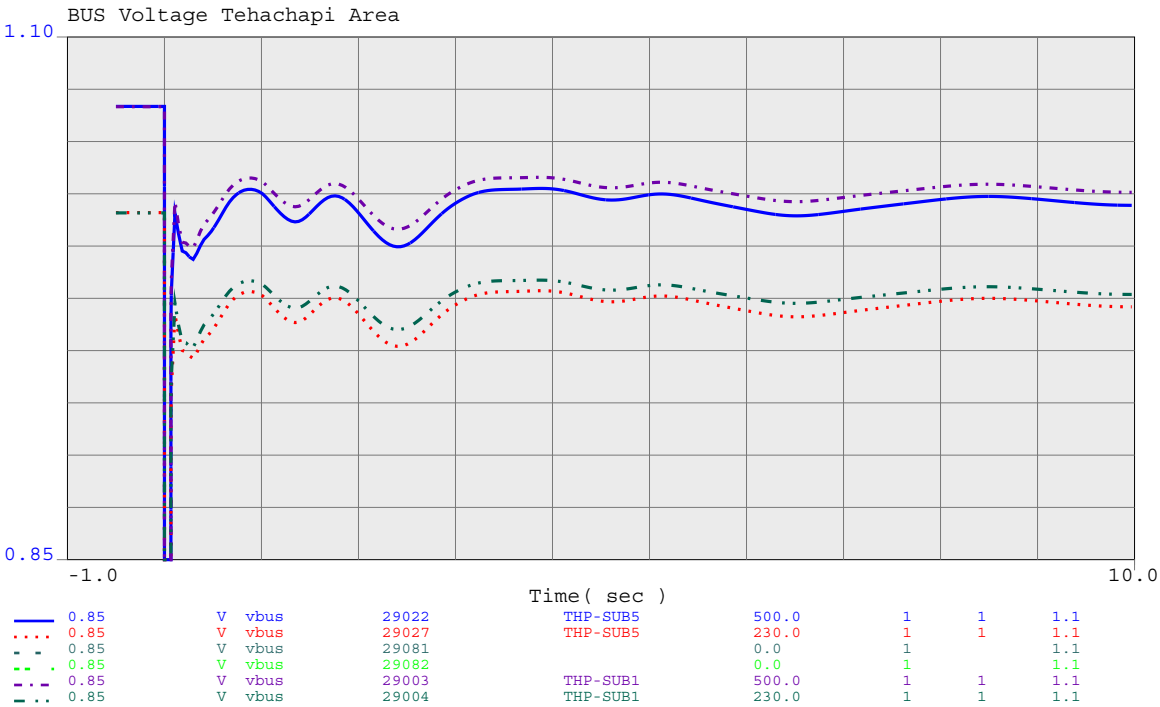
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

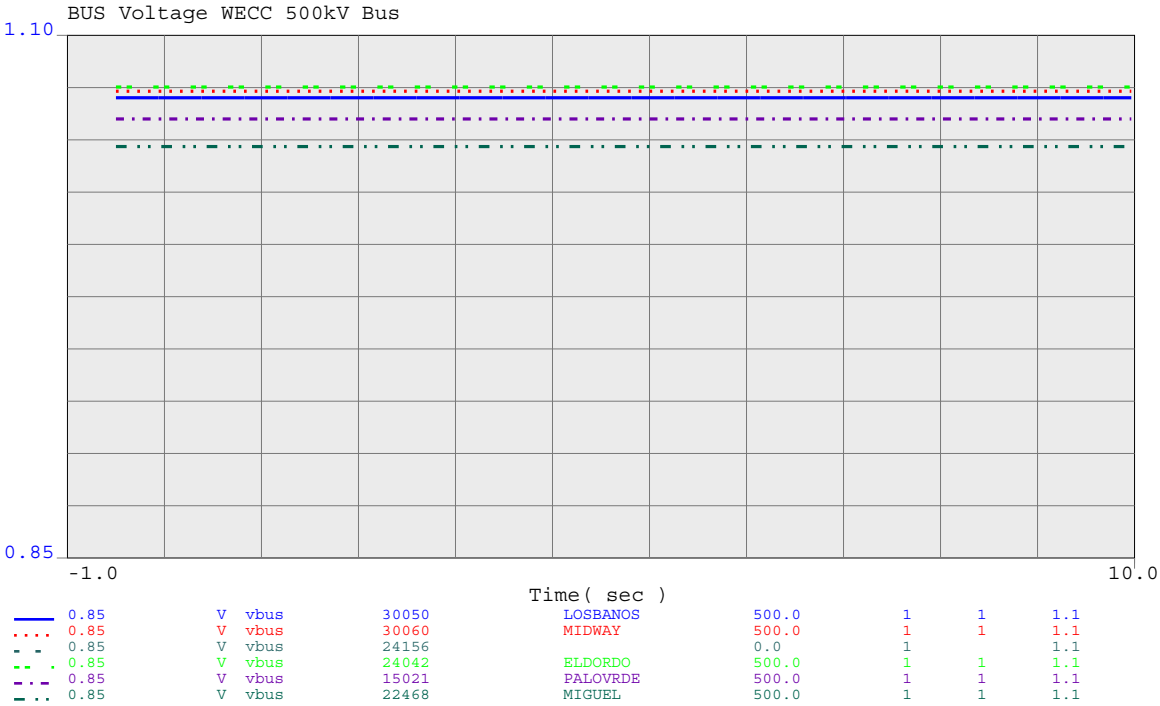
PRE PROJECT

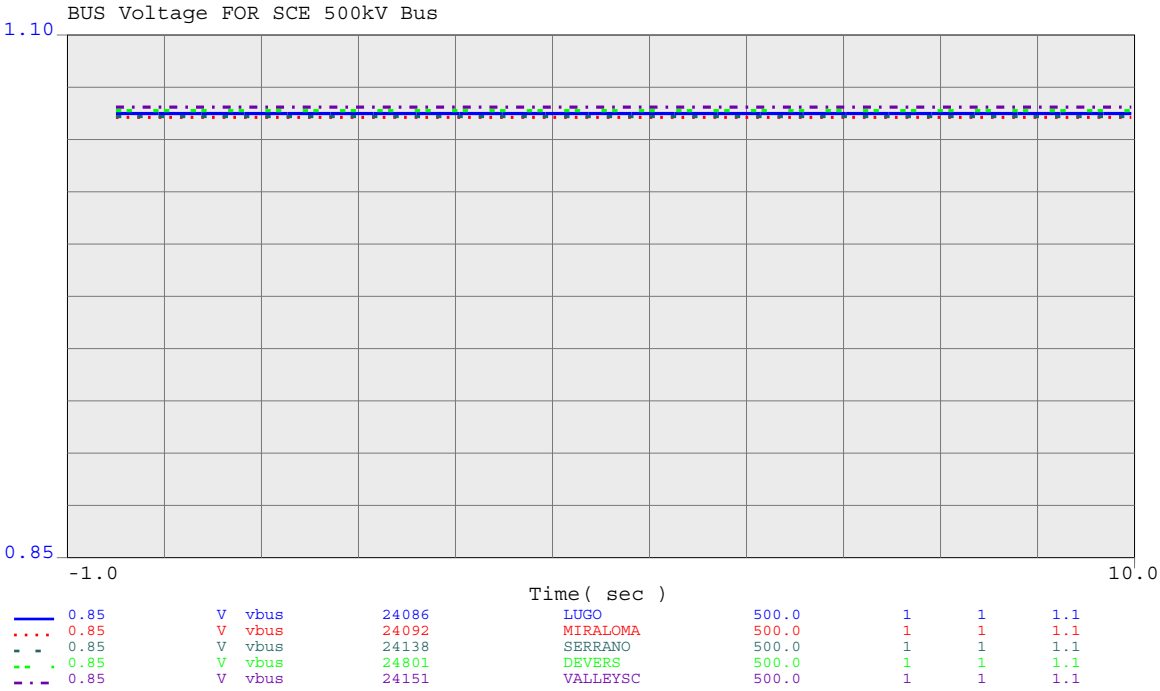
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

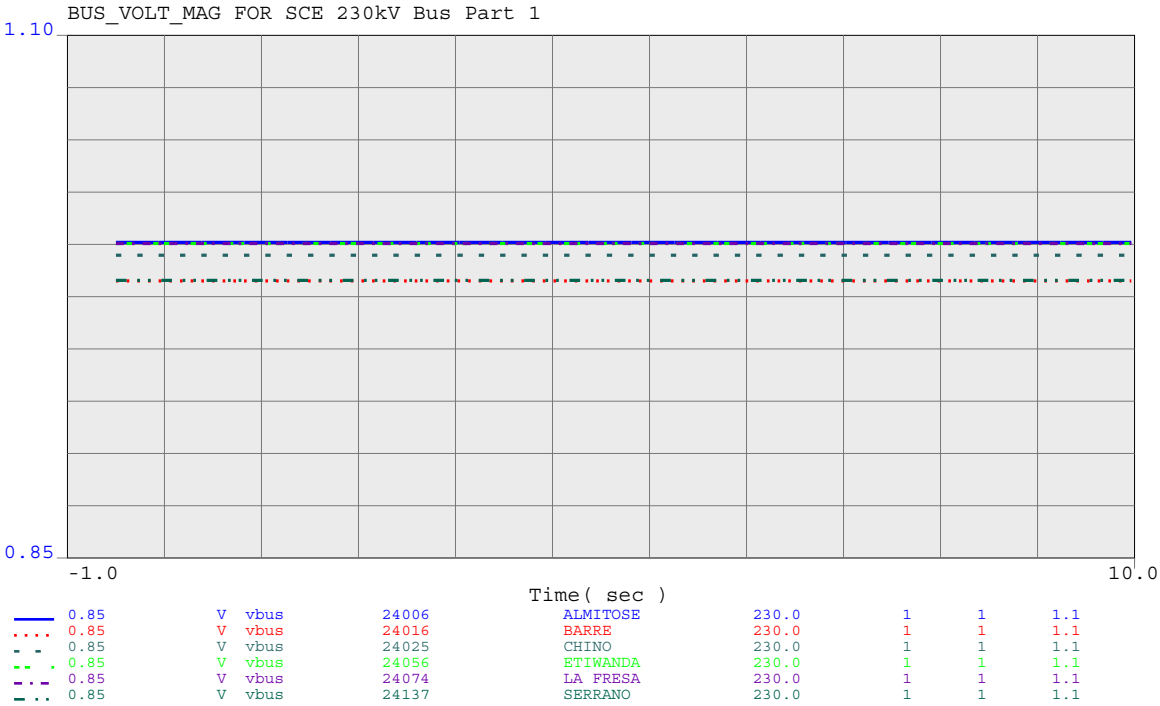
PRE PROJECT

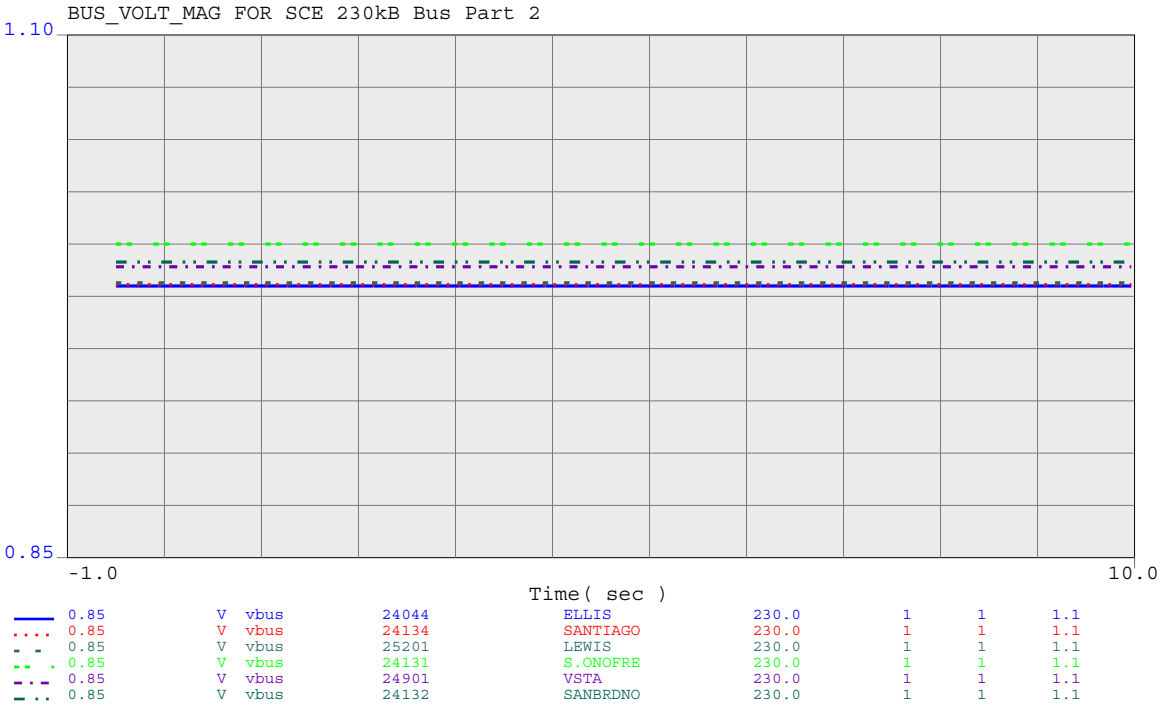
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

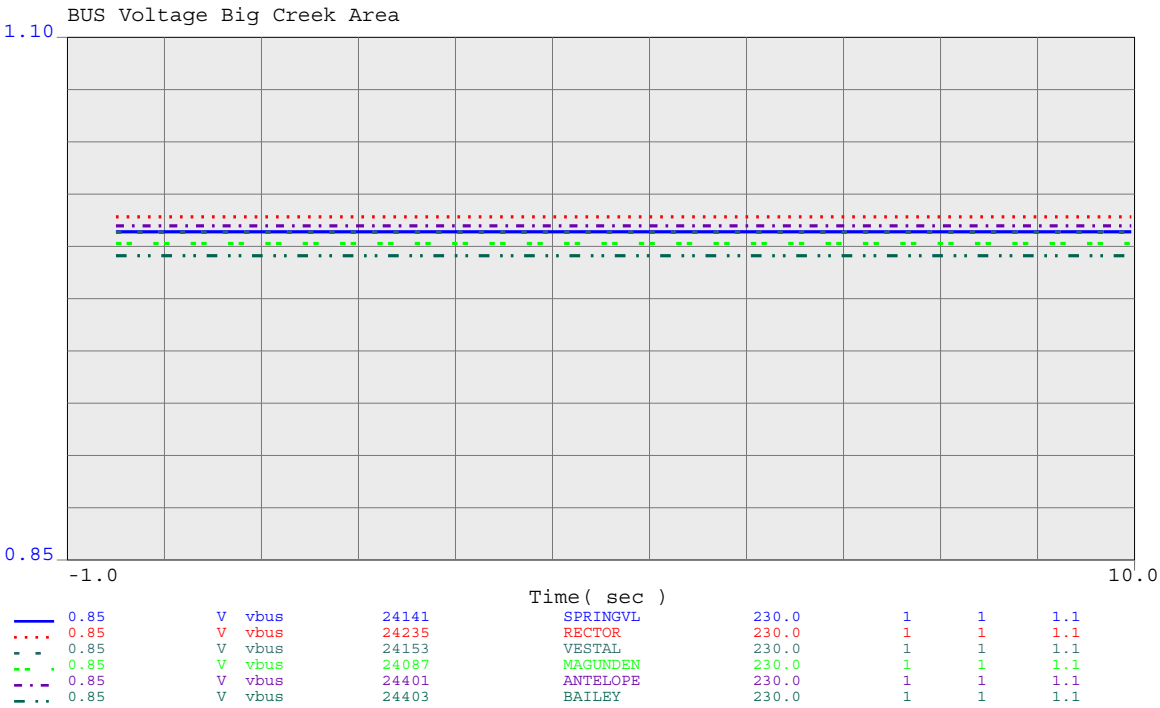
PRE PROJECT

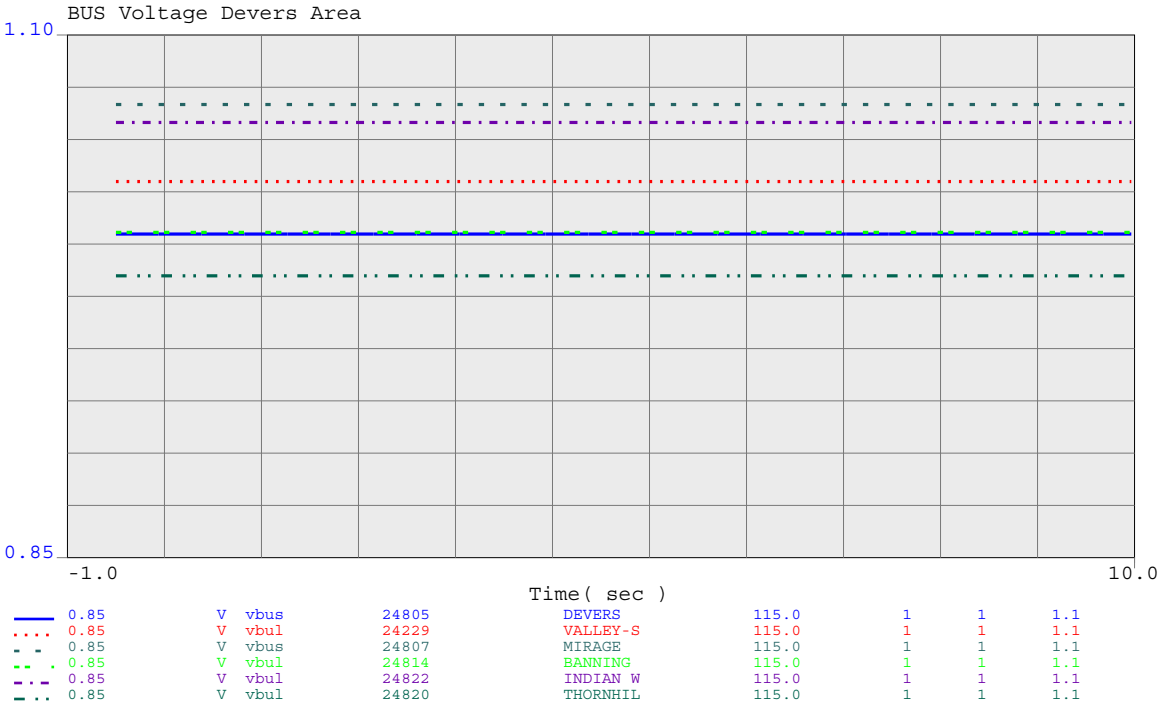
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

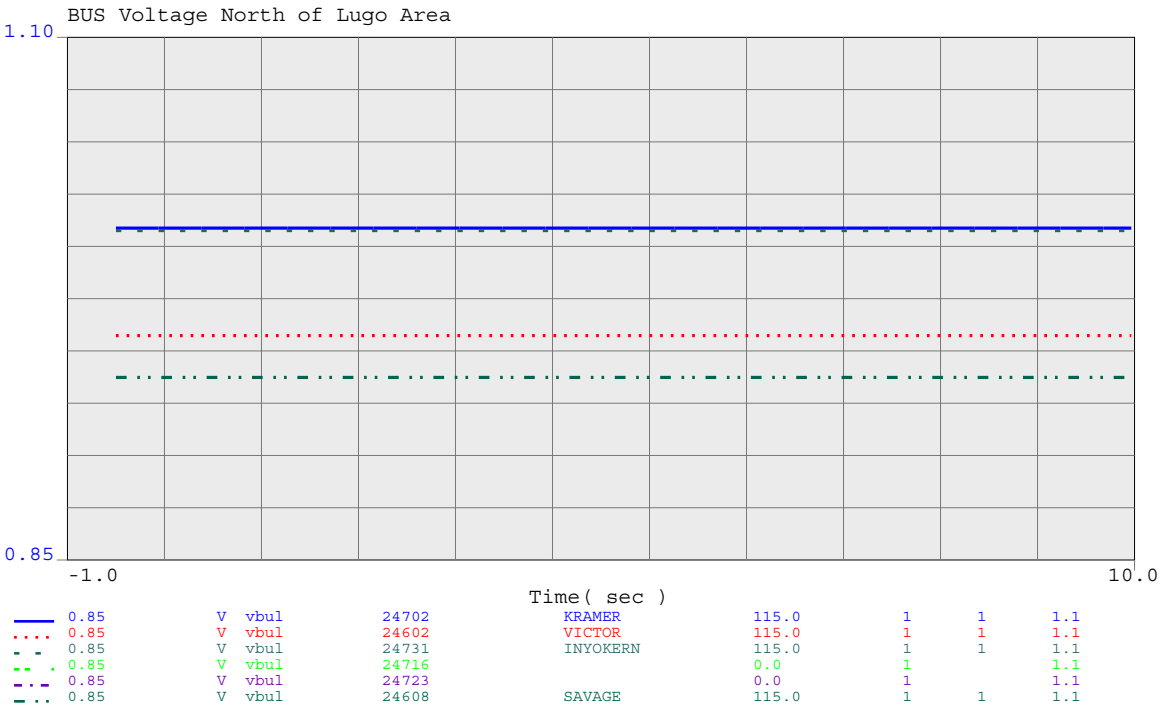
PRE PROJECT

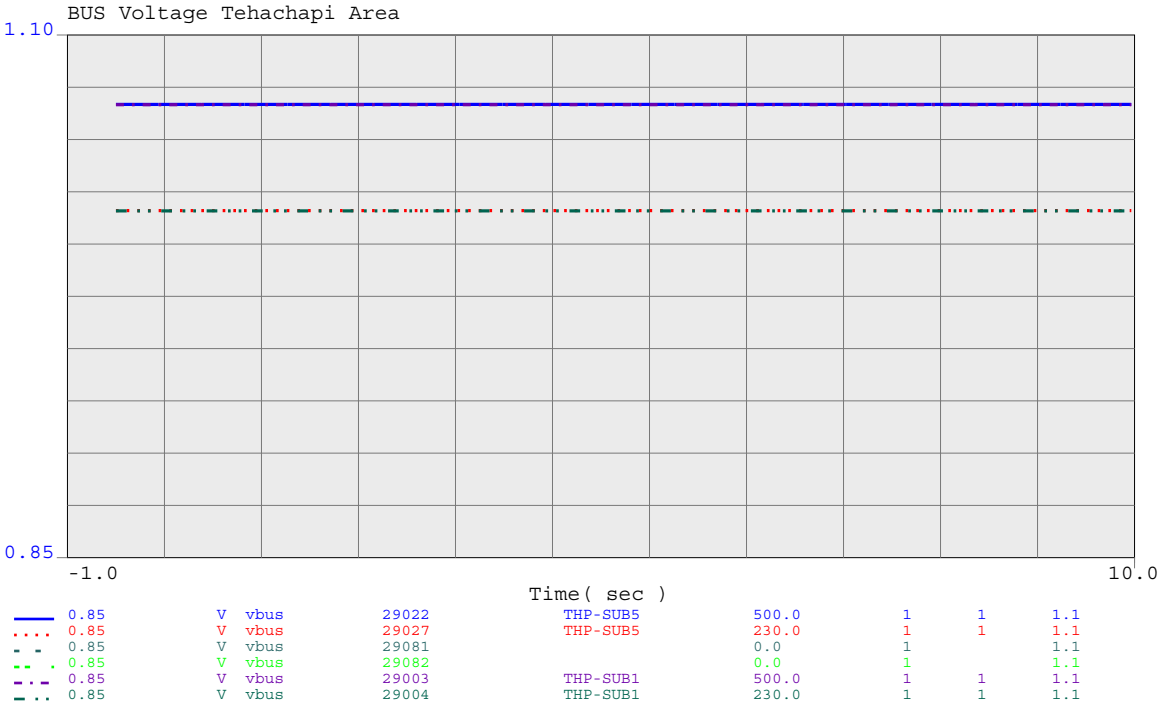
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

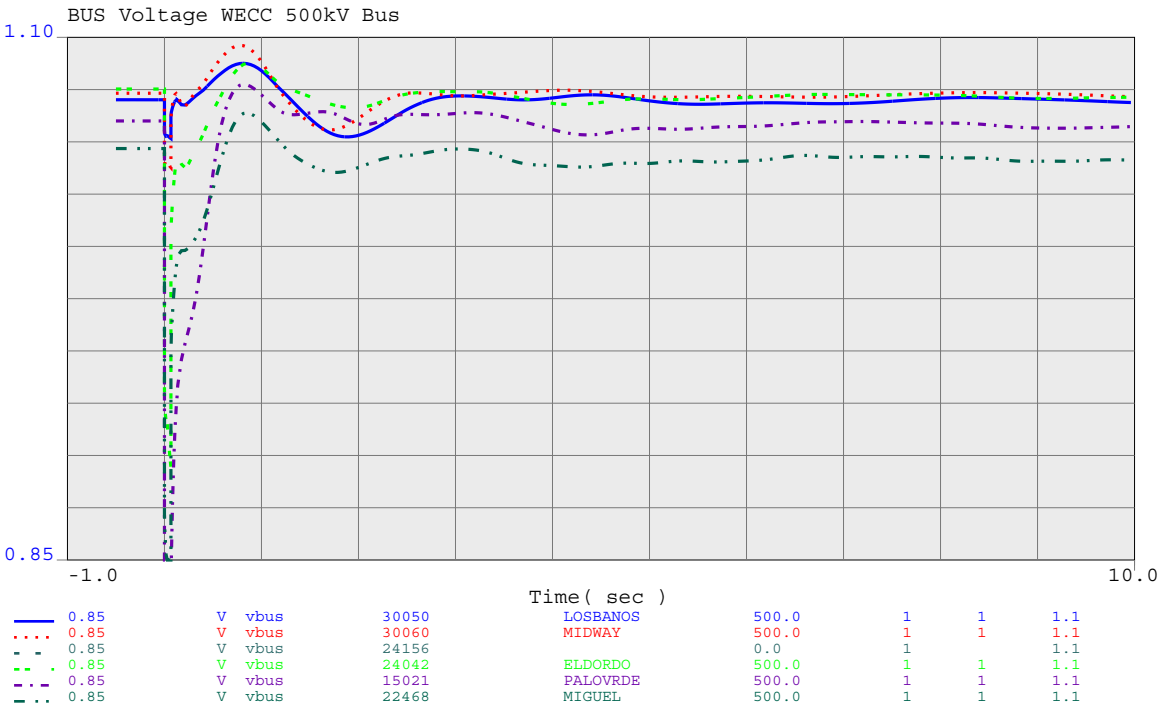
PRE PROJECT

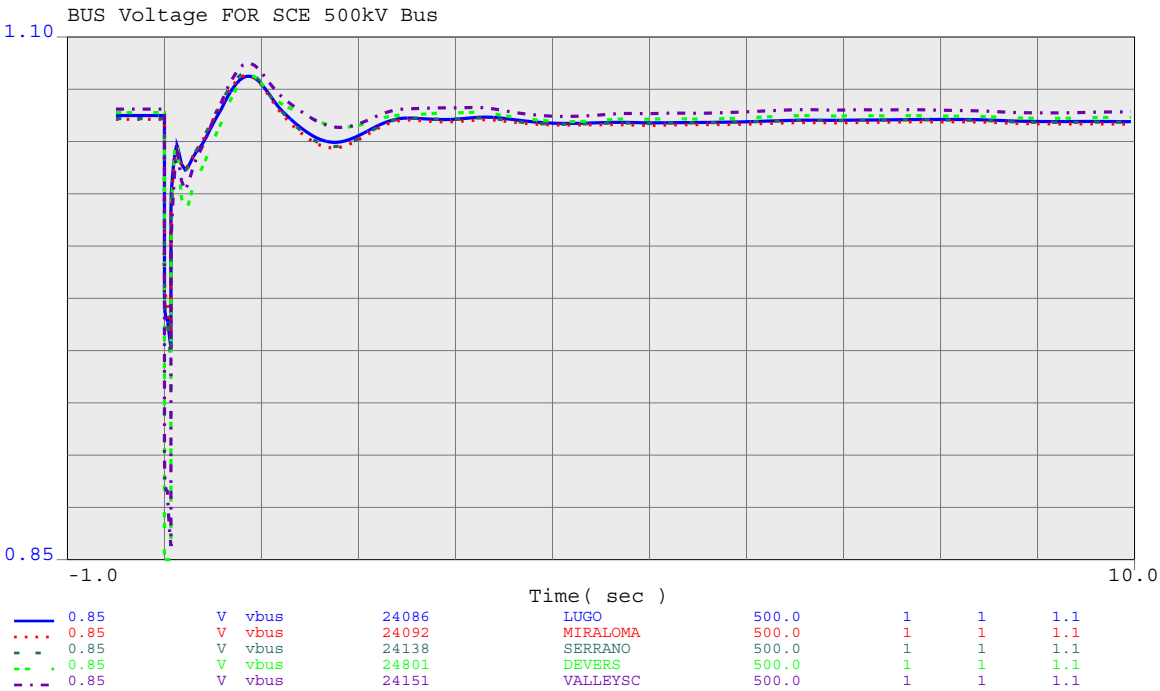
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

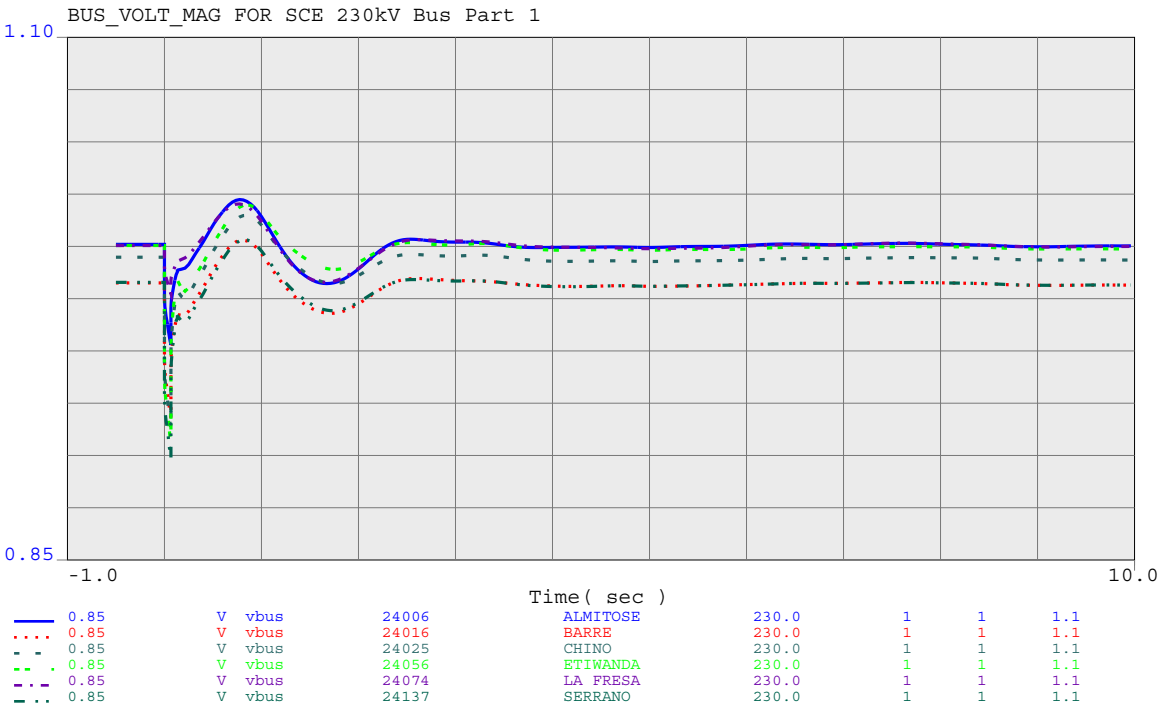
PRE PROJECT

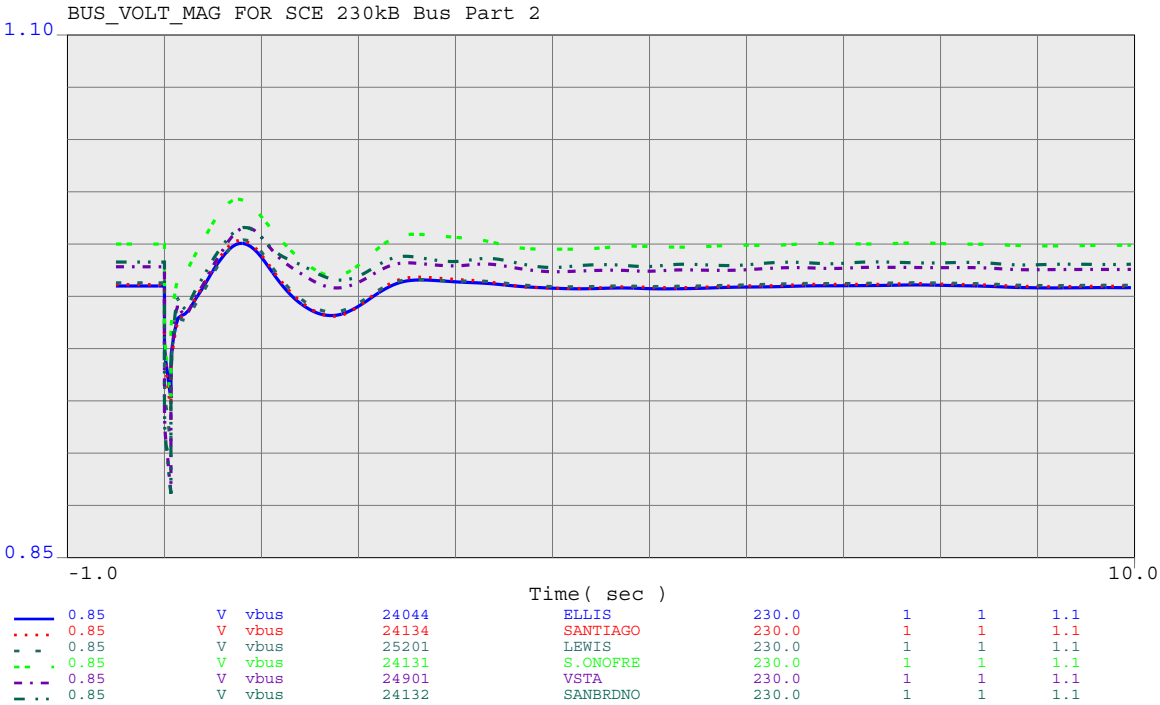
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

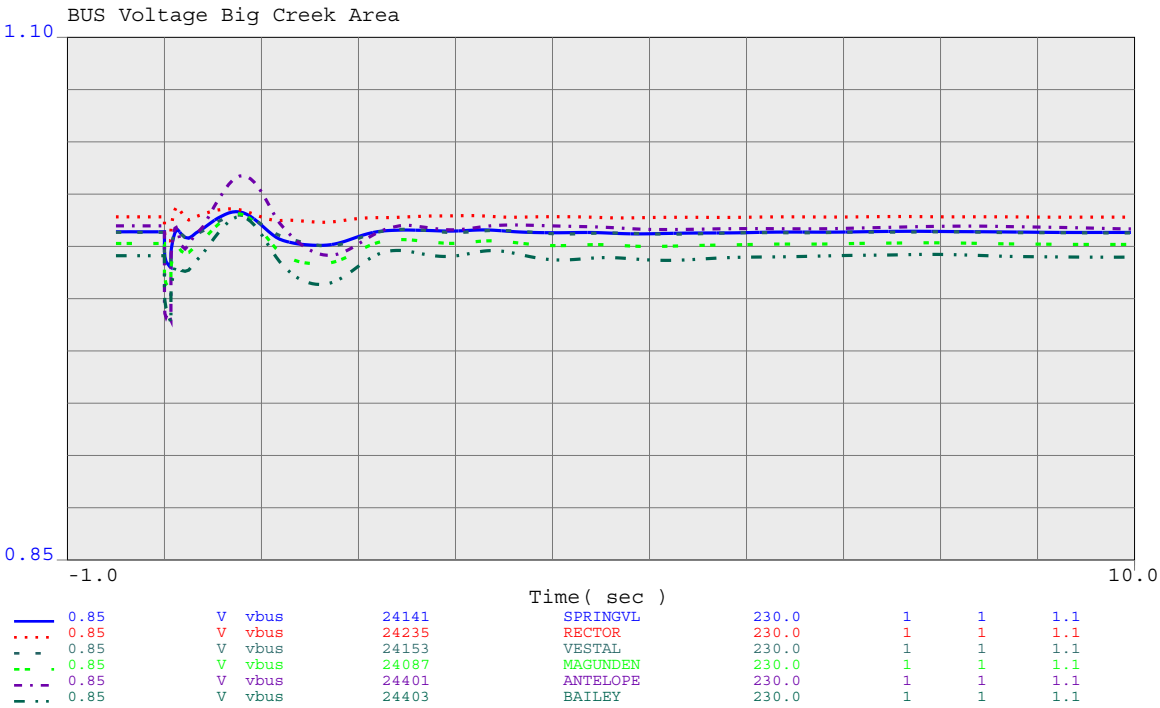
PRE PROJECT

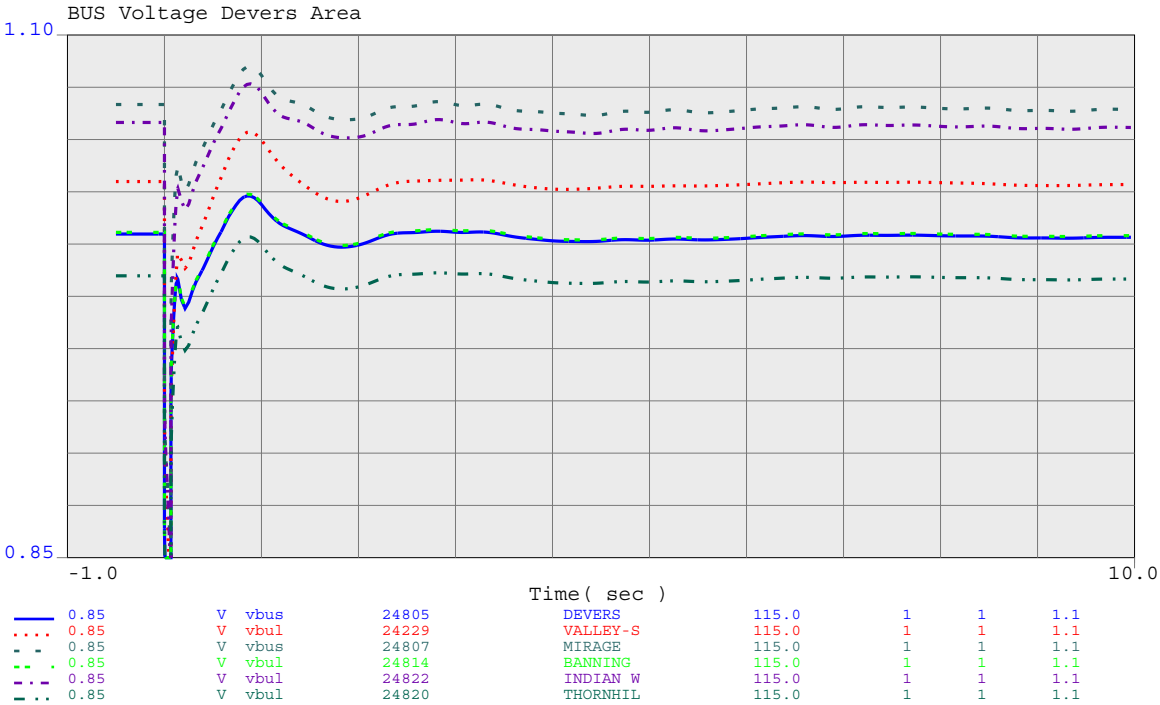
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

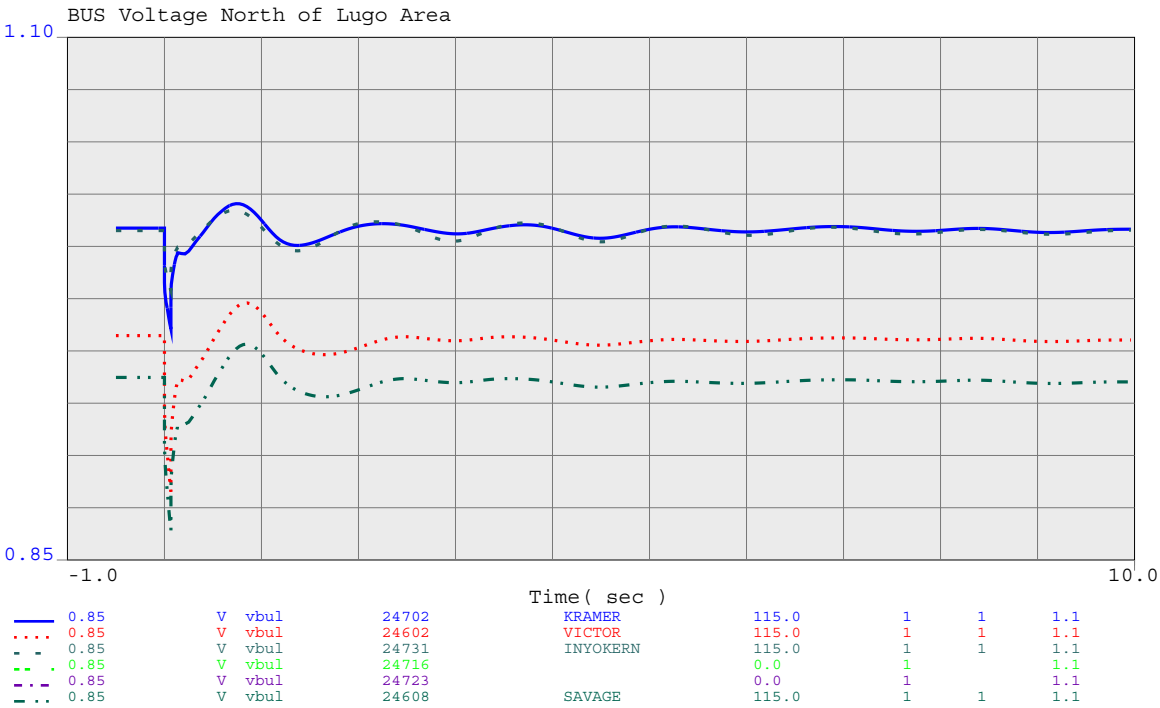
PRE PROJECT

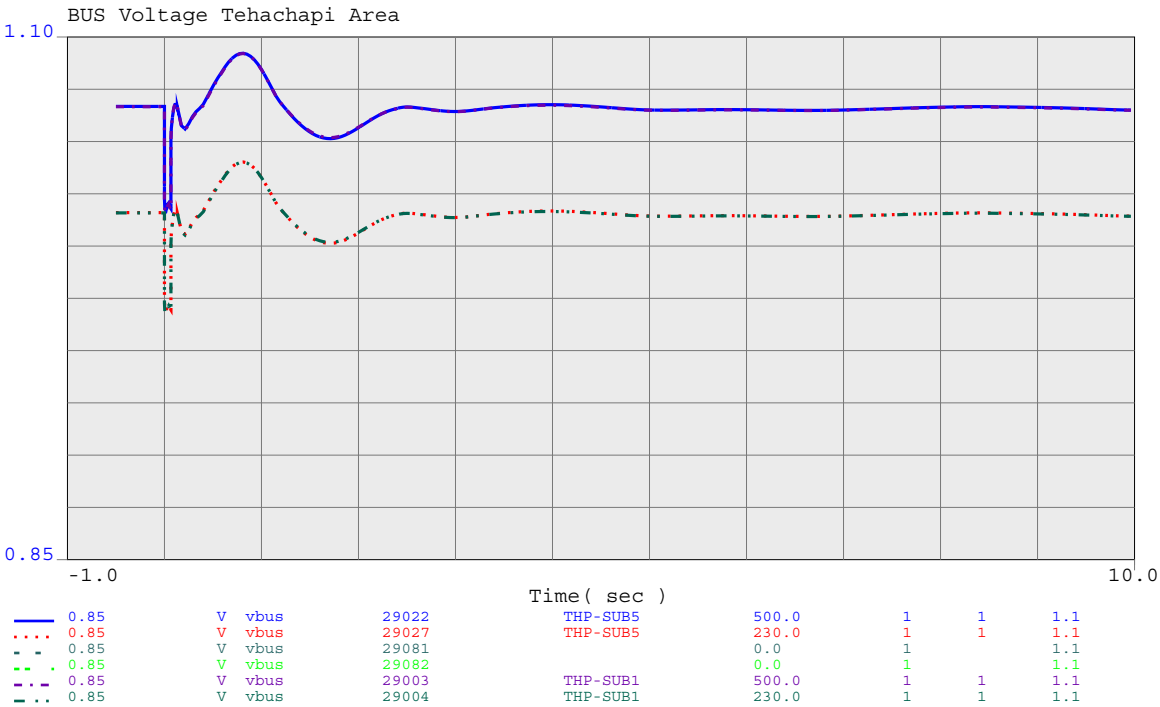
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

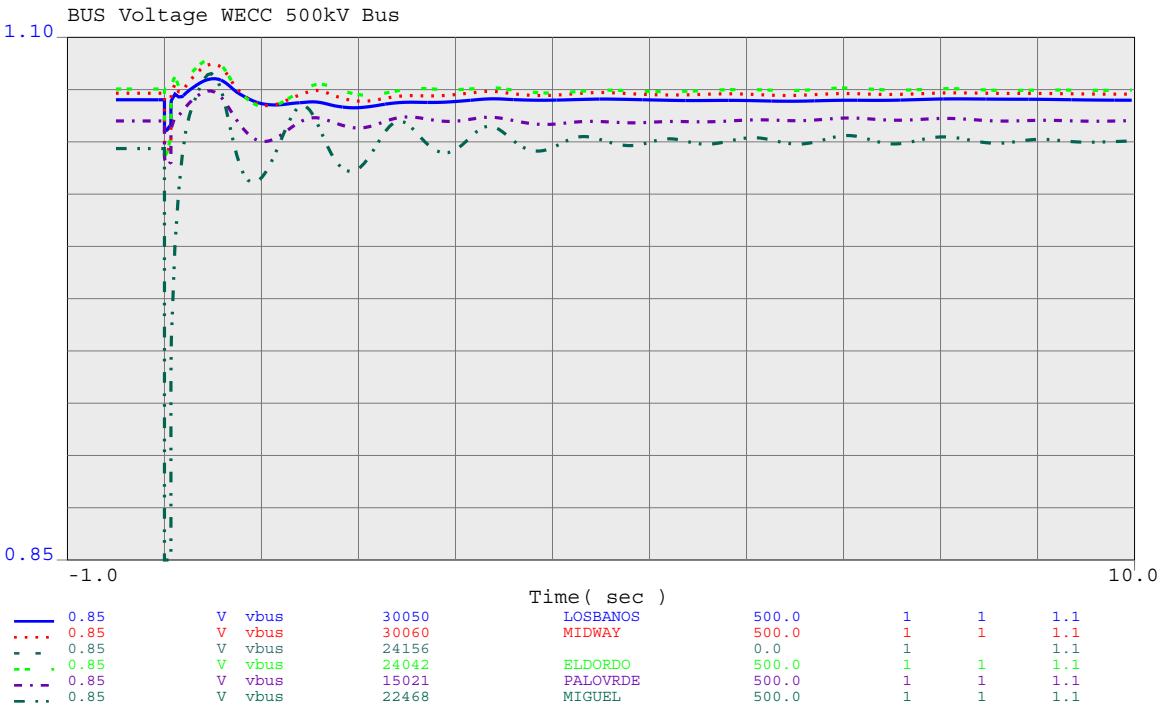
PRE PROJECT

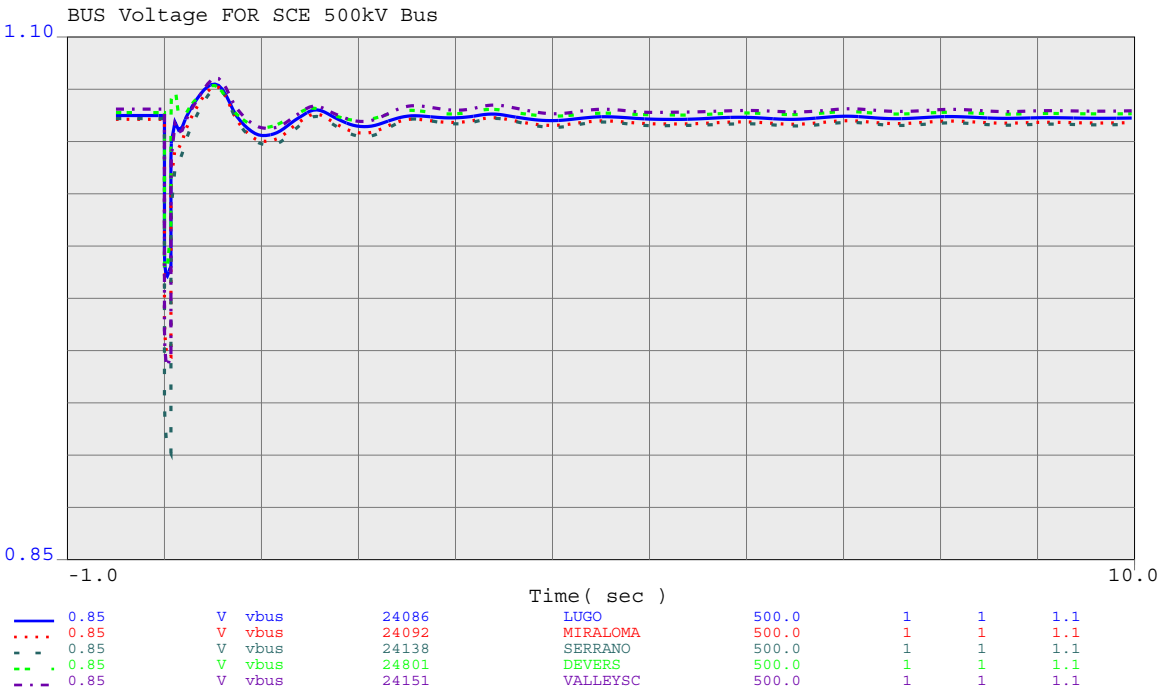
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

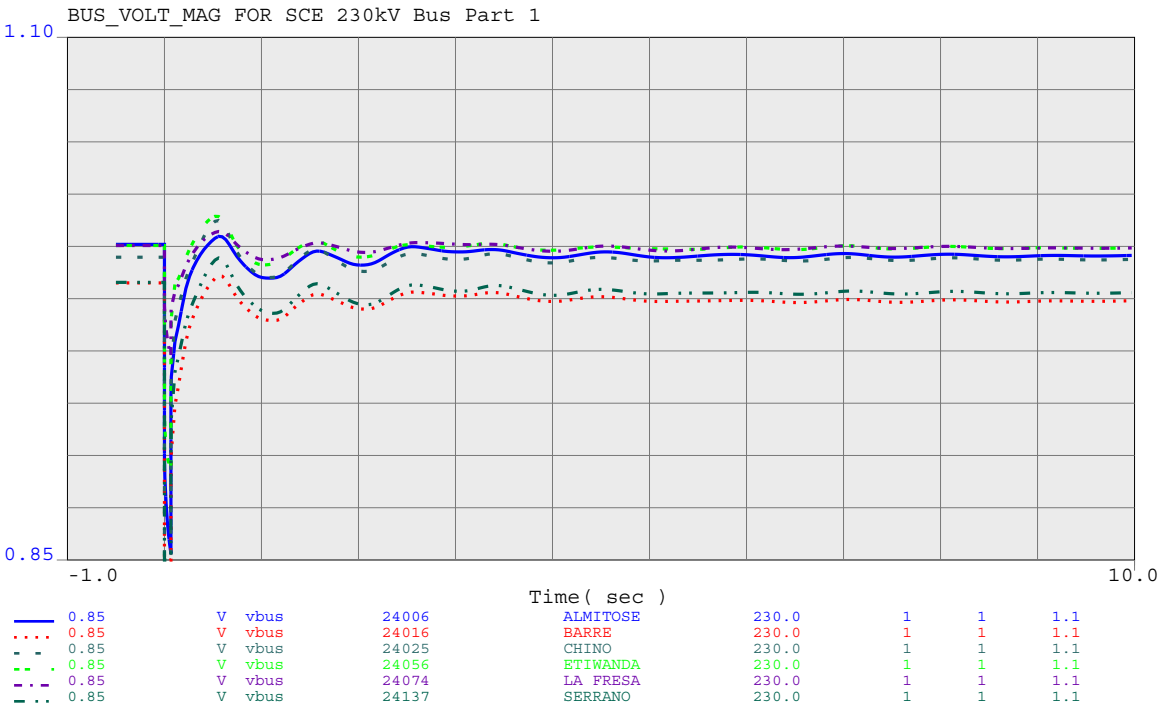
PRE PROJECT

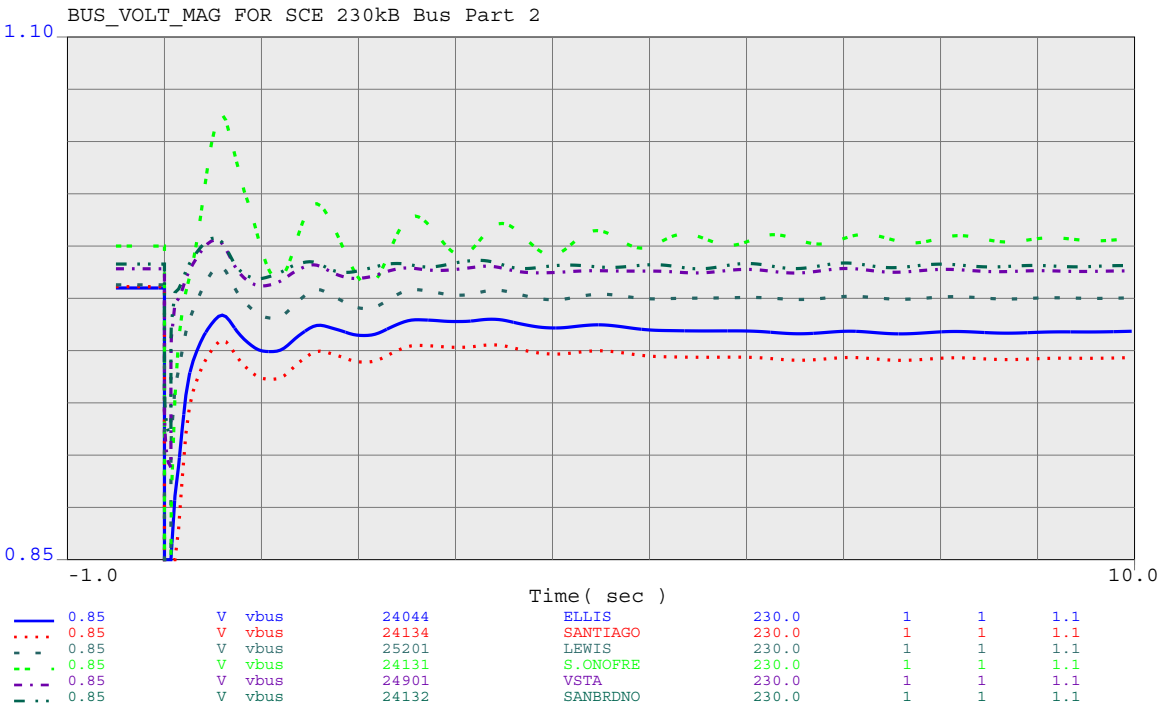
2013 Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

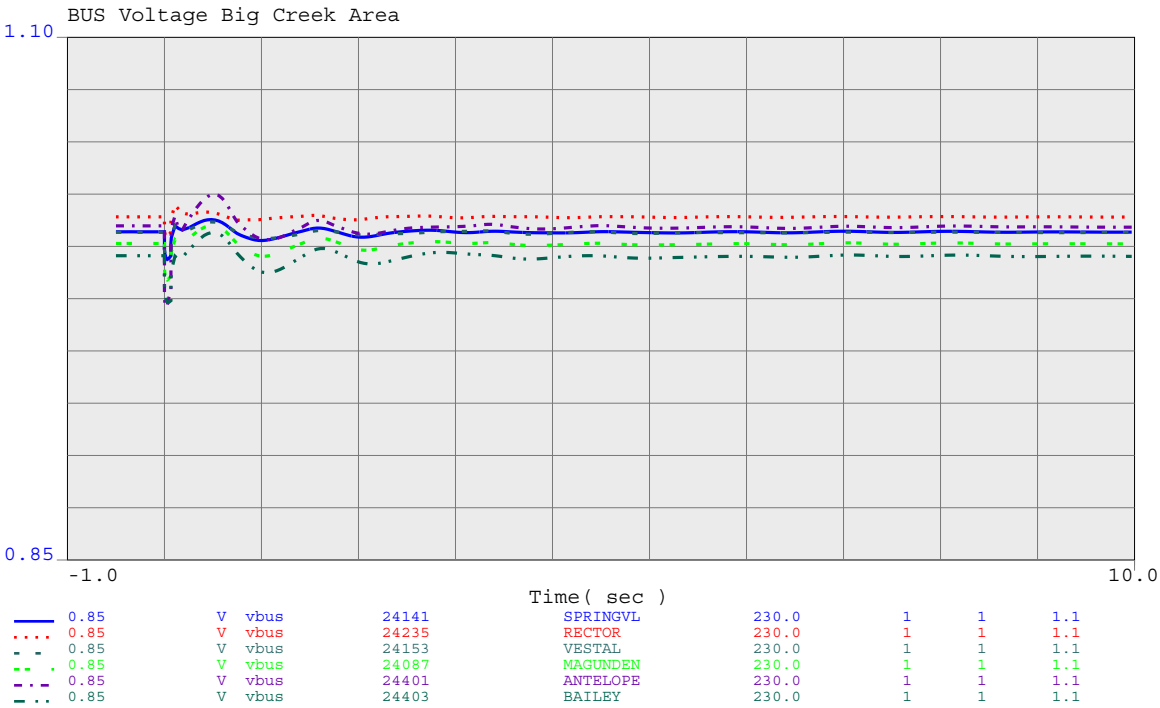
PRE PROJECT

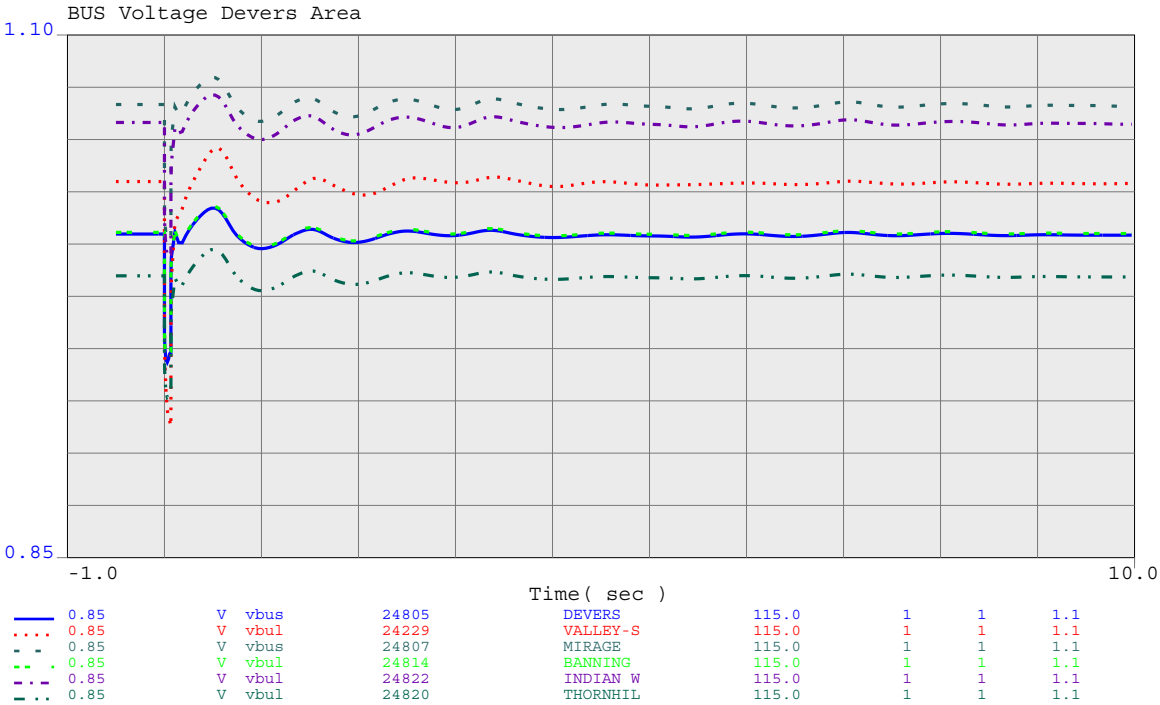
2013 Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

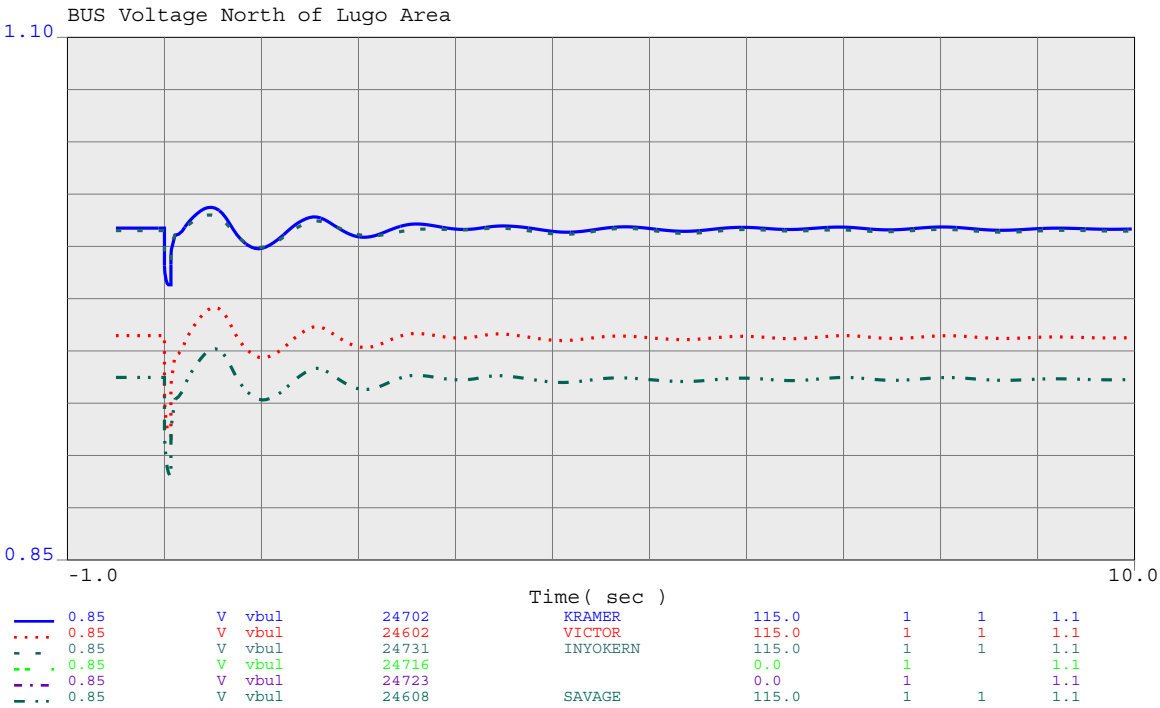
PRE PROJECT

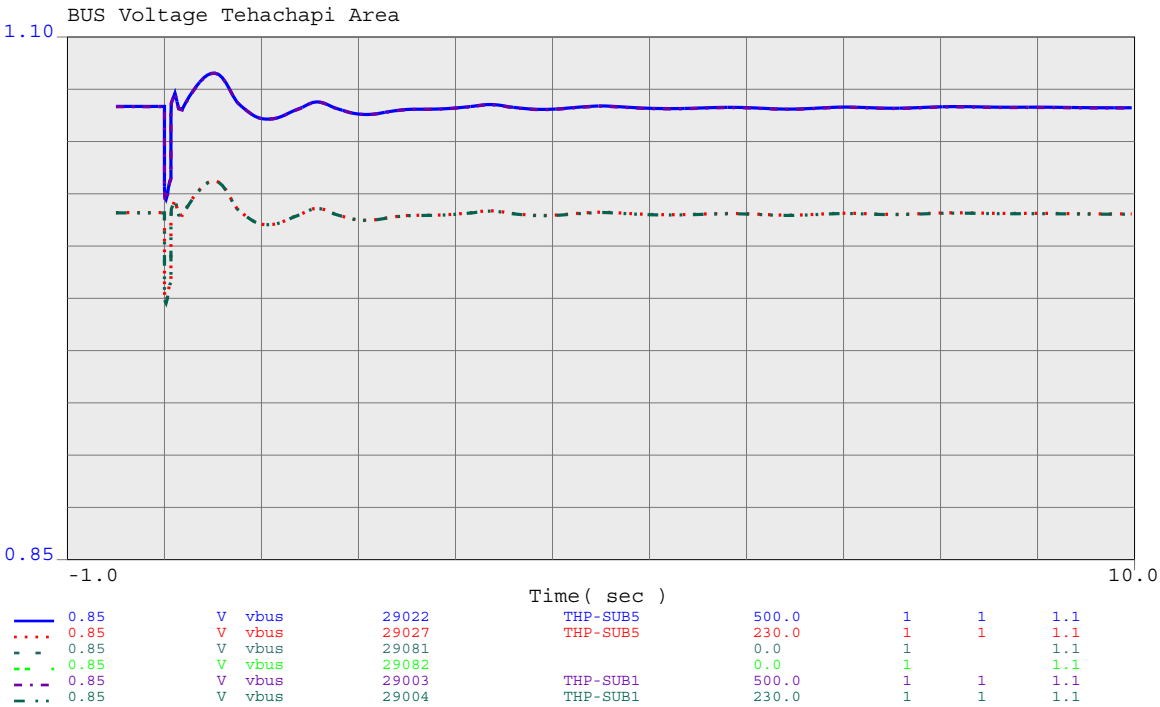
2013 Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

PRE PROJECT

2013 Peak Case

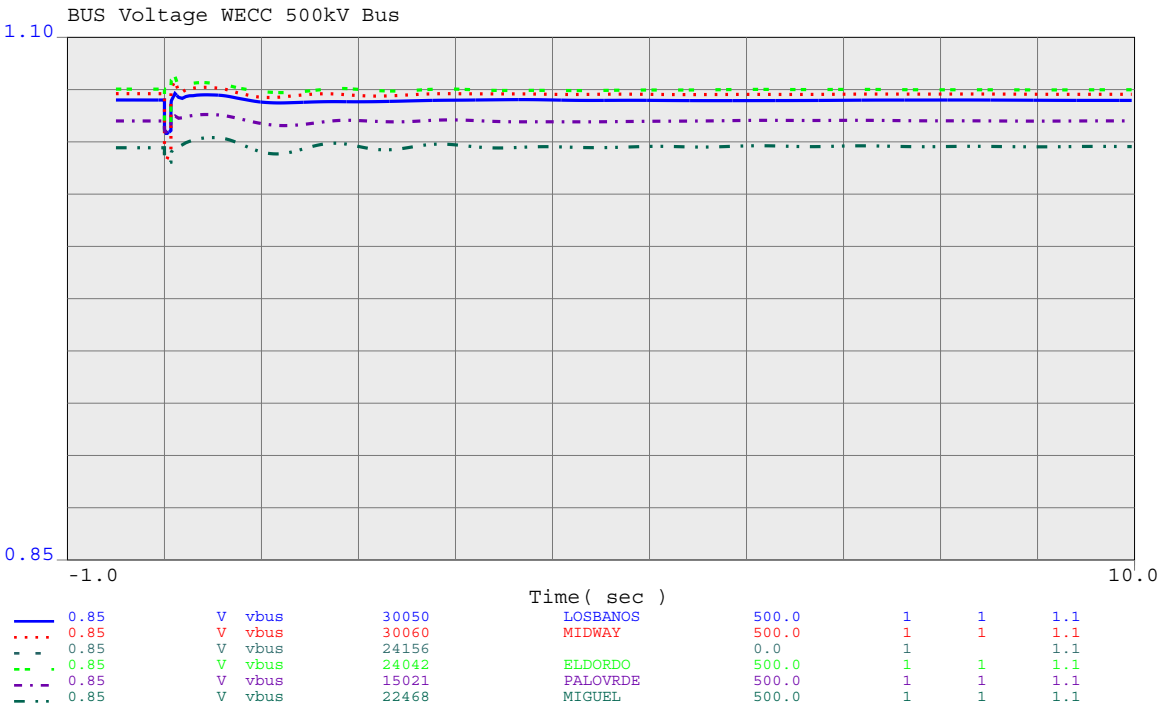
SONGS - Santiago Double Line Outage (fault at SONGS)

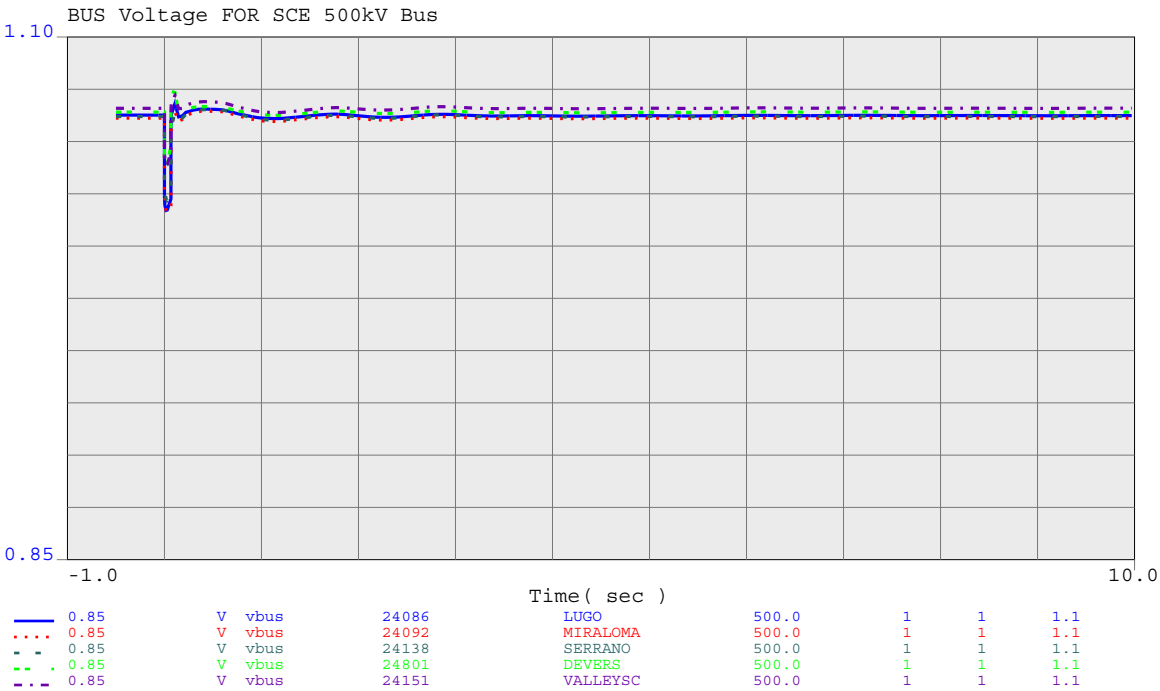
[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

APPENDIX A

Heavy Summer Stability Plots Post - Project

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

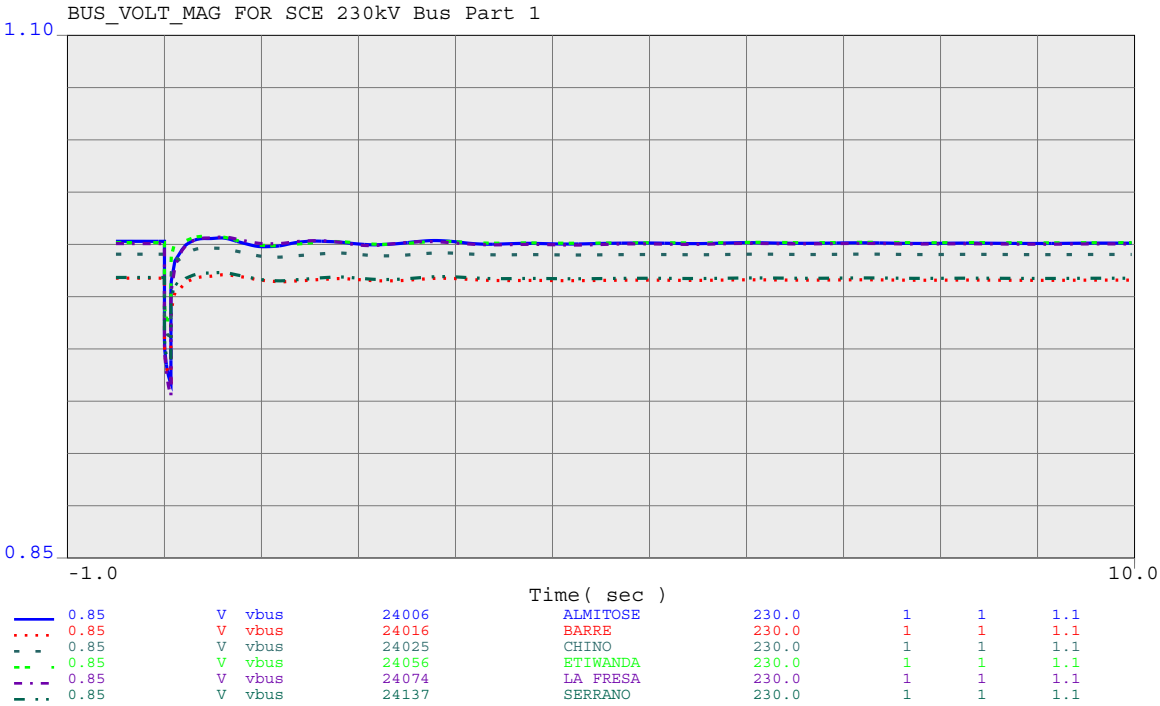
POST PROJECT

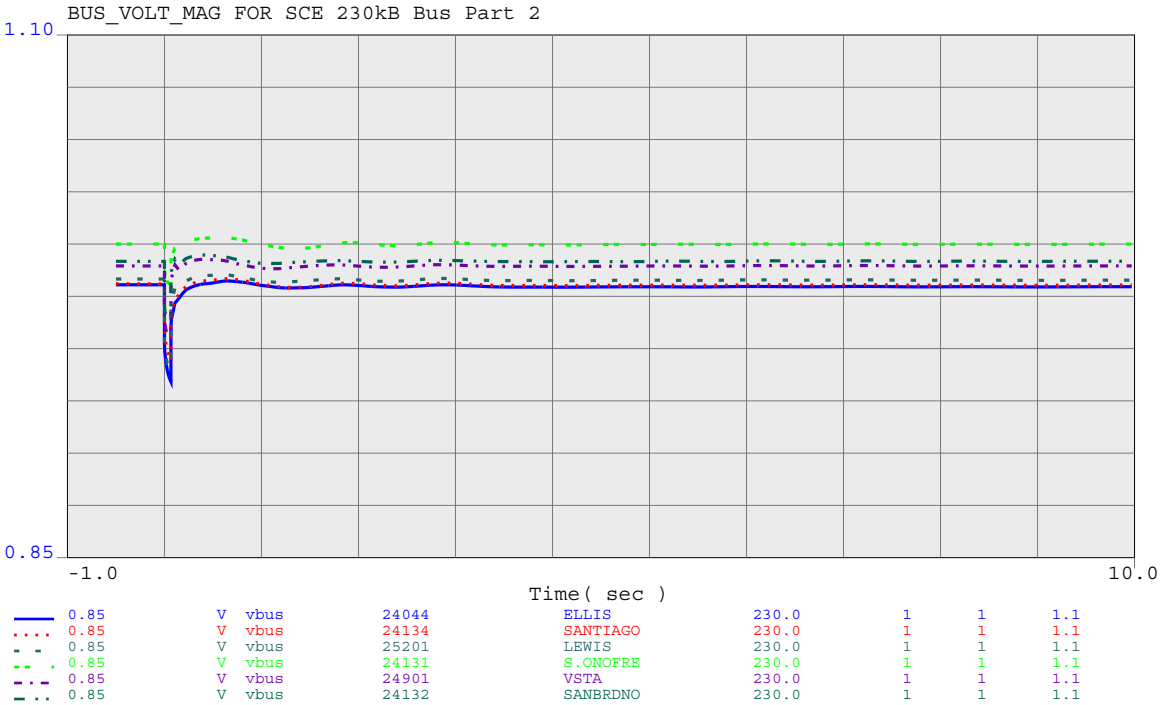
2013 Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

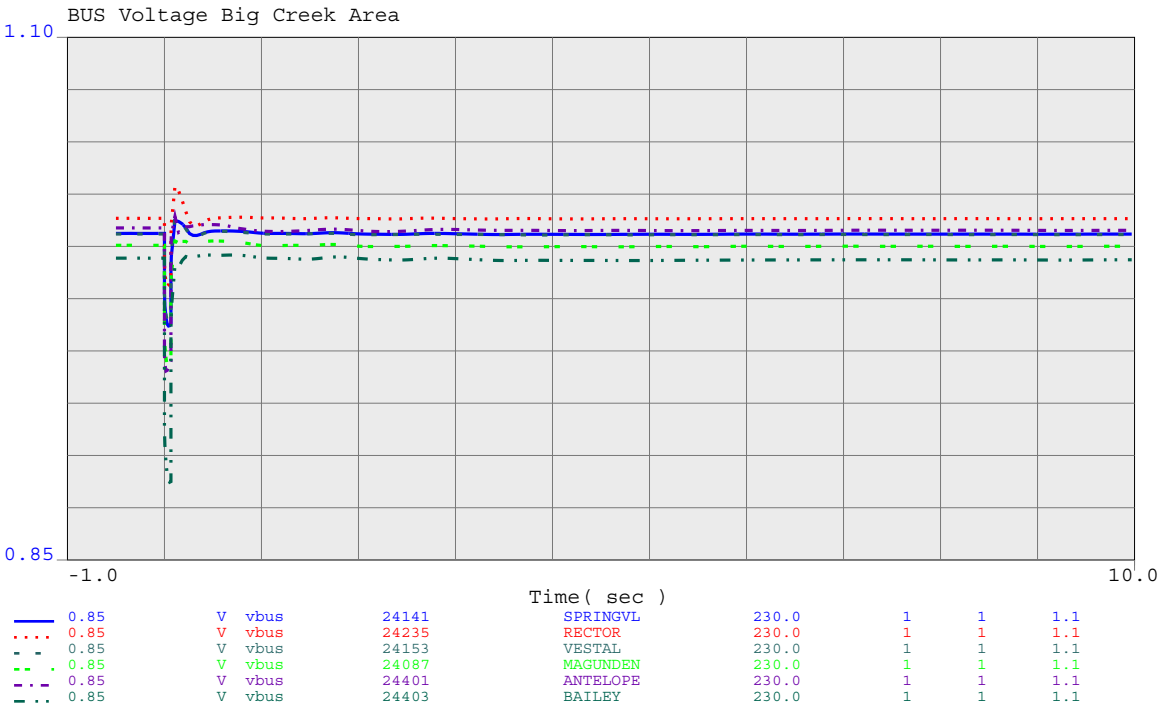
POST PROJECT

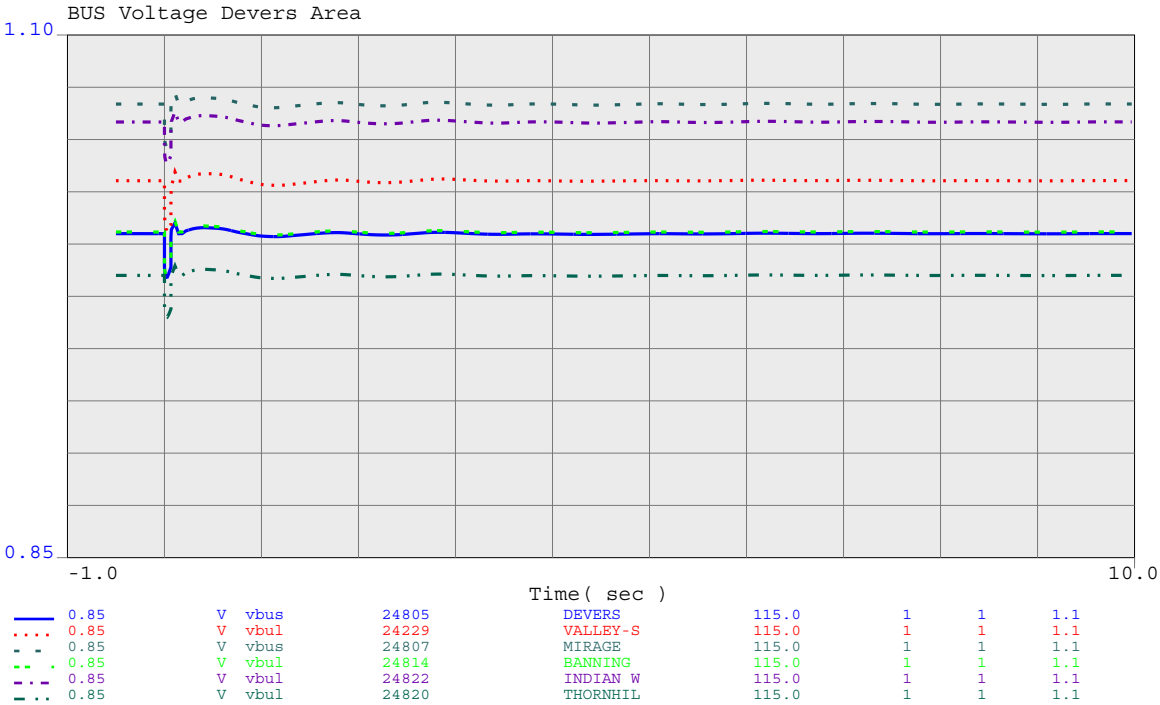
2013 Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

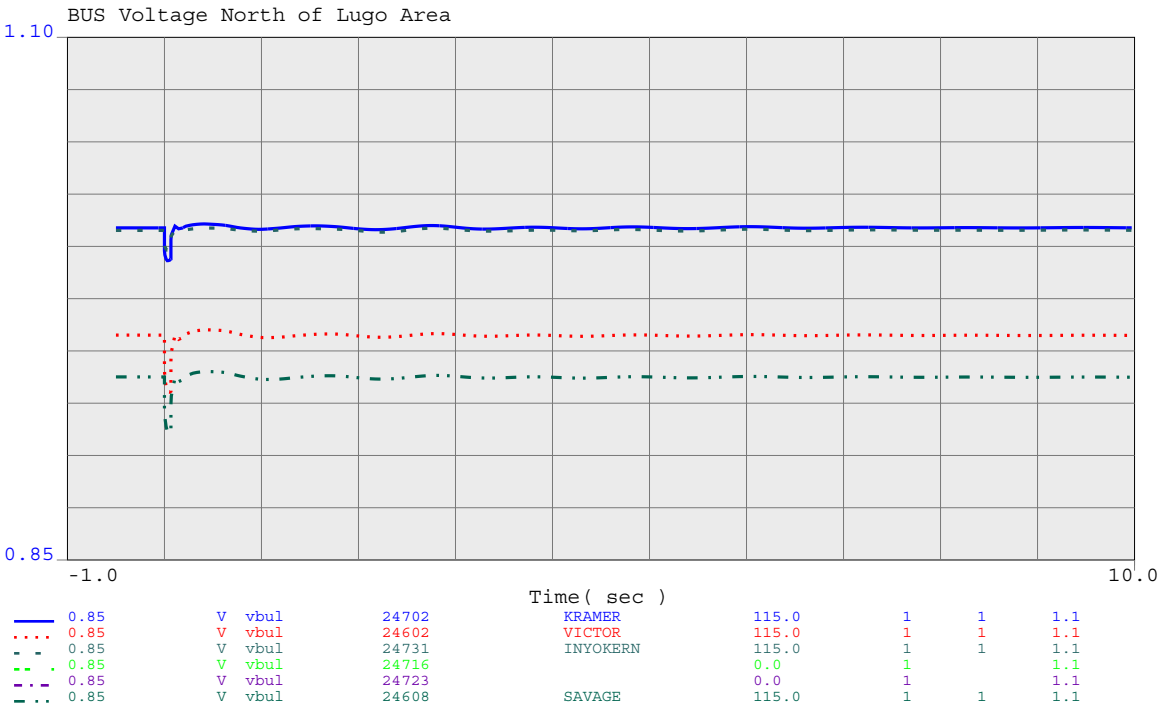
POST PROJECT

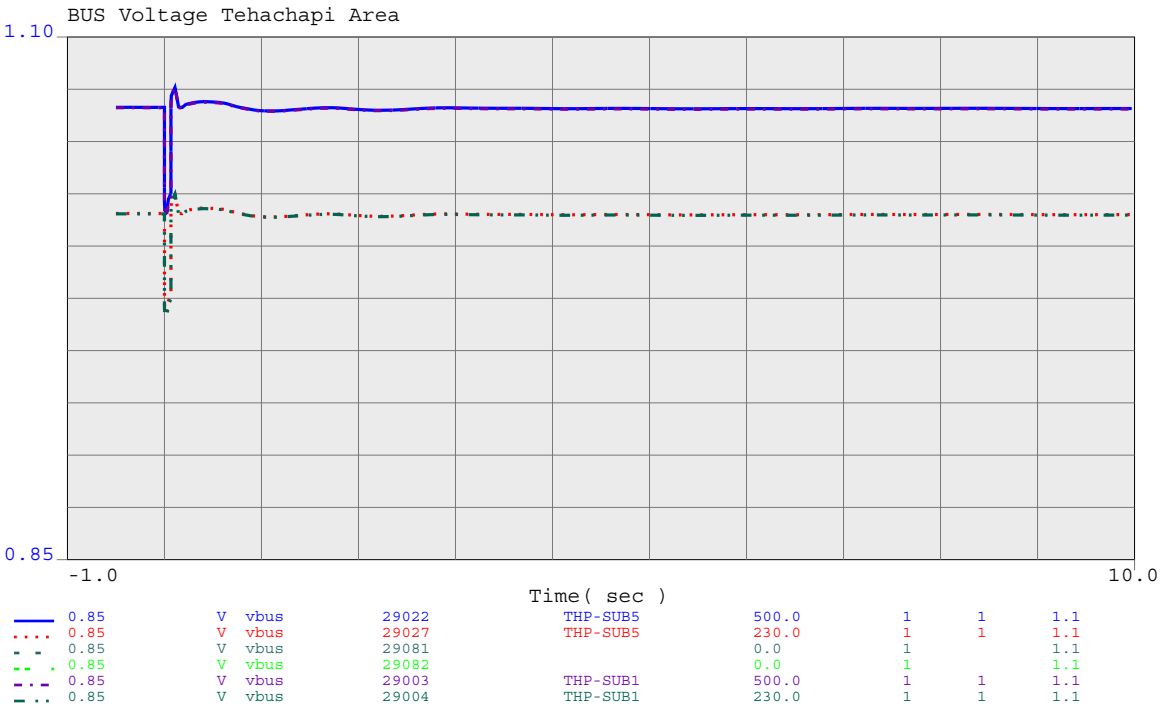
2013 Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

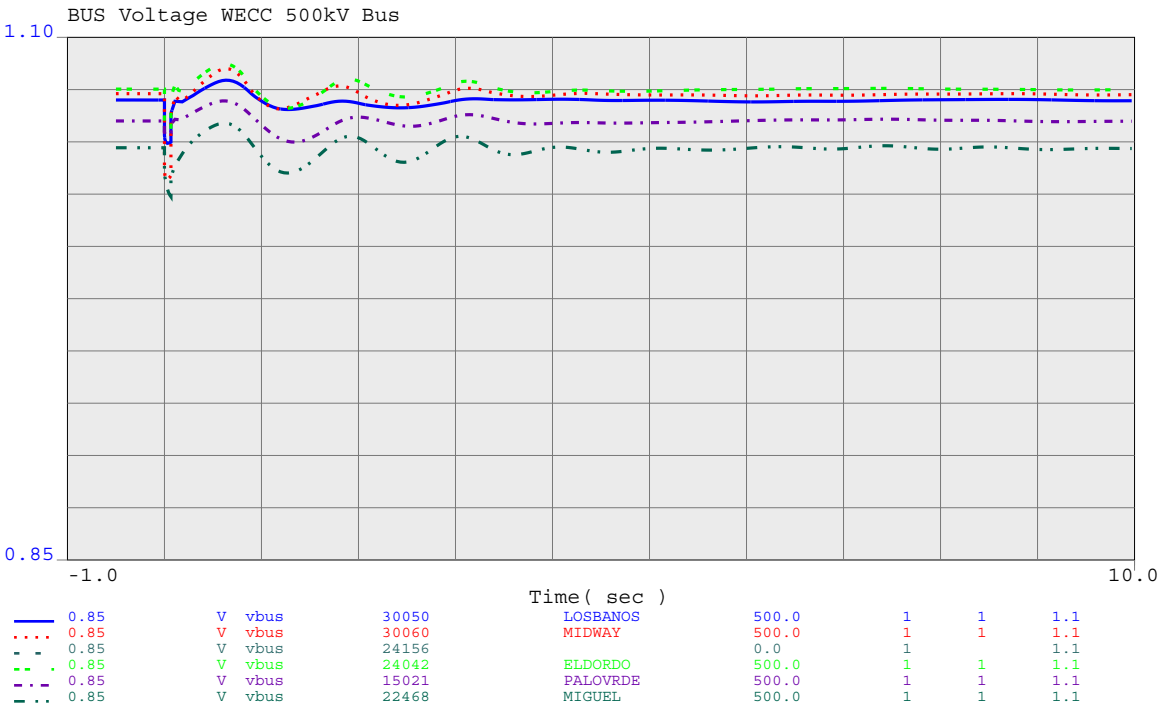
POST PROJECT

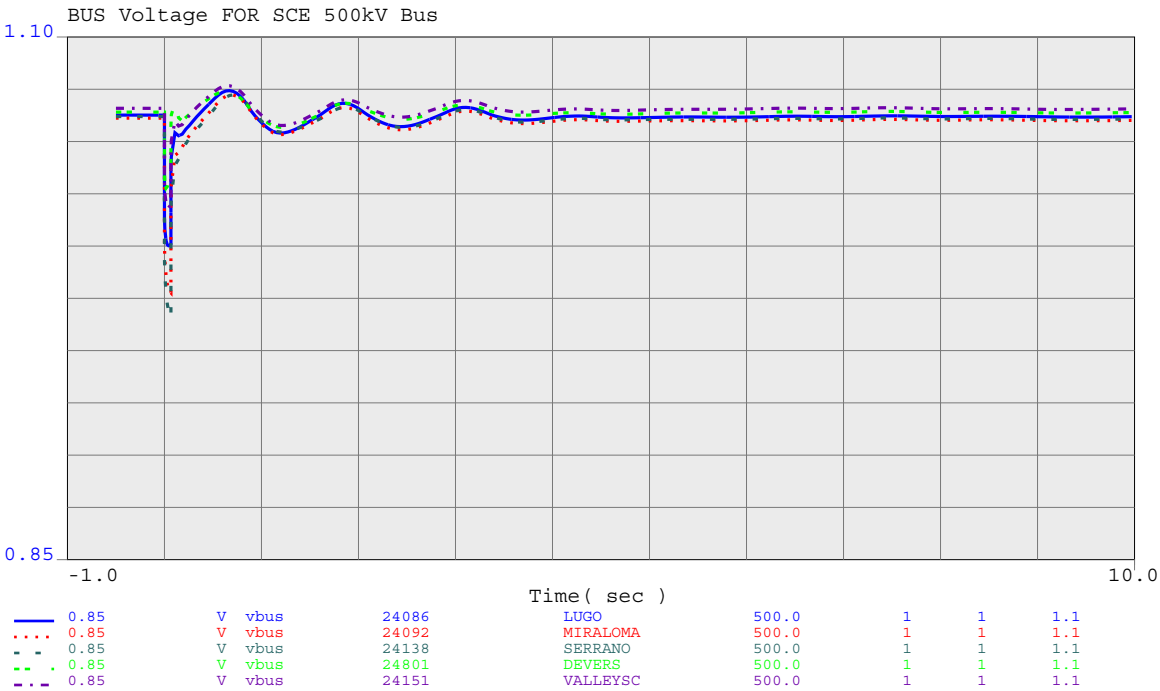
2013 Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

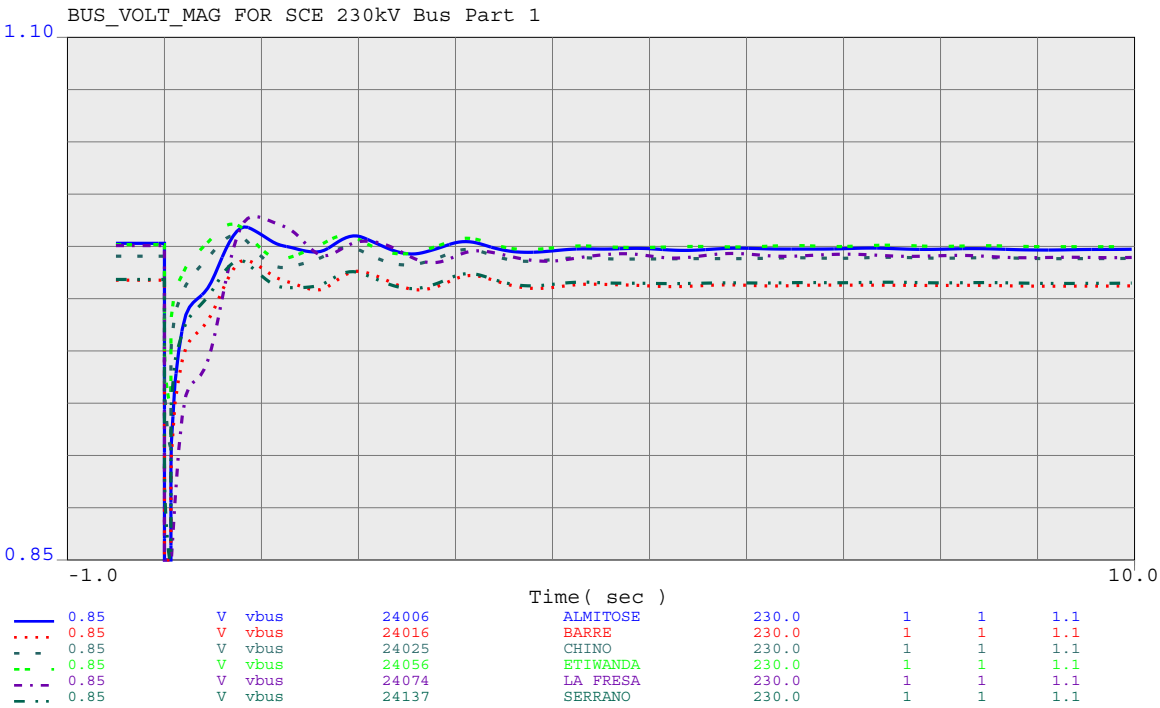
POST PROJECT

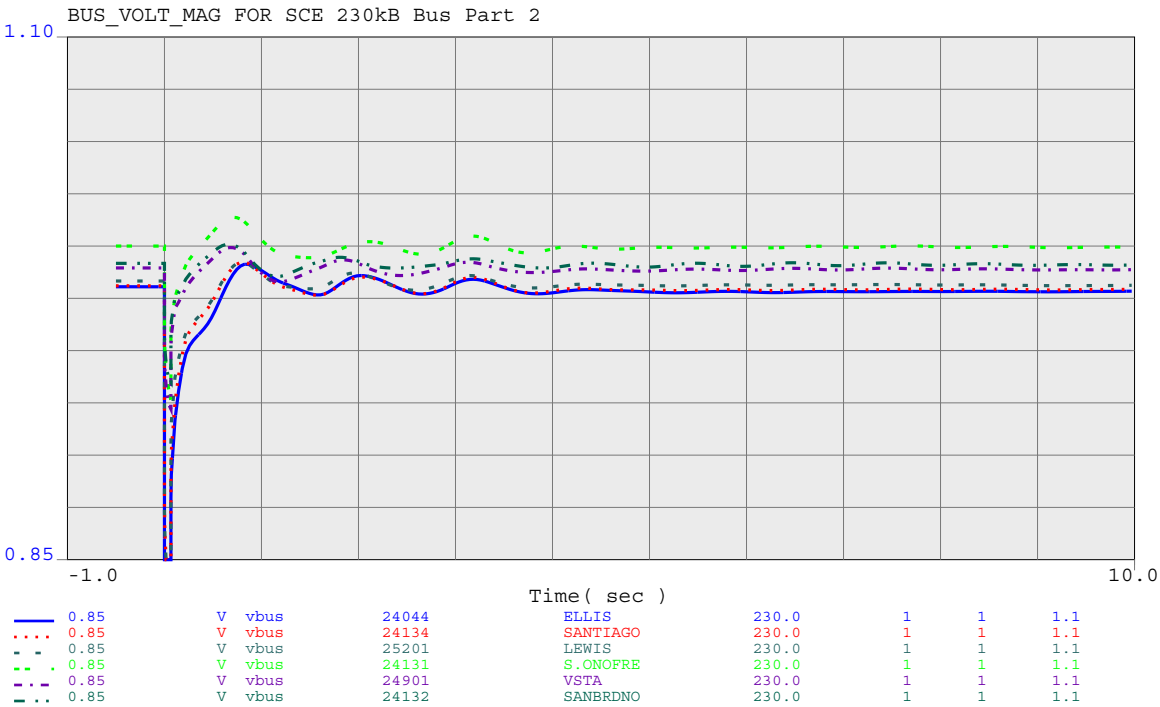
2013 Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

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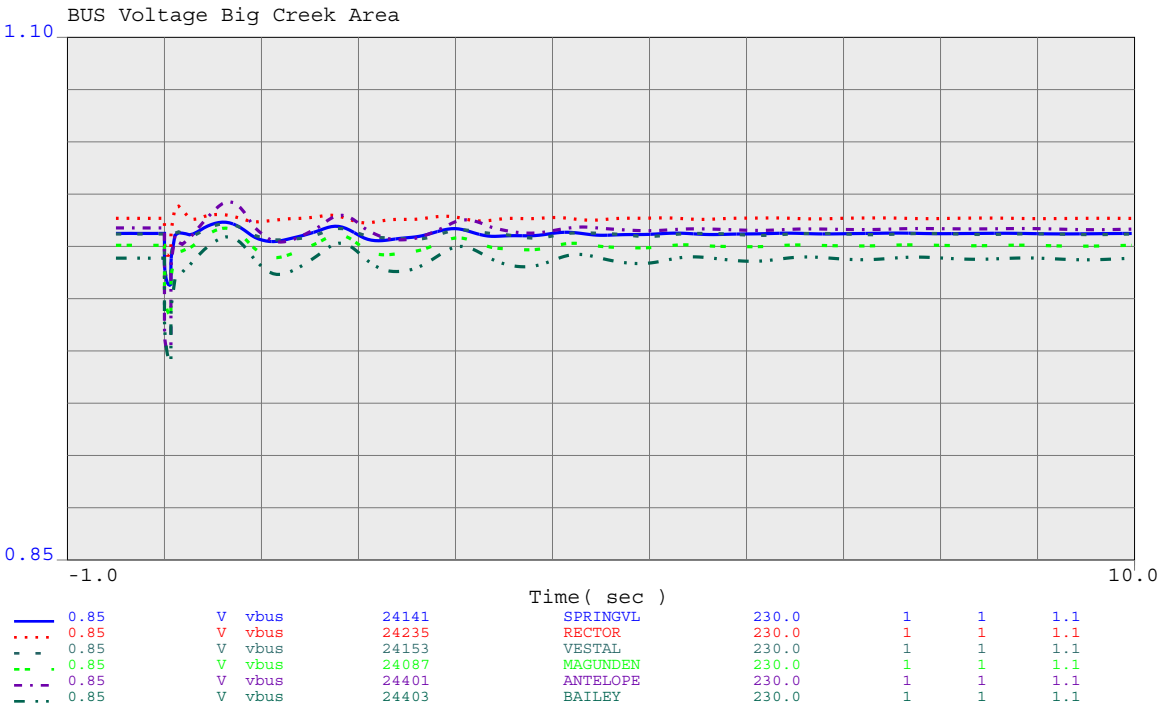

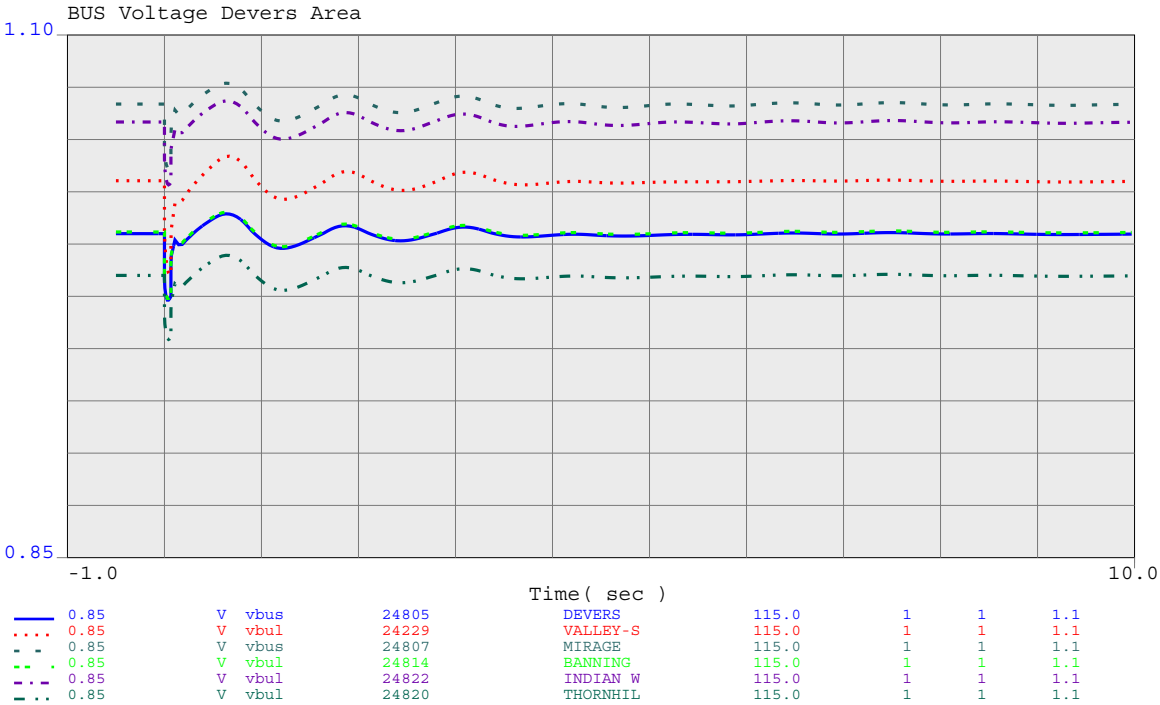

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

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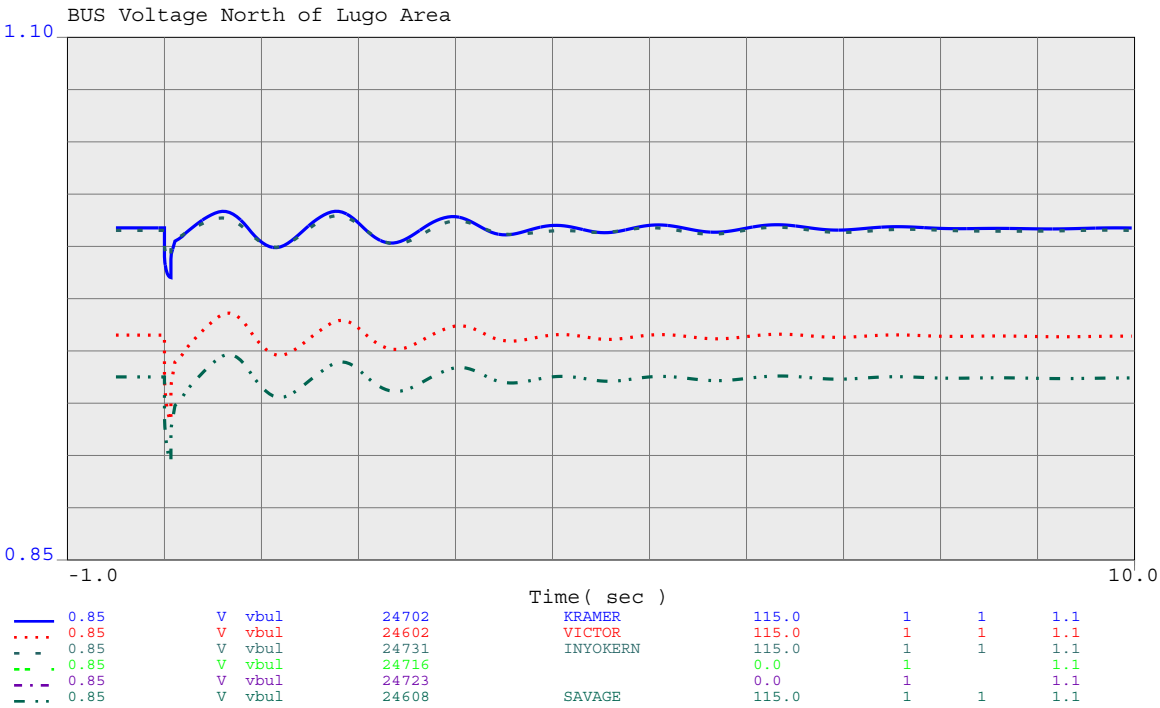
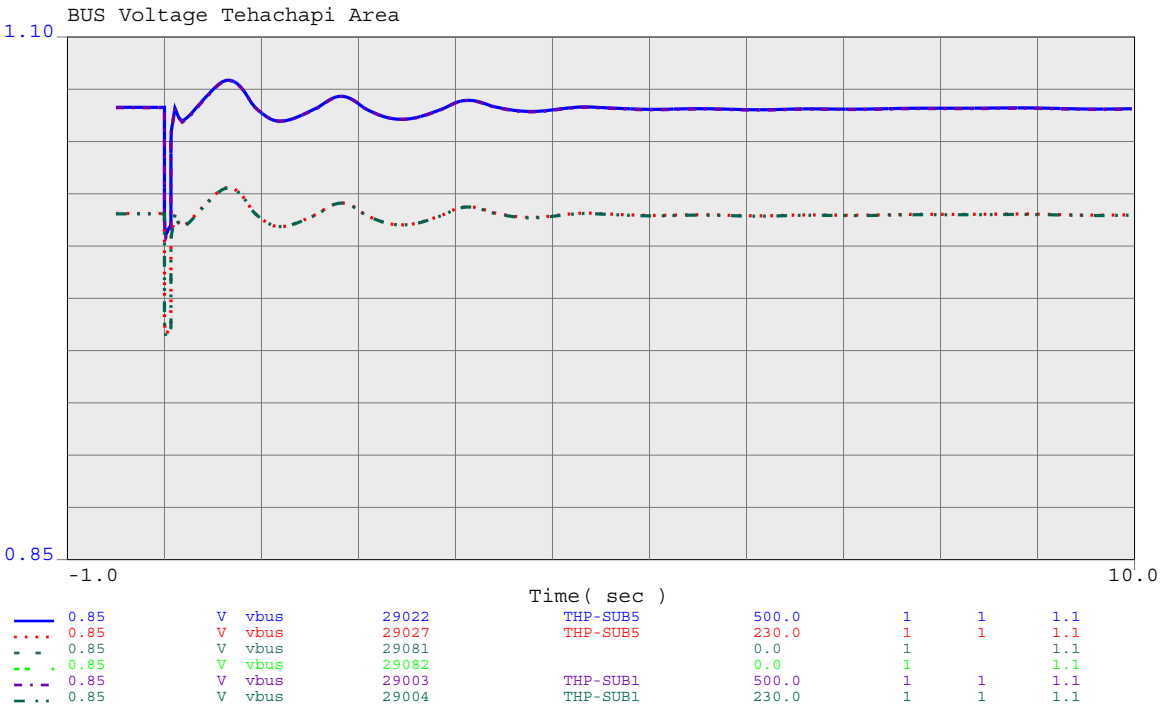
Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

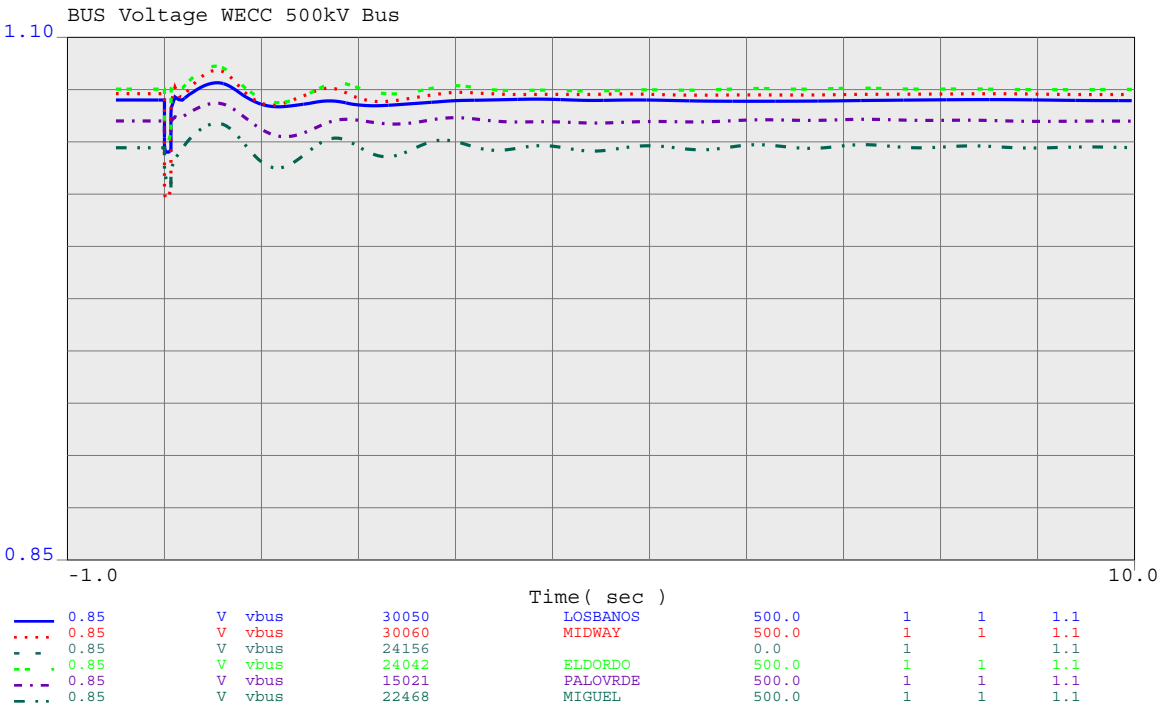
POST PROJECT

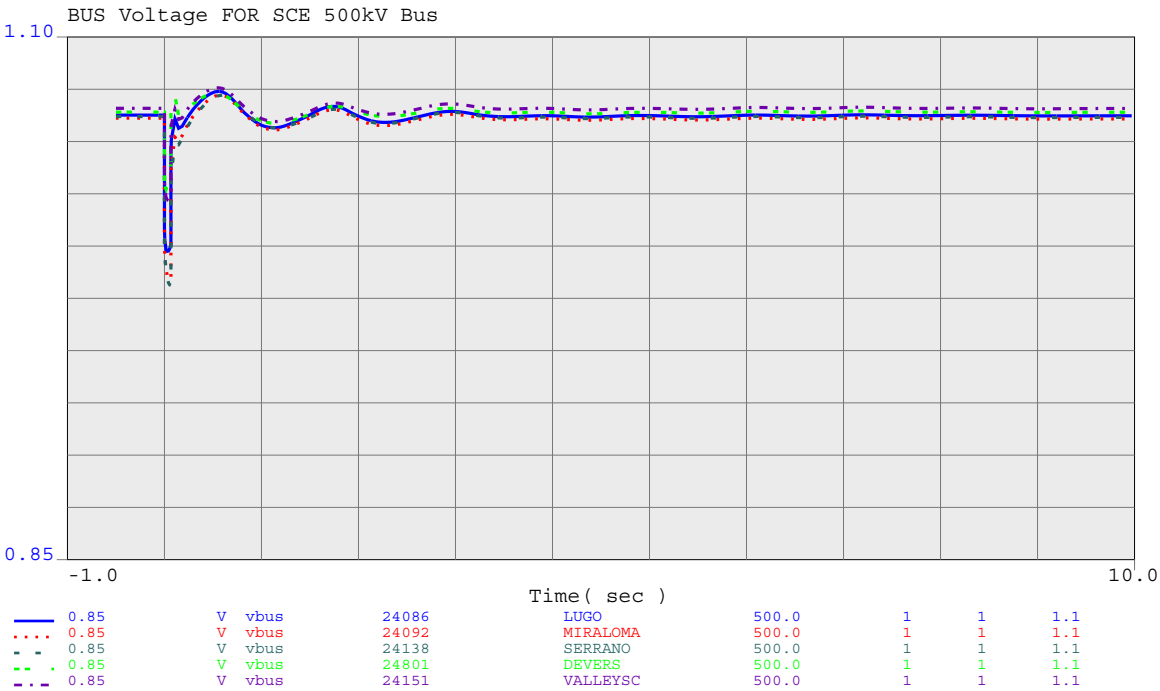
2013 Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

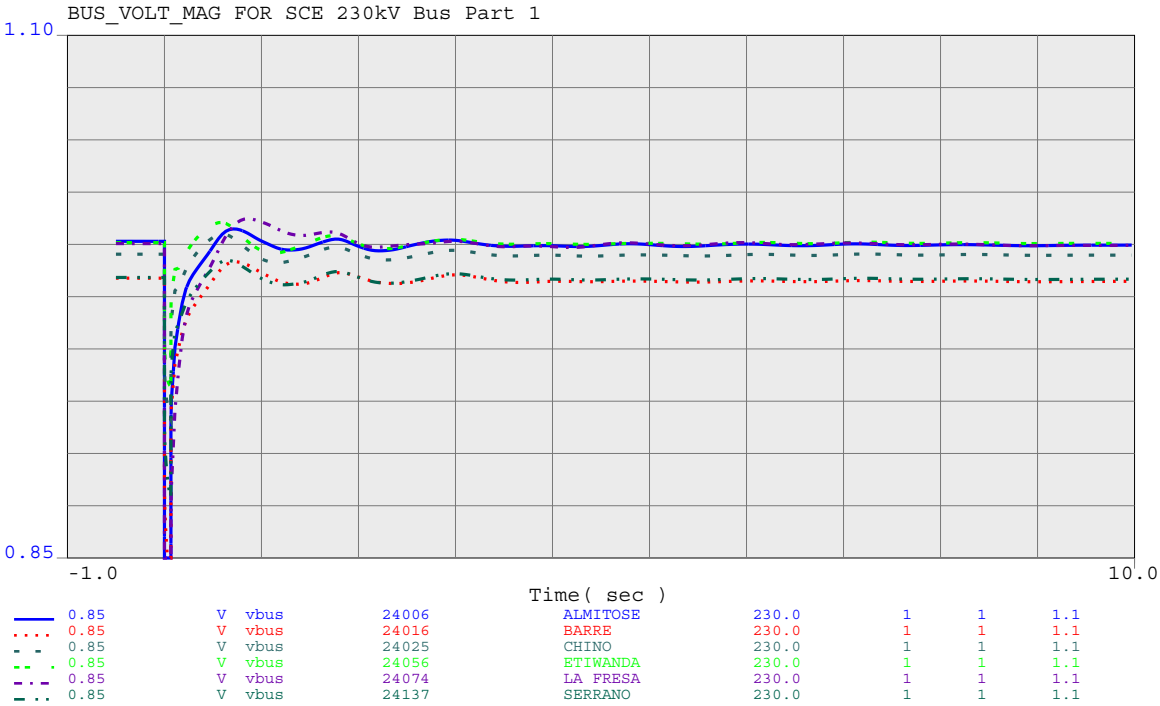
POST PROJECT

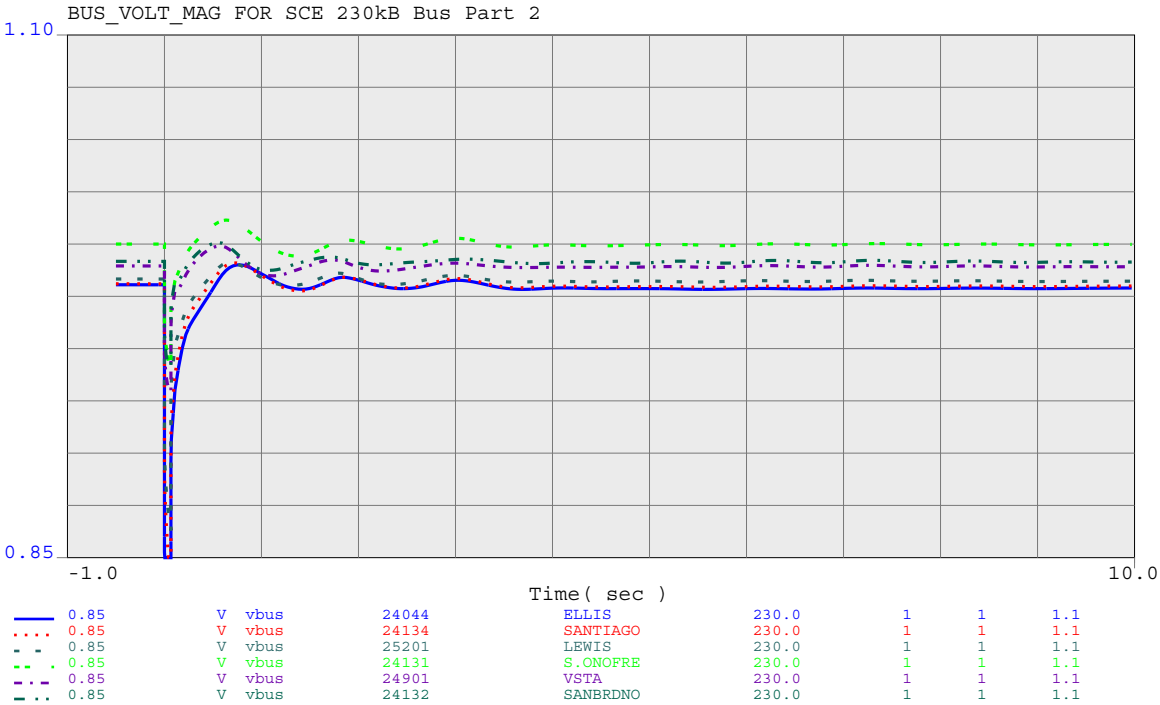
2013 Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

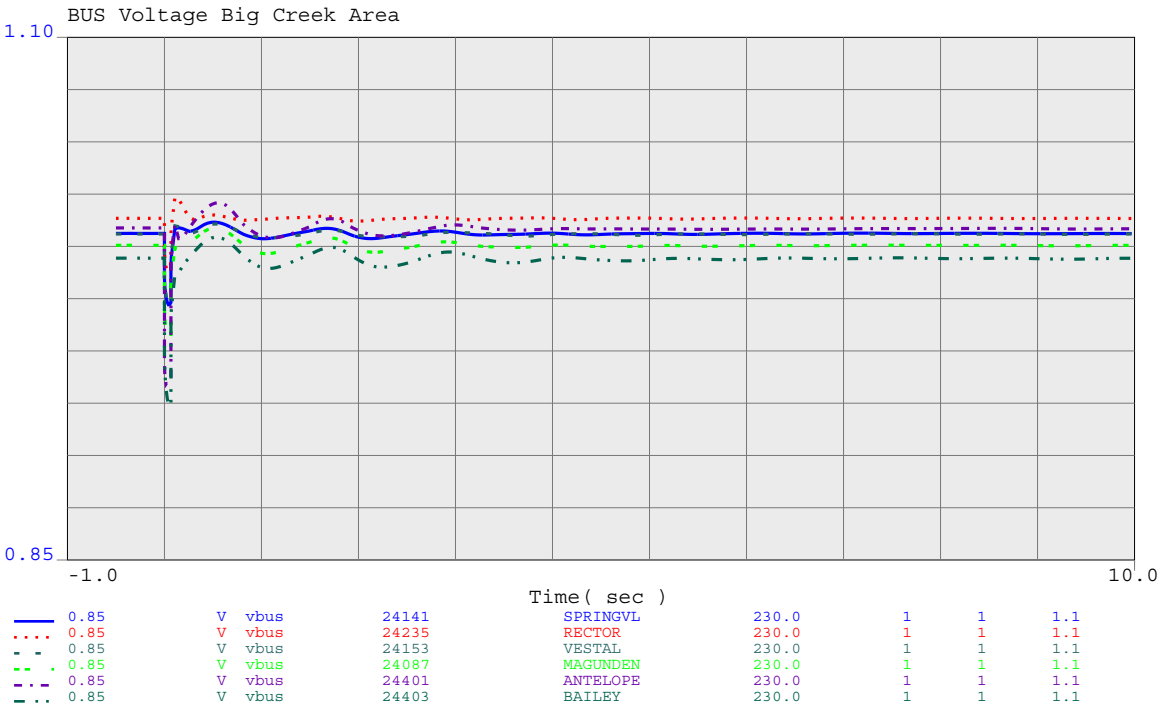
POST PROJECT

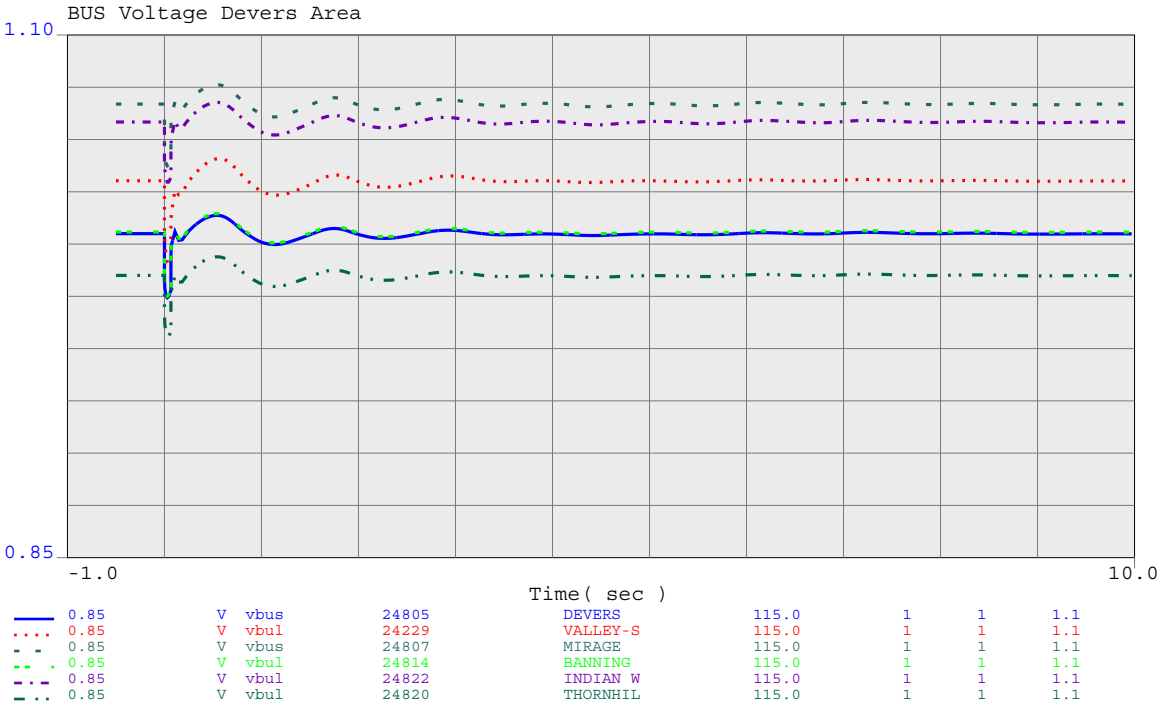
2013 Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

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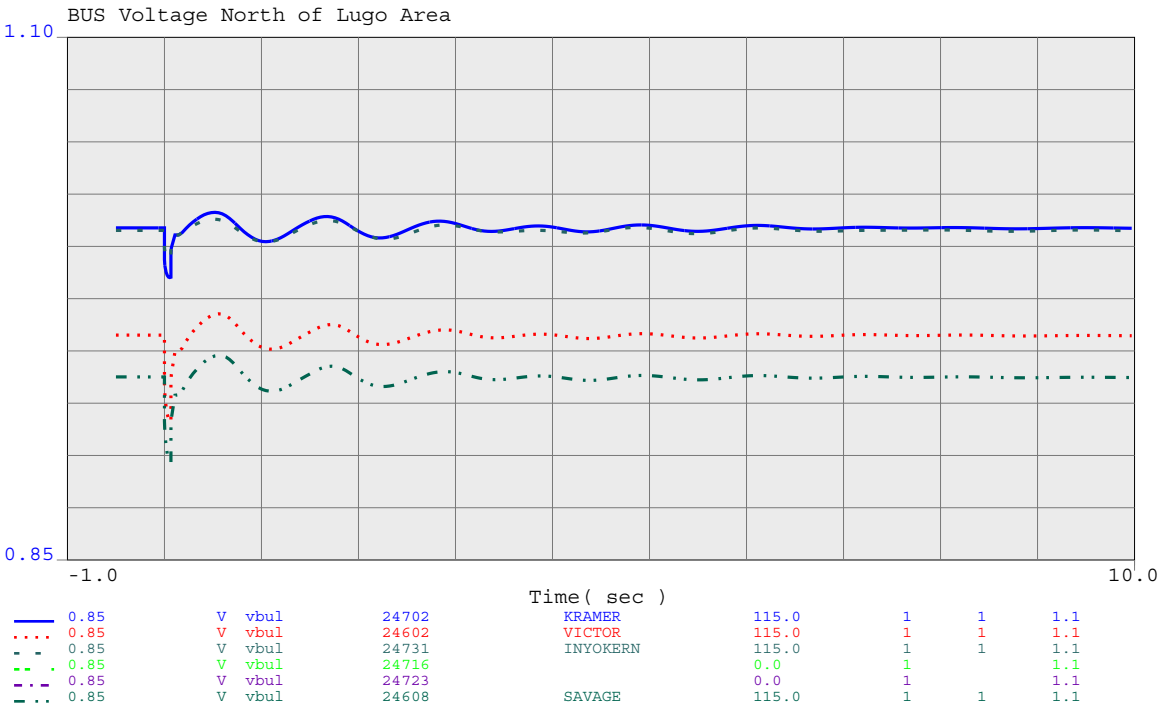

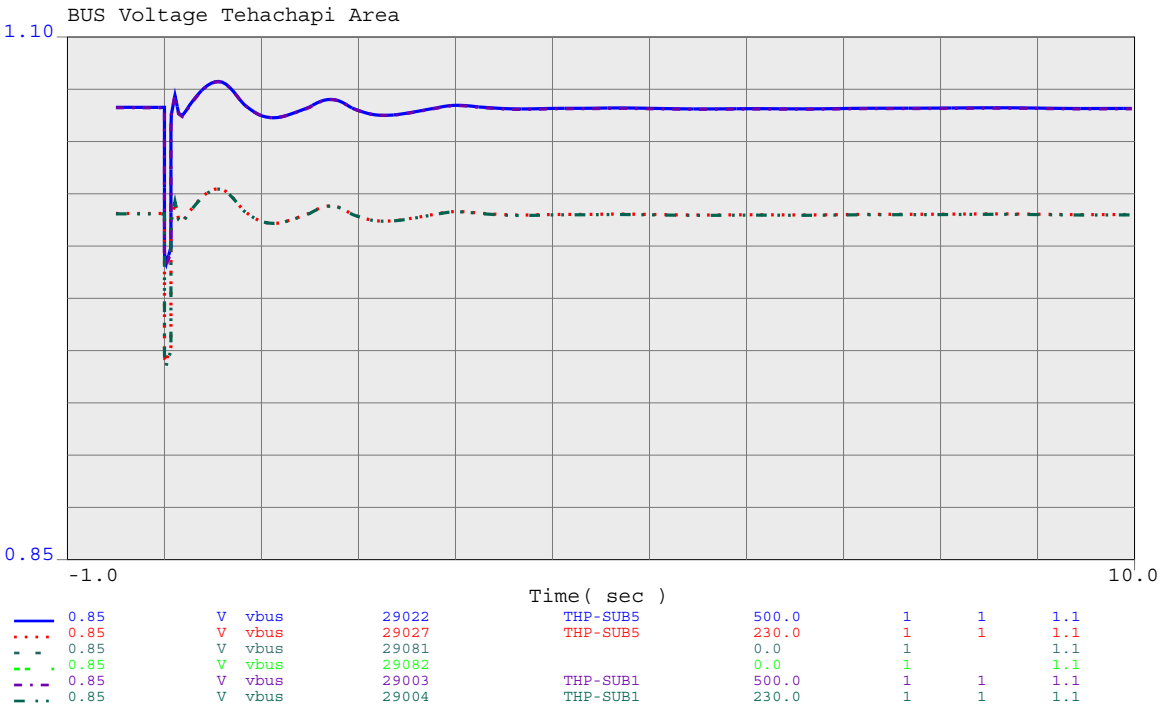

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

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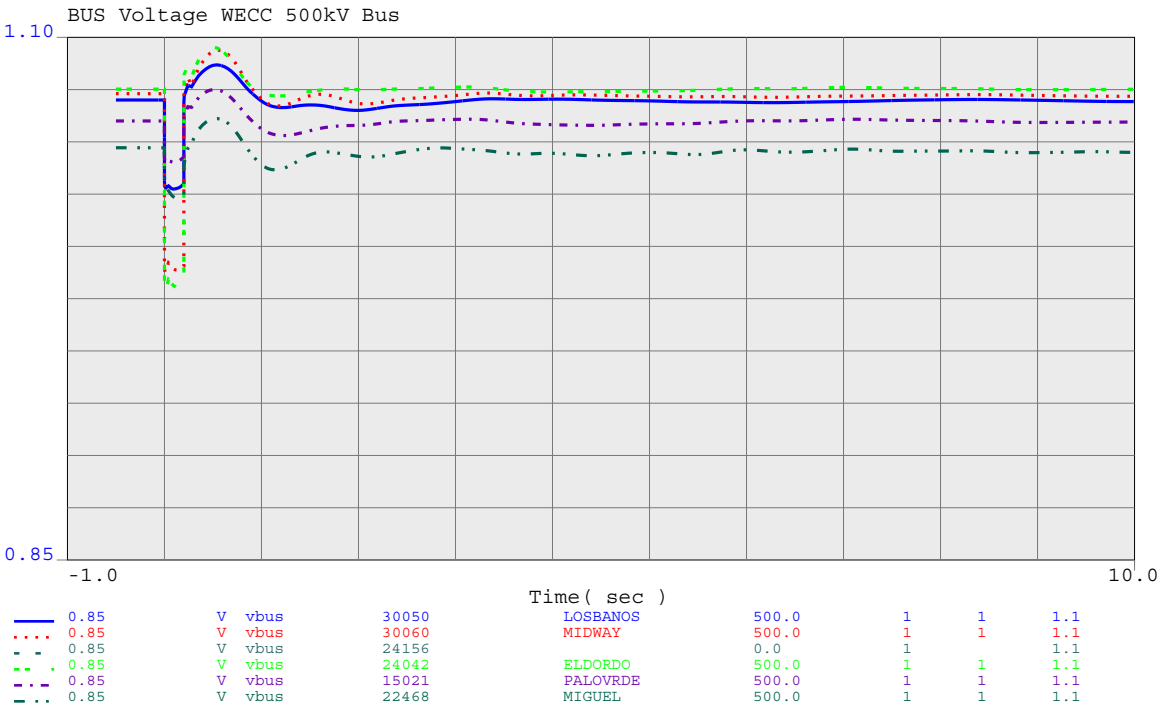
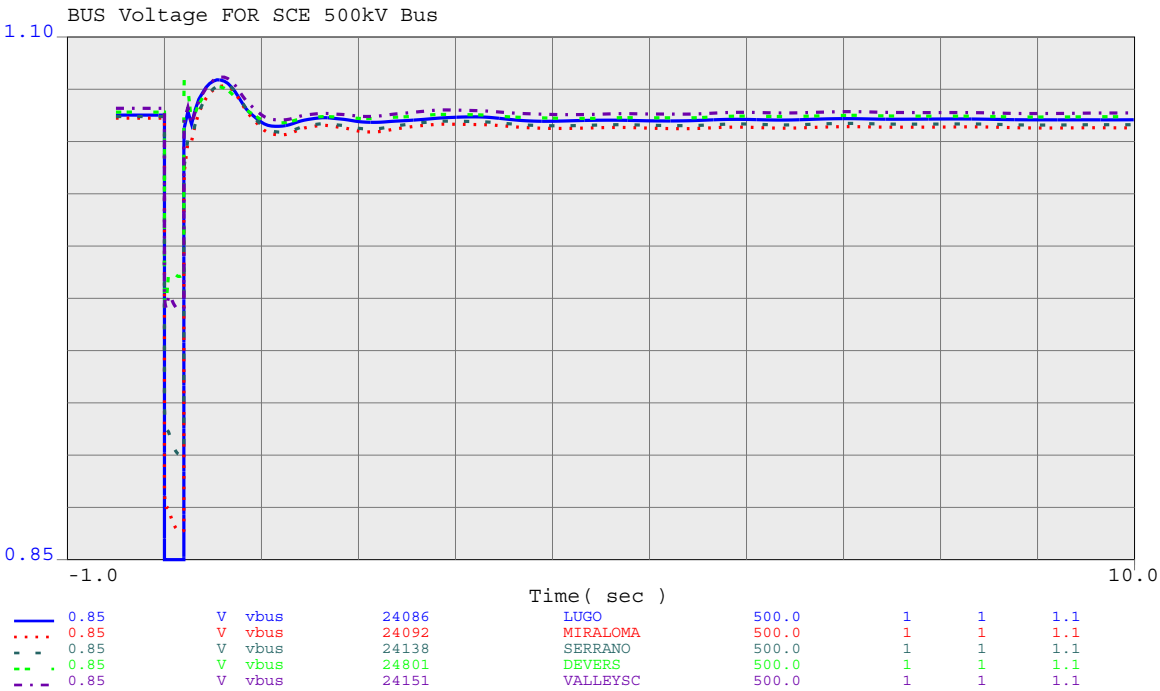




ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

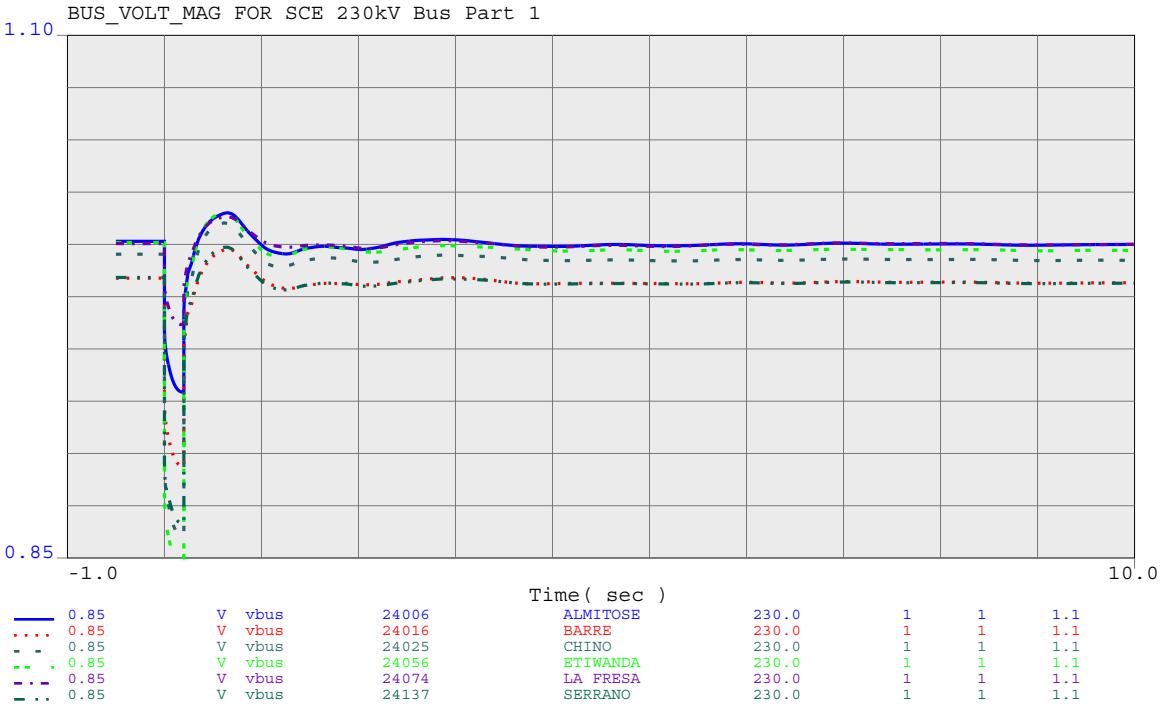
POST PROJECT

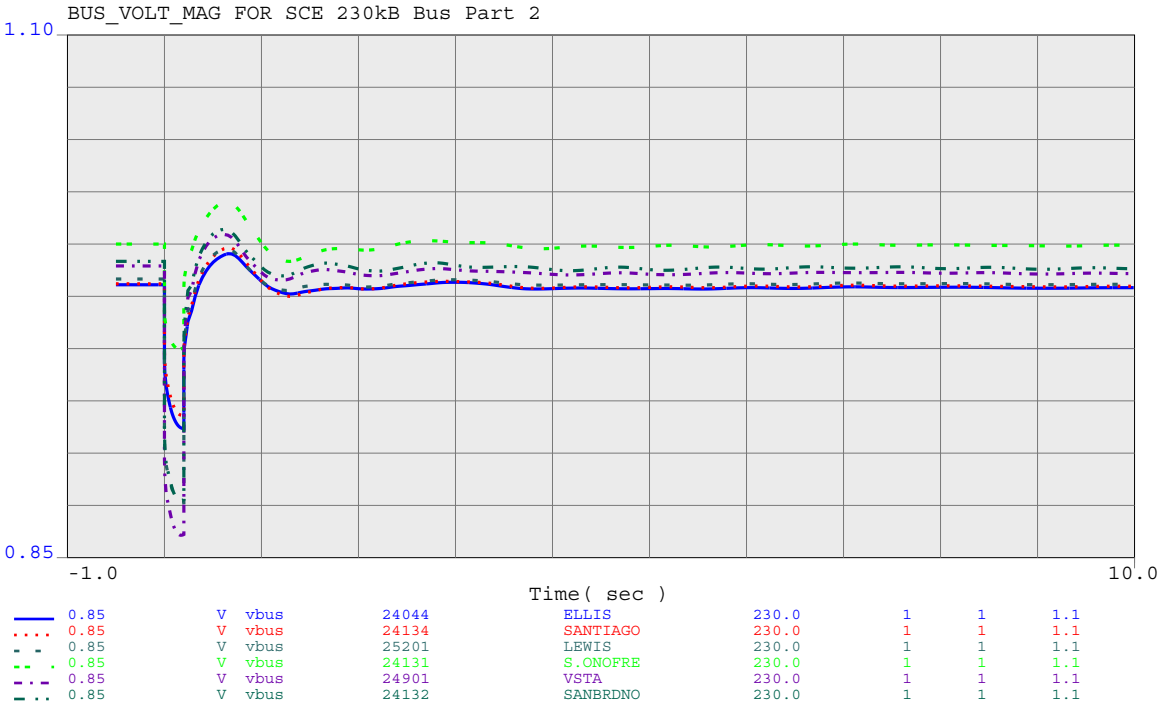
2013 Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

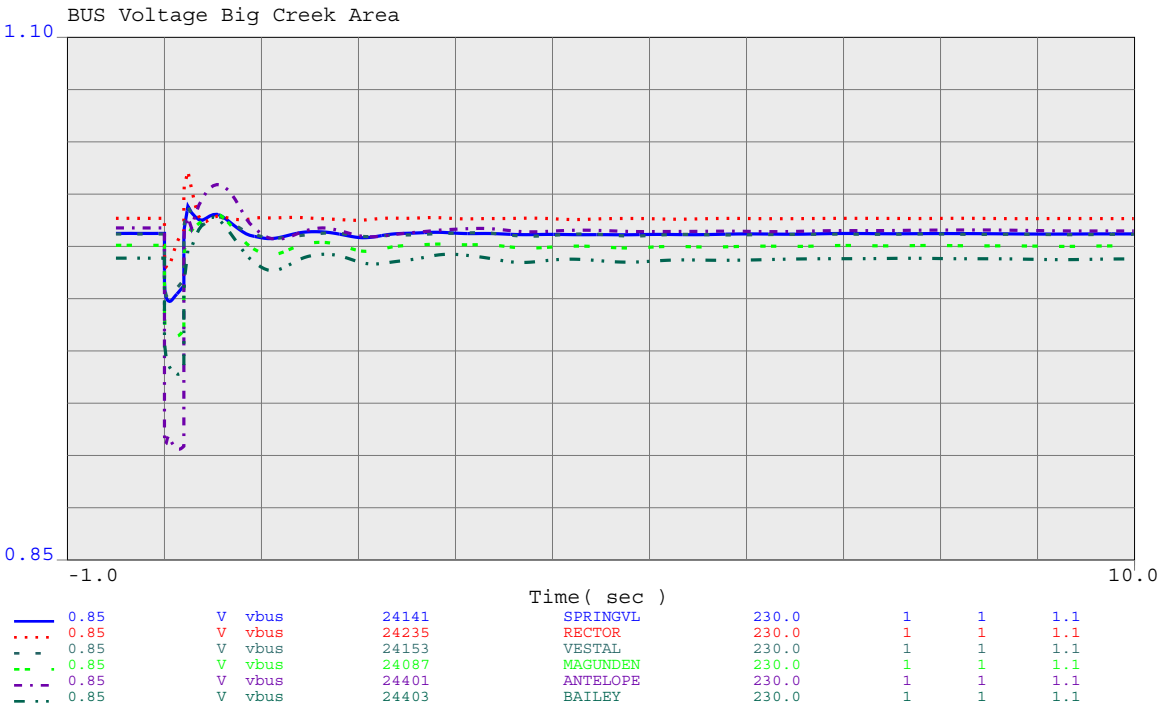
POST PROJECT

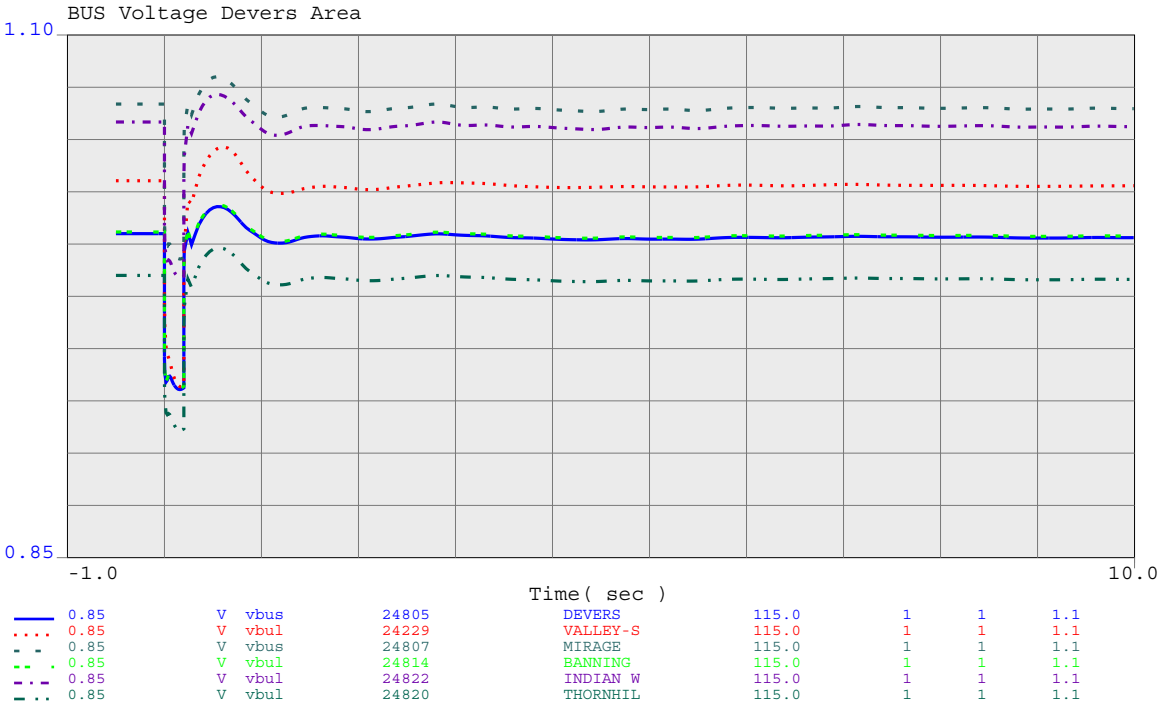
2013 Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

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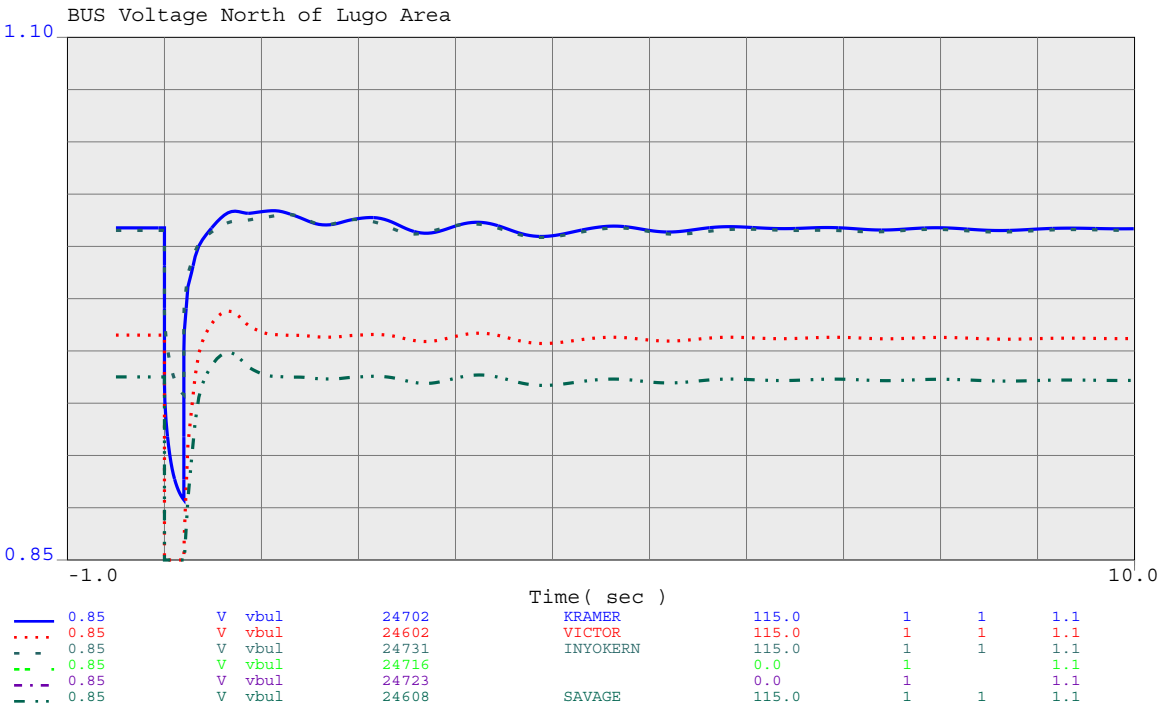
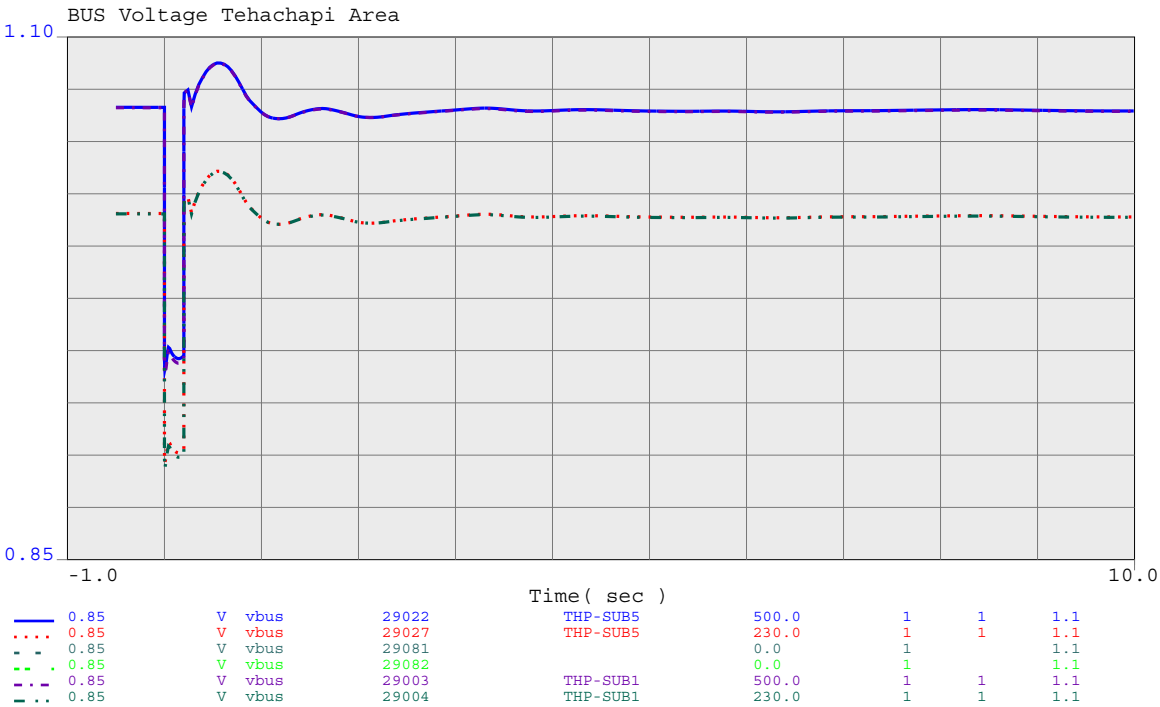
Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

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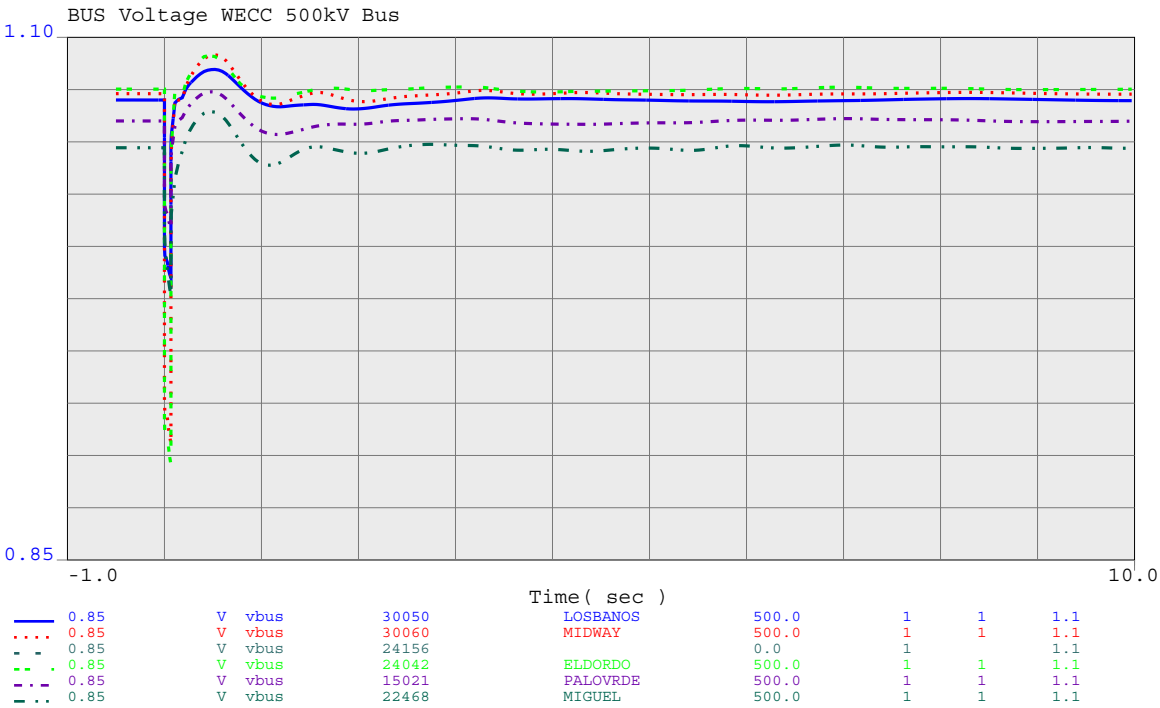
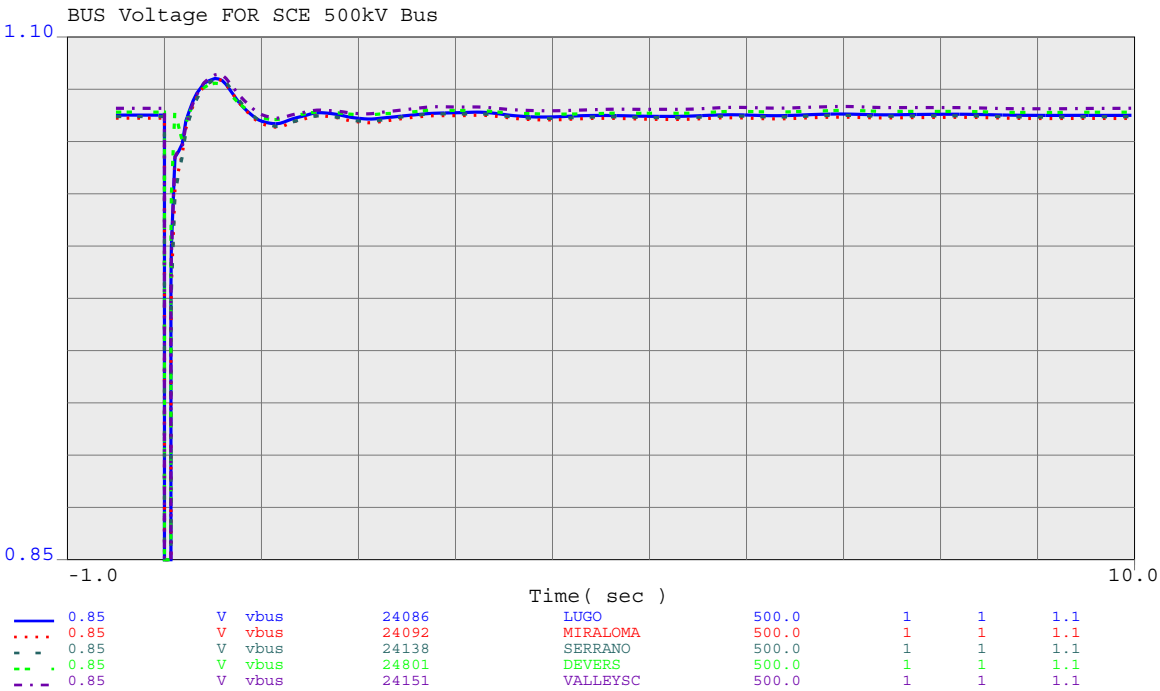




ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

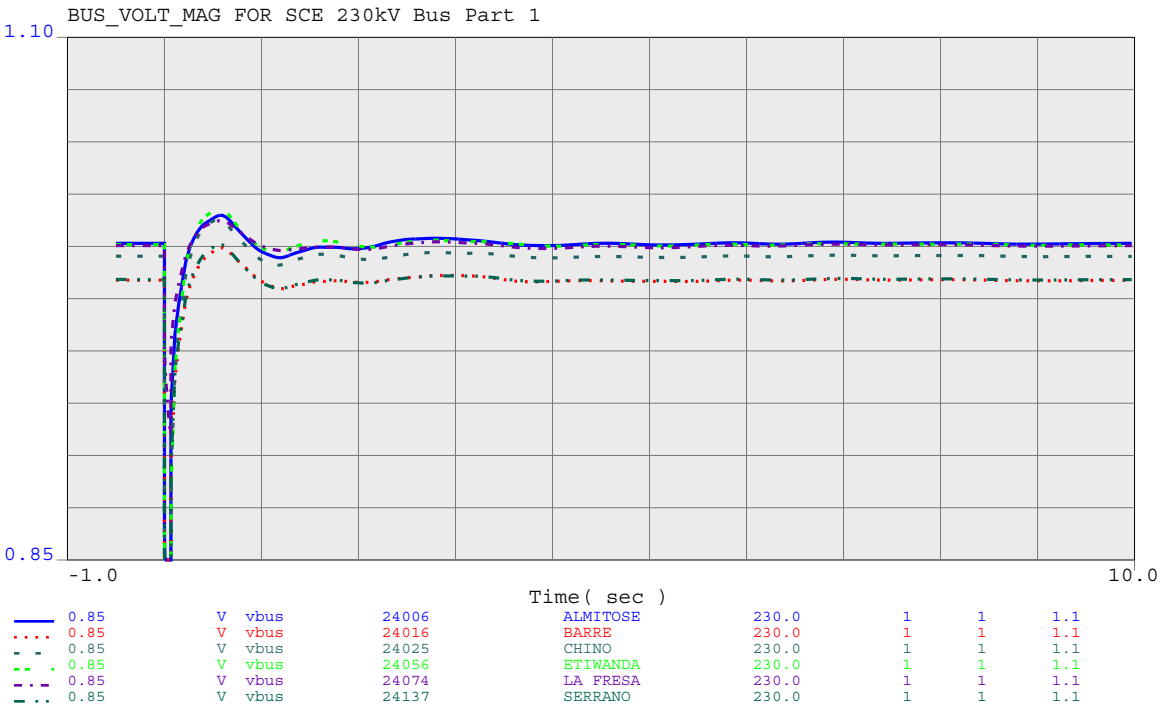
POST PROJECT

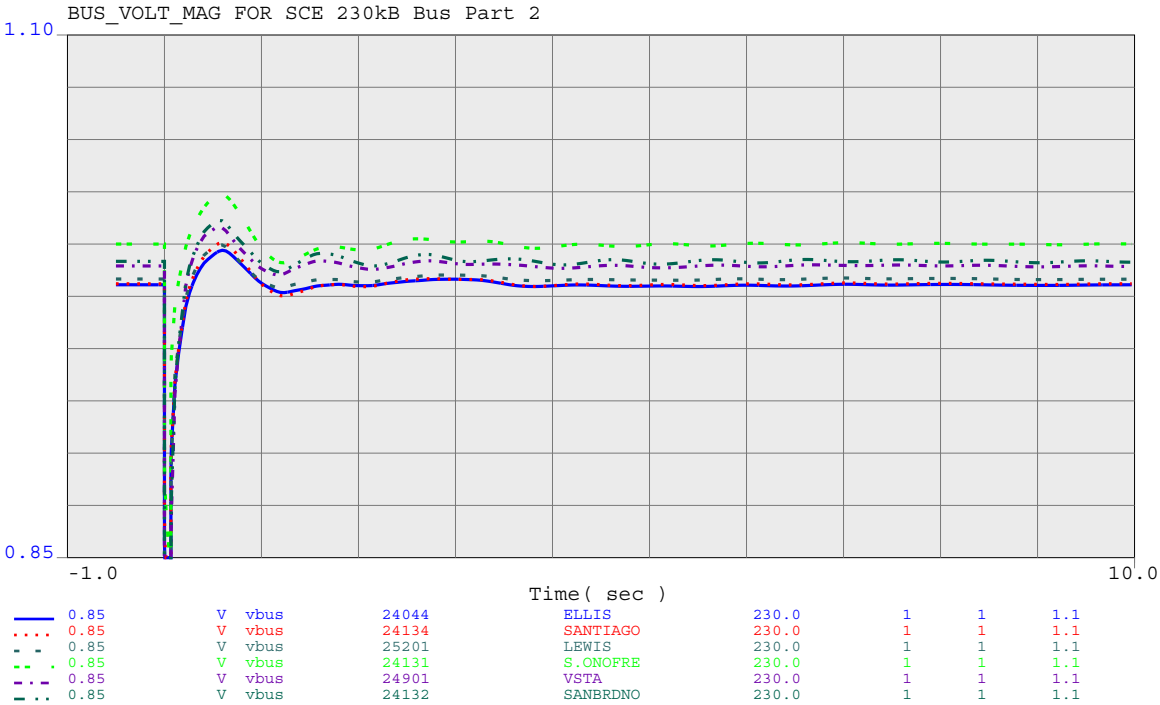
2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

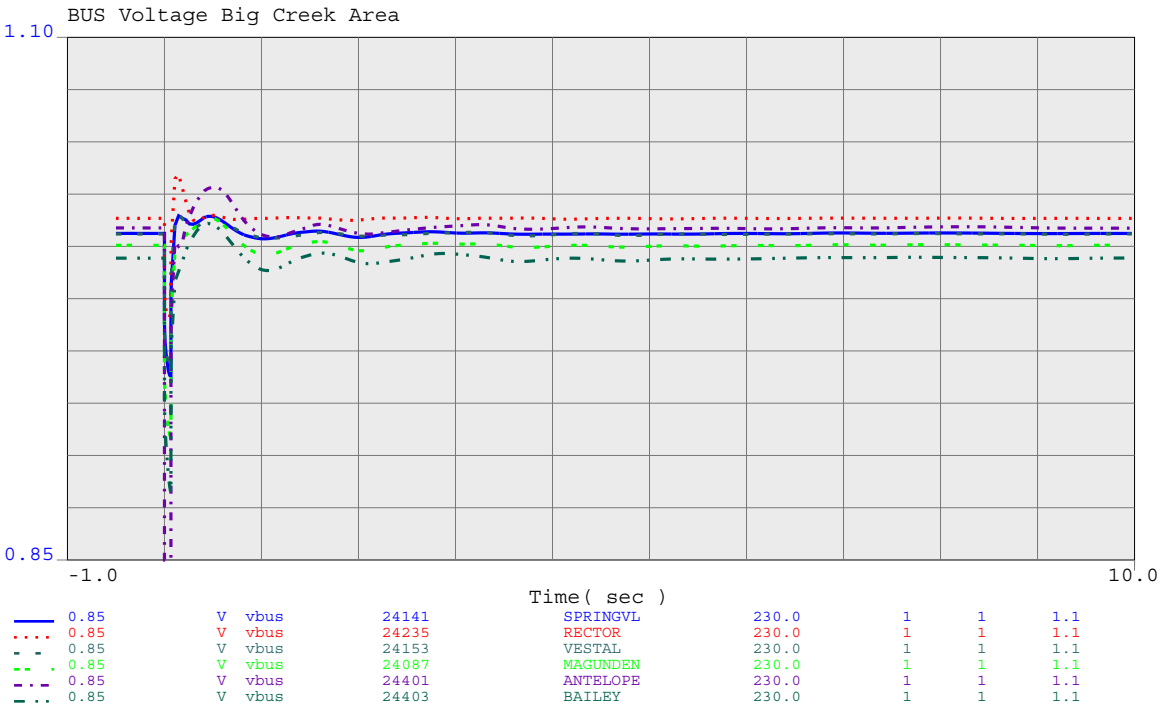
POST PROJECT

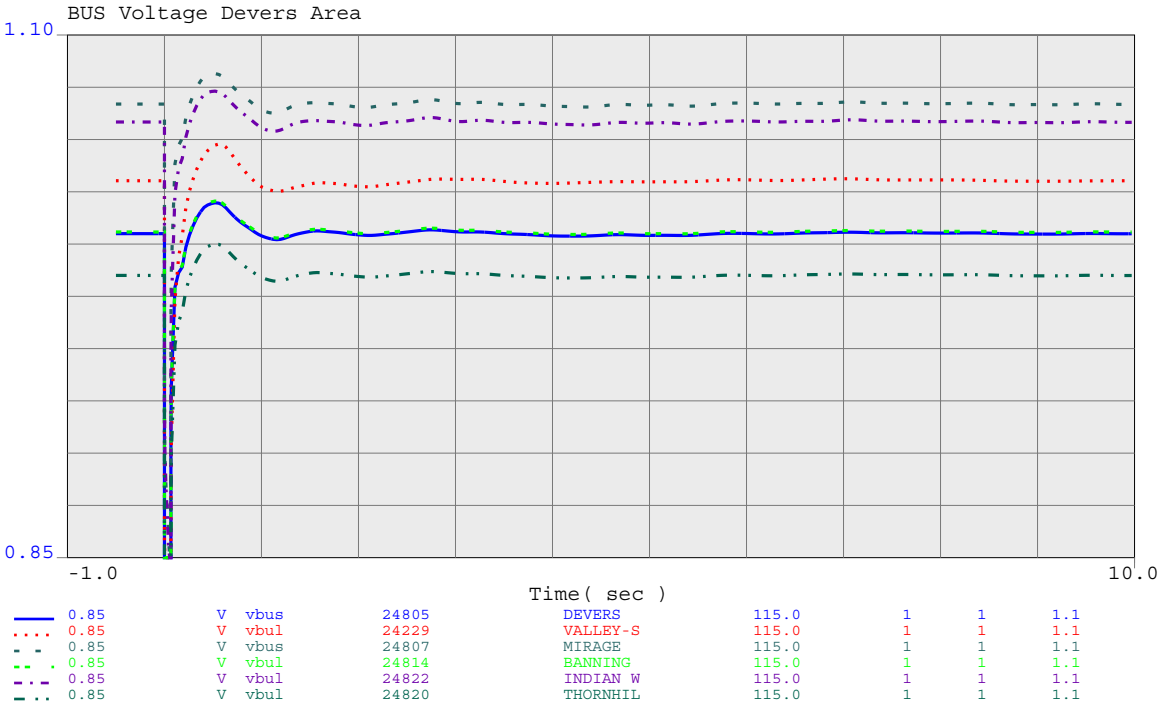
2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

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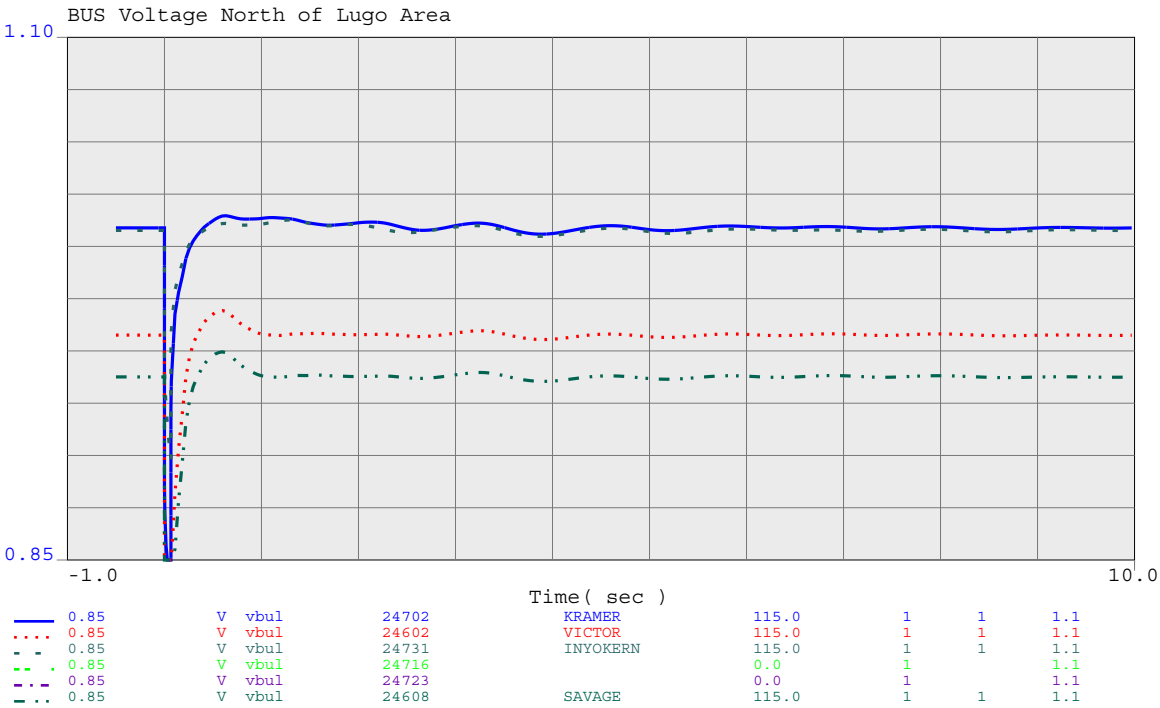
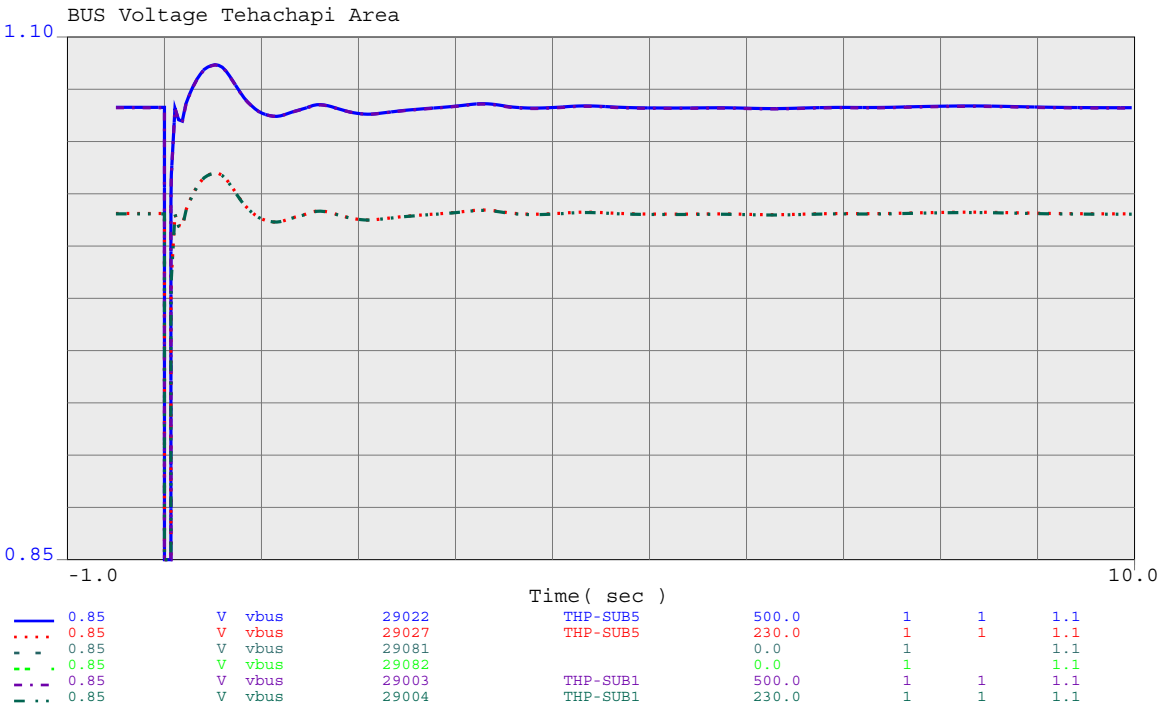
Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

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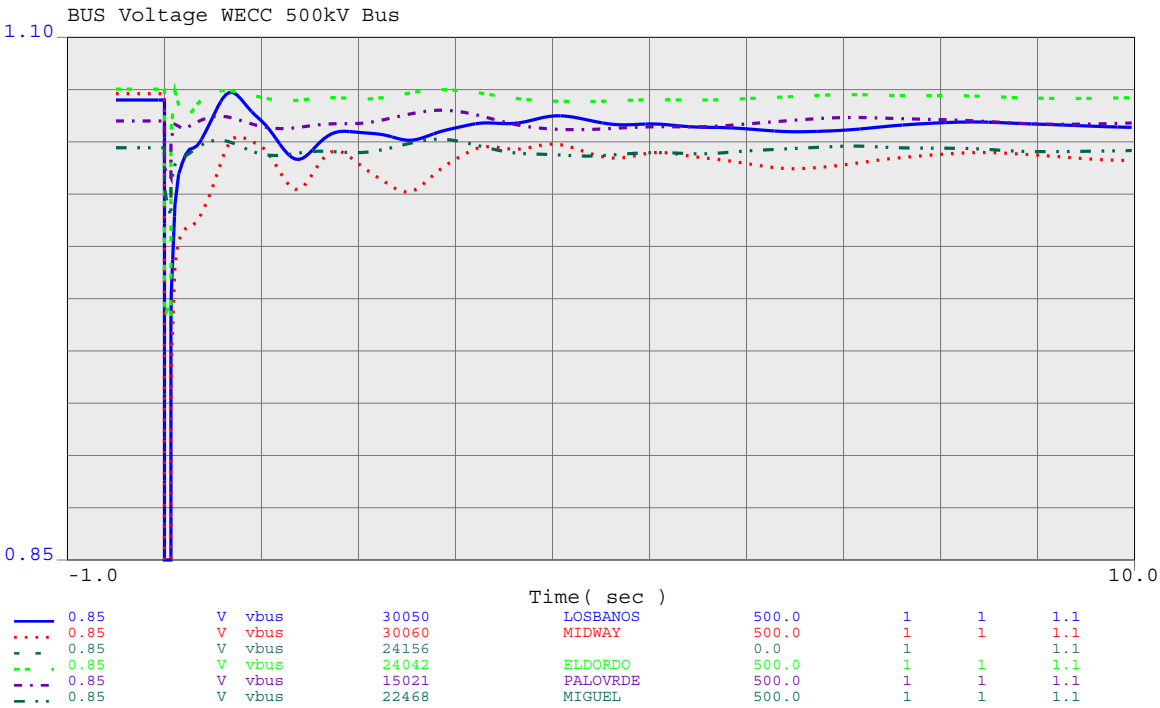
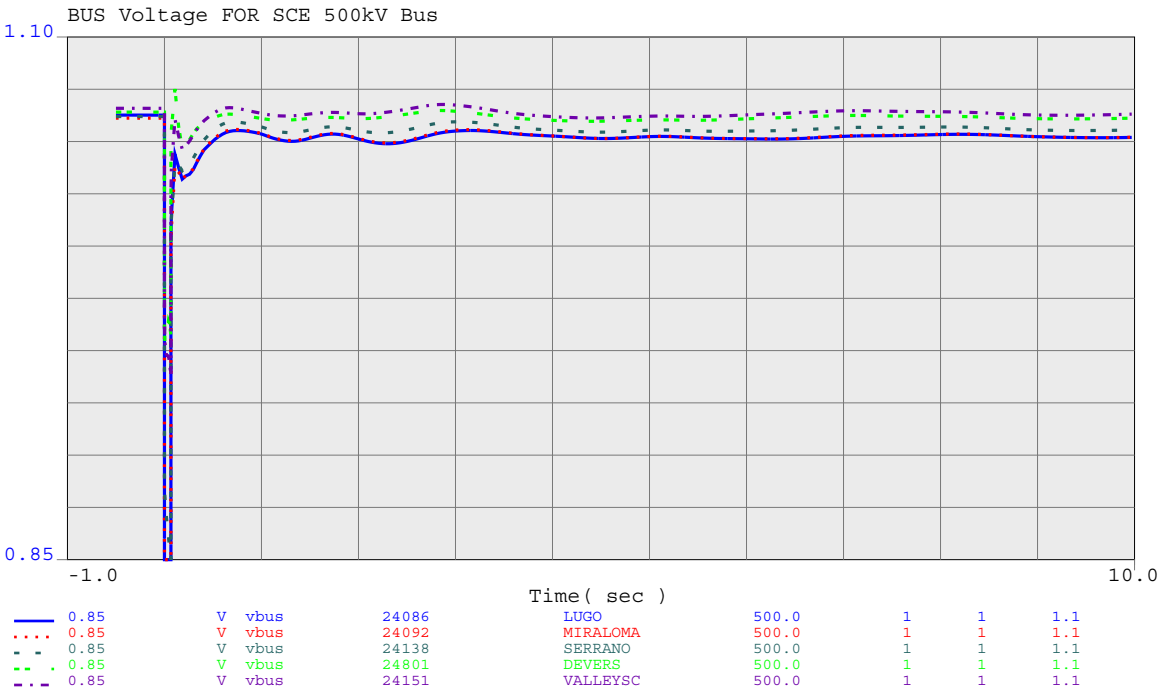
Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

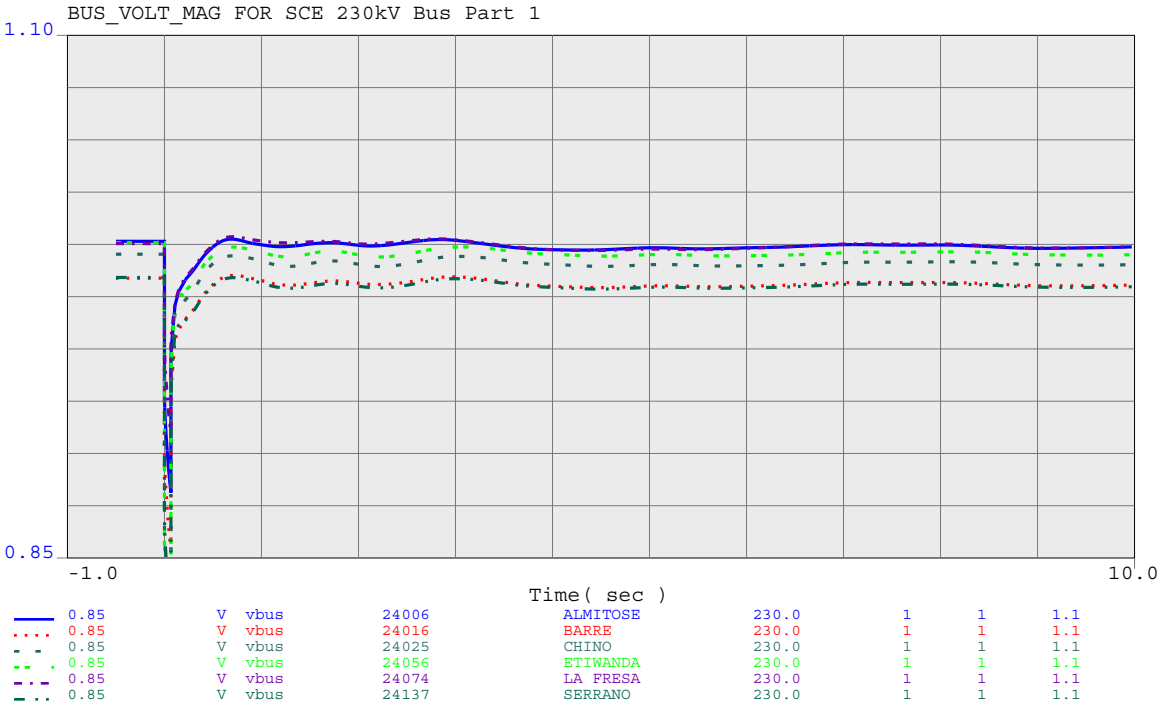
POST PROJECT

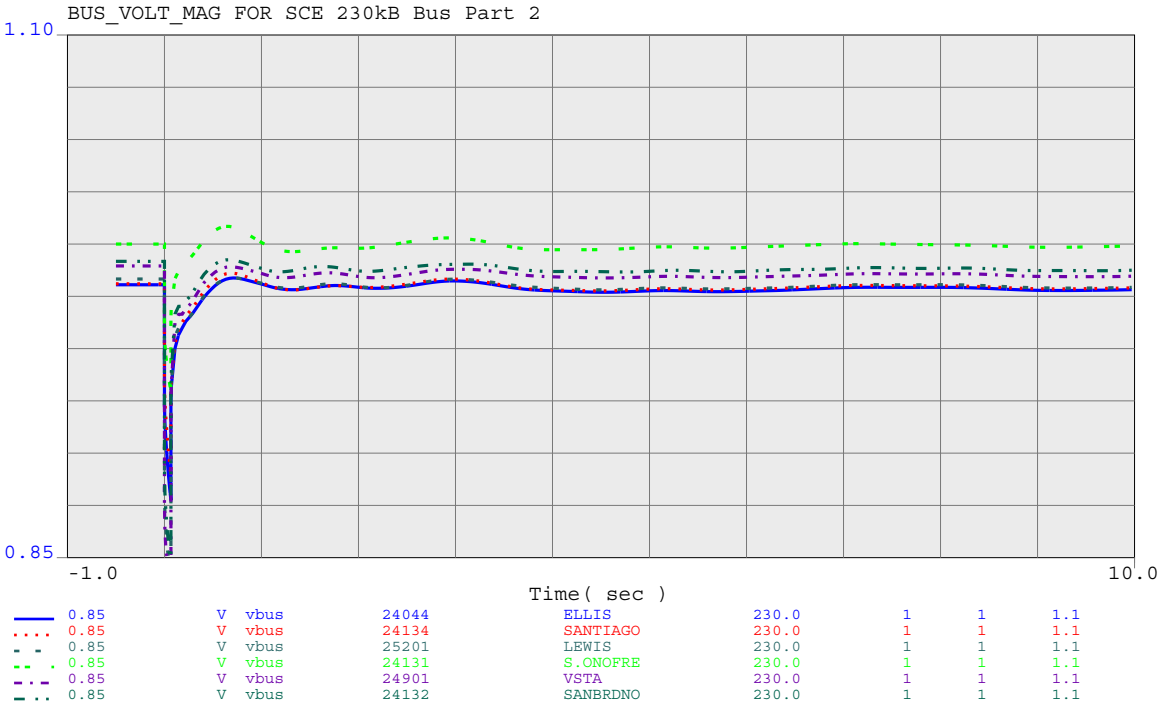
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

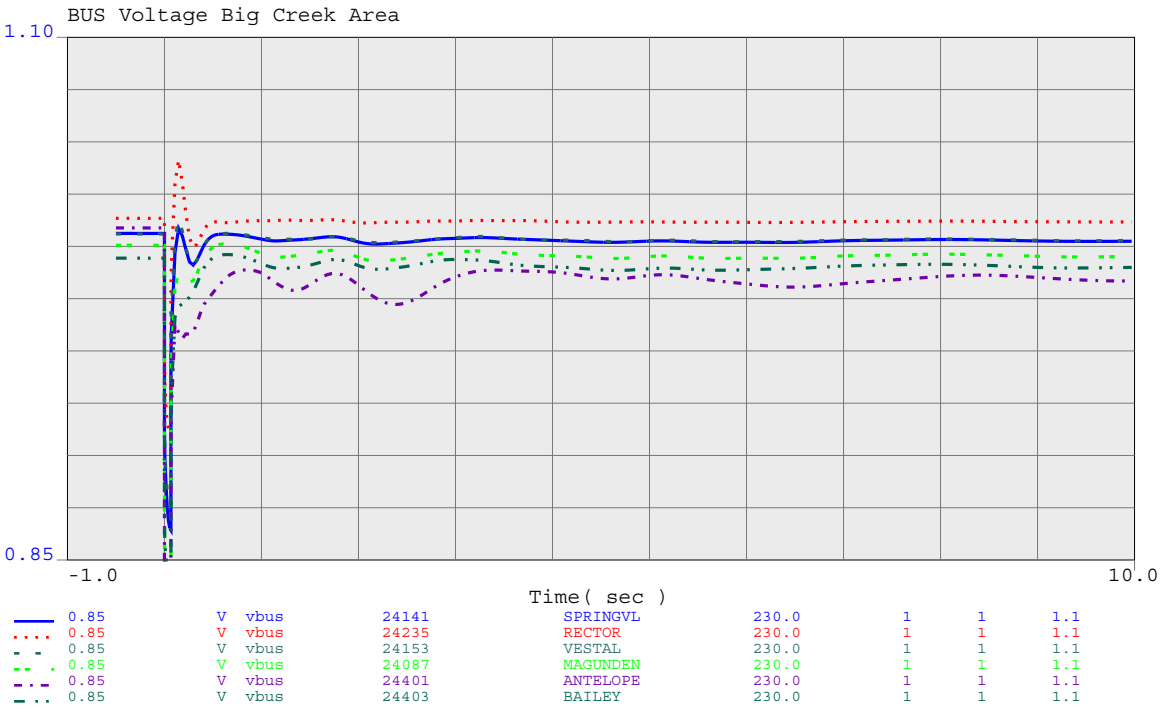
POST PROJECT

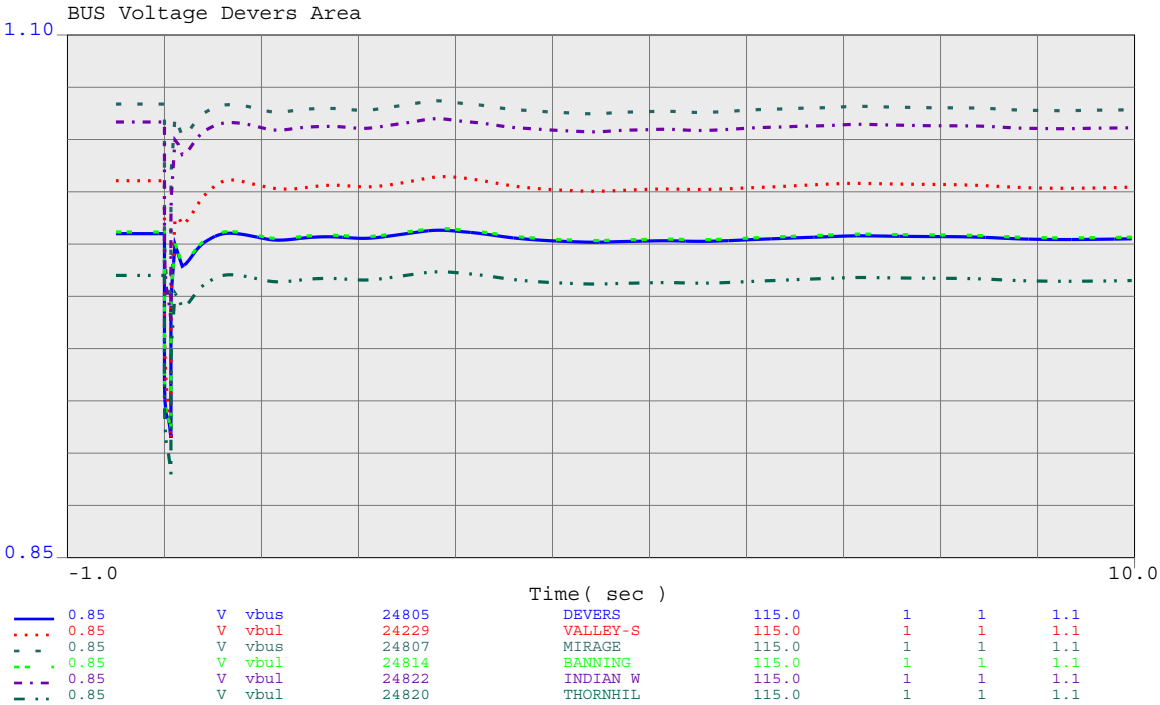
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

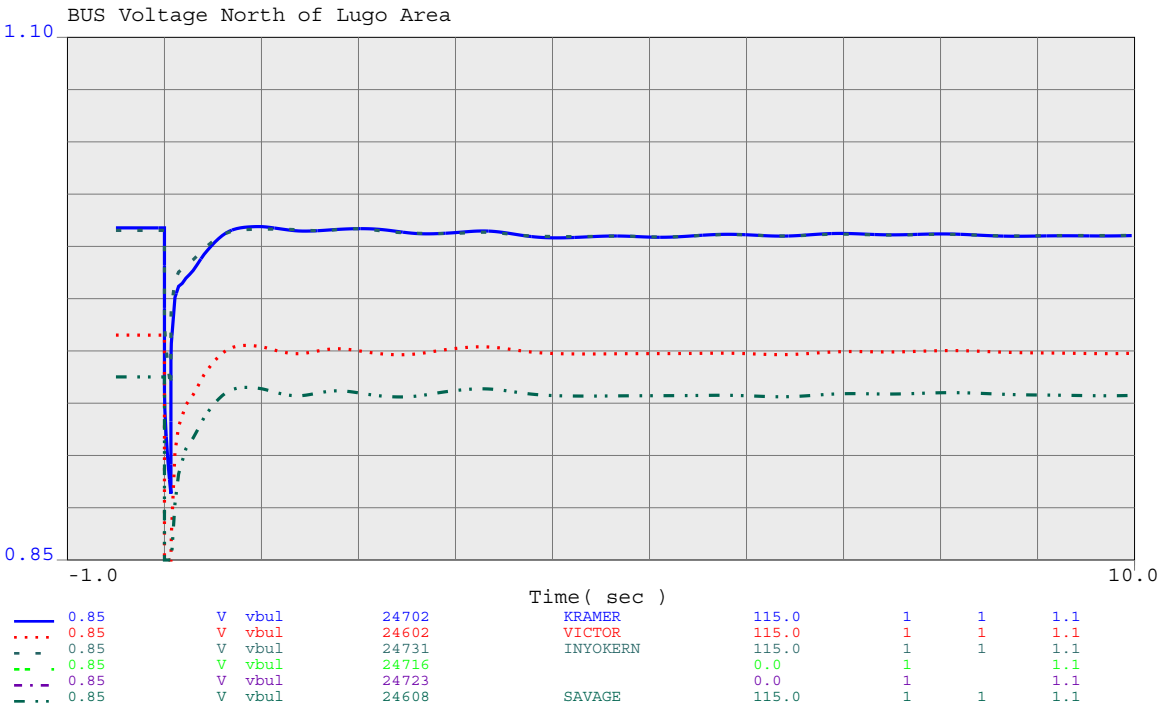
POST PROJECT

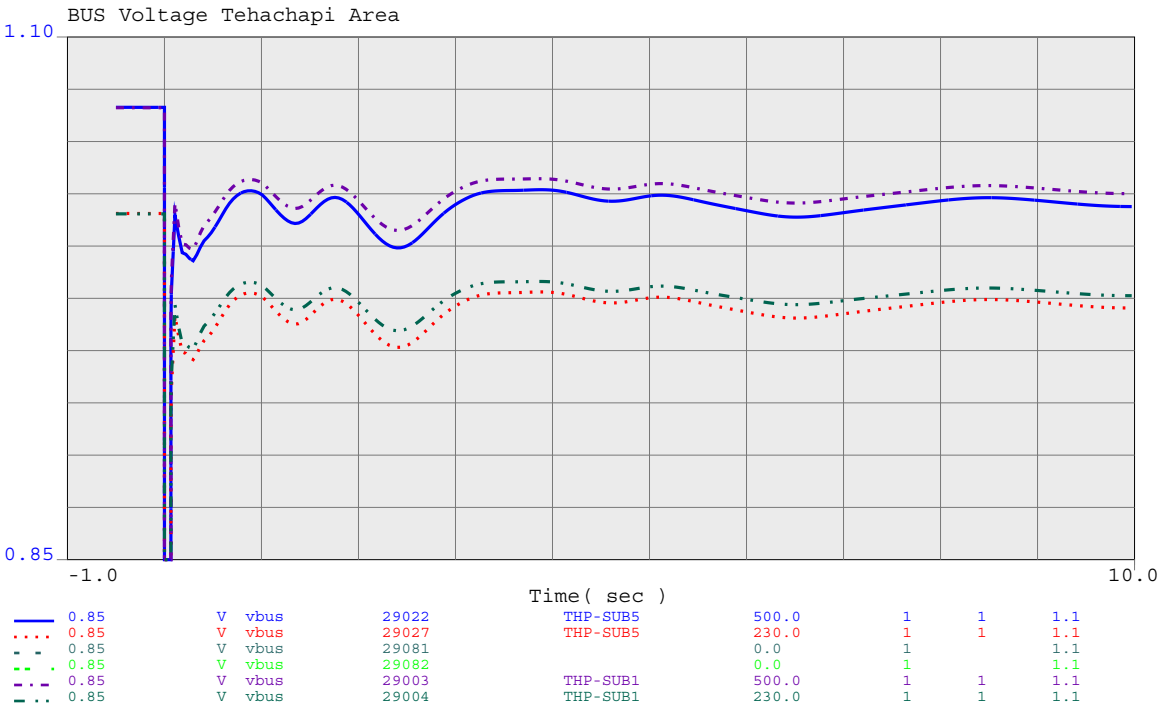
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

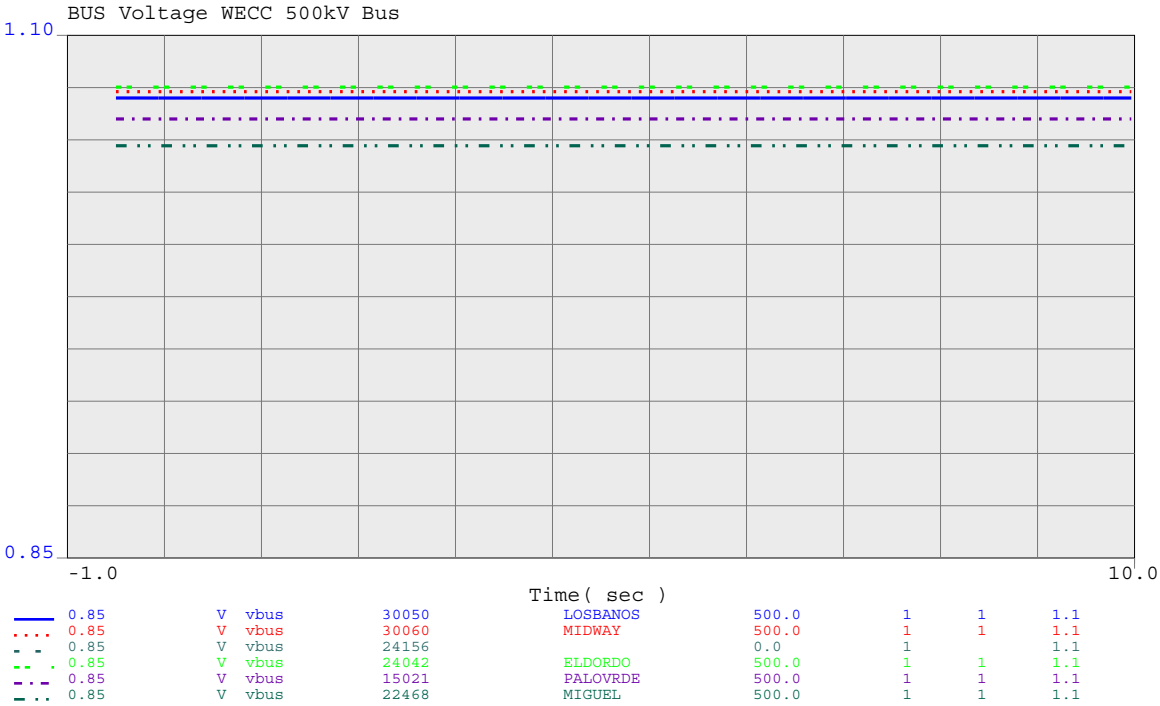
POST PROJECT

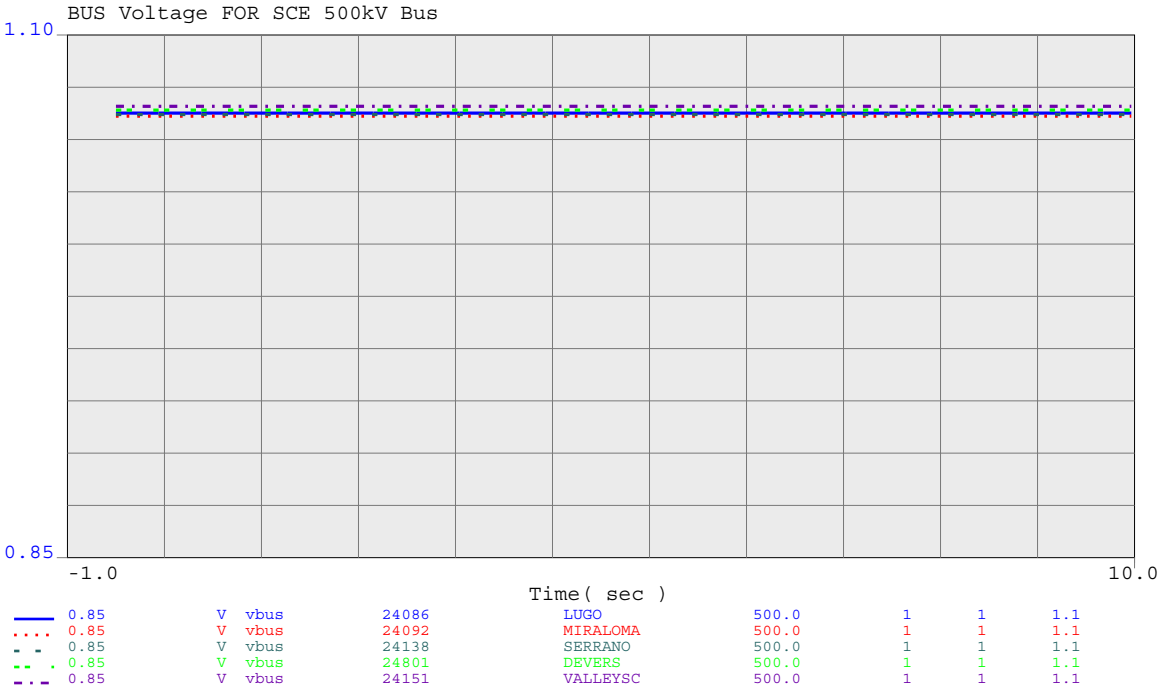
2013 Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

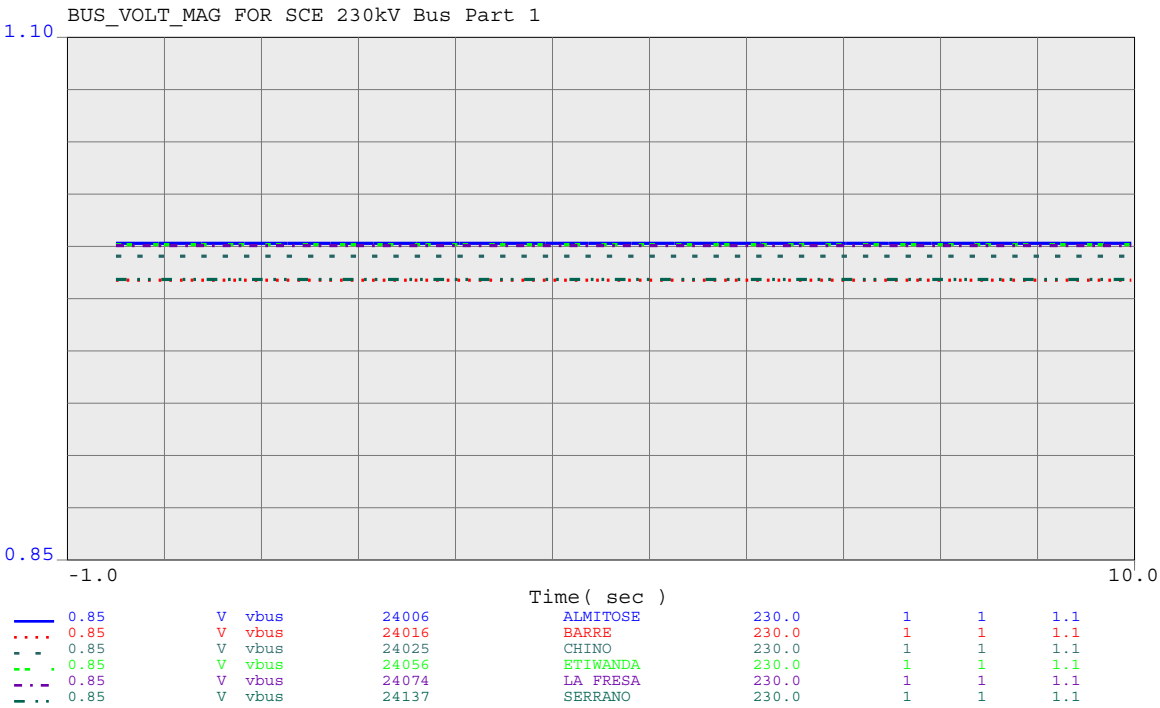
POST PROJECT

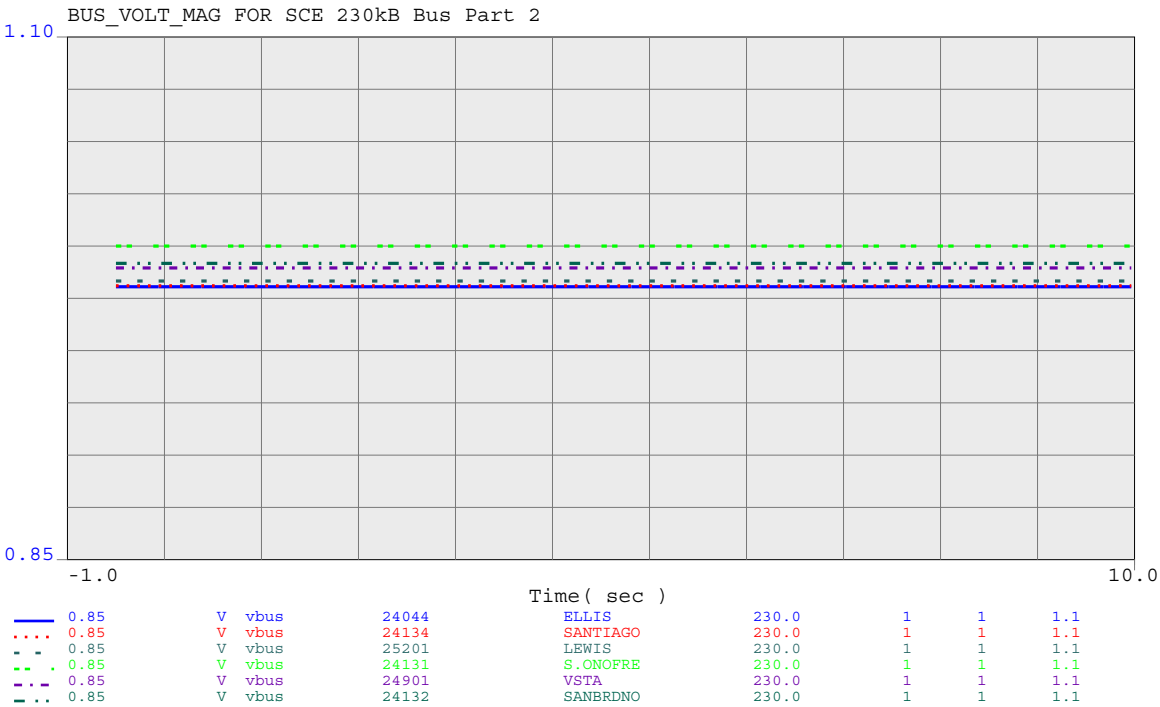
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

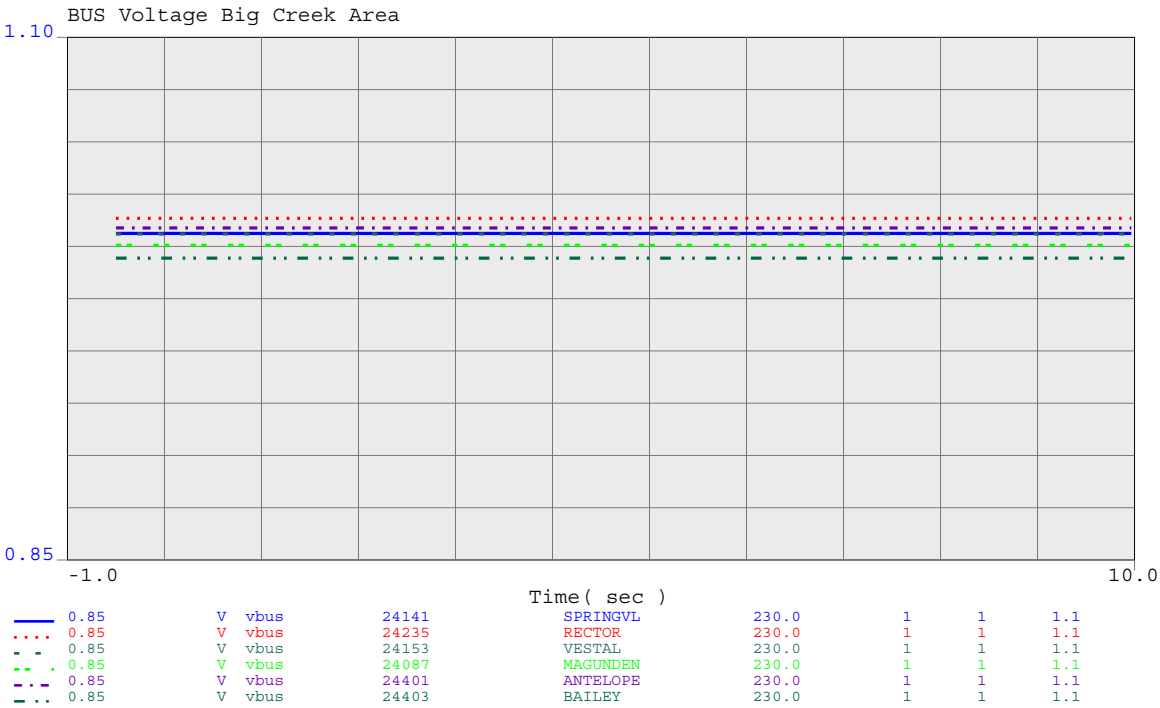
POST PROJECT

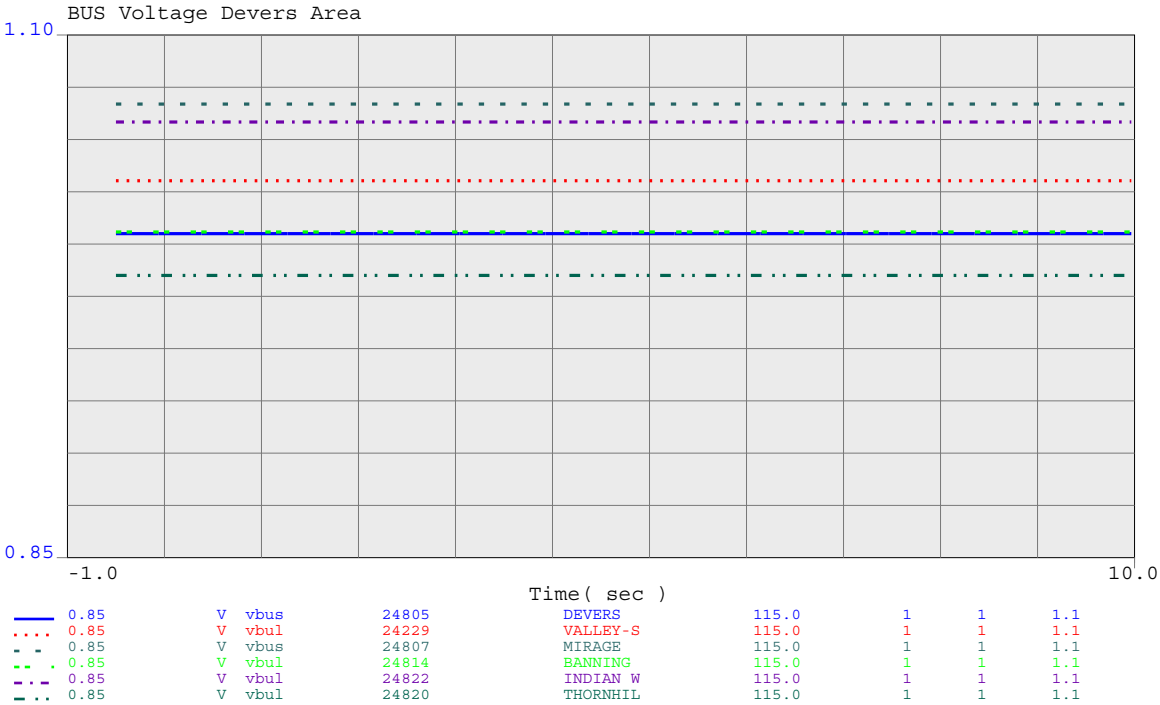
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

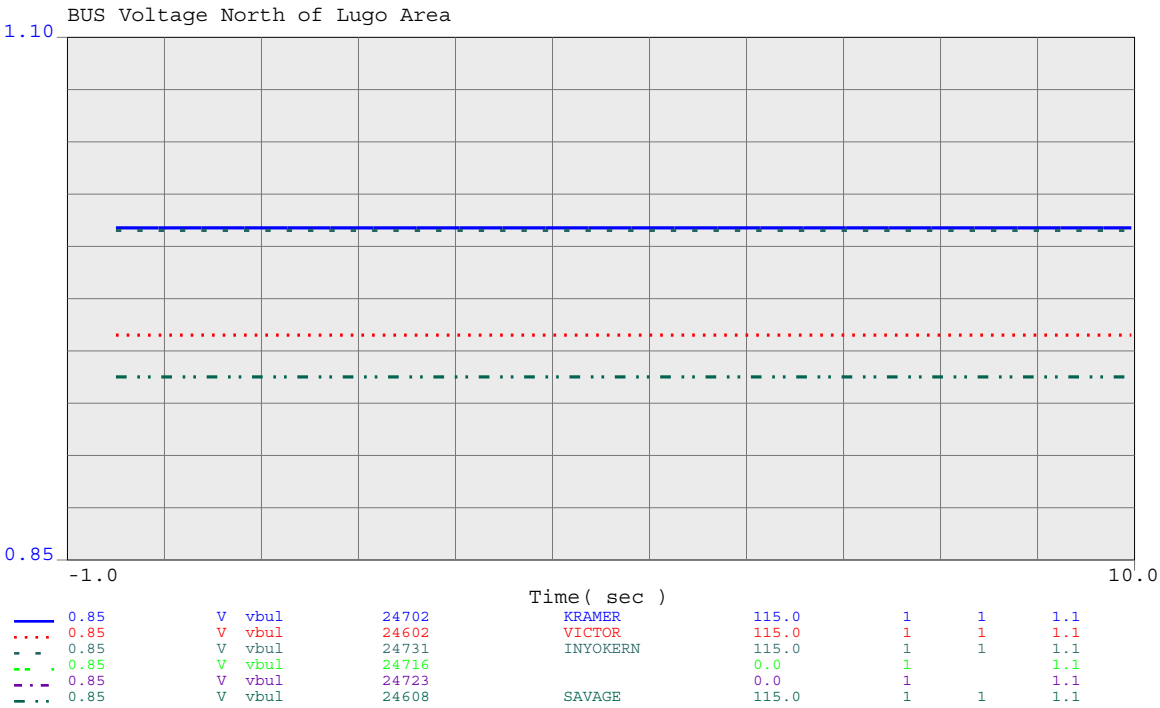
POST PROJECT

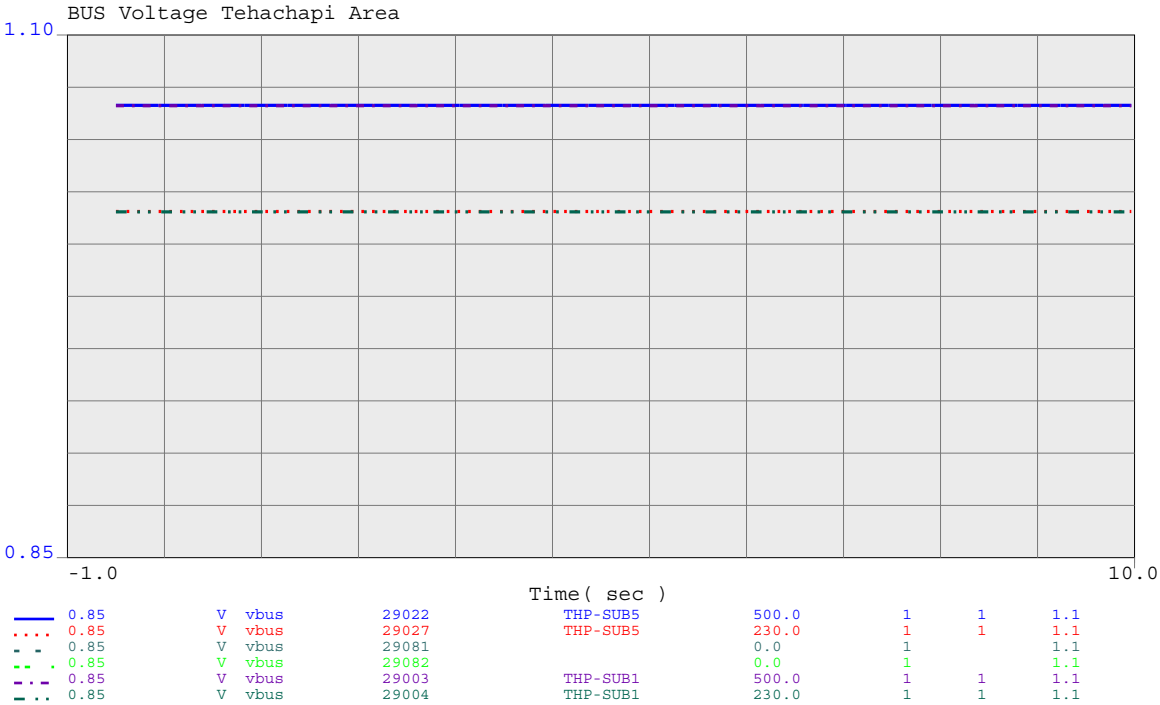
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

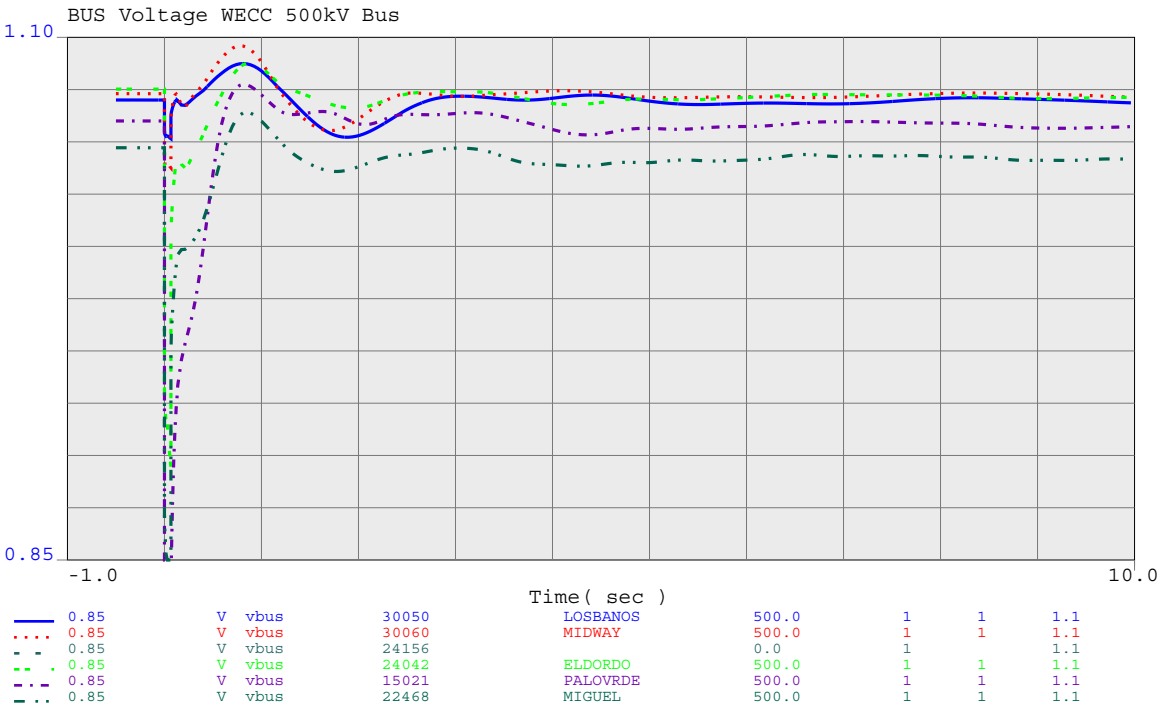
POST PROJECT

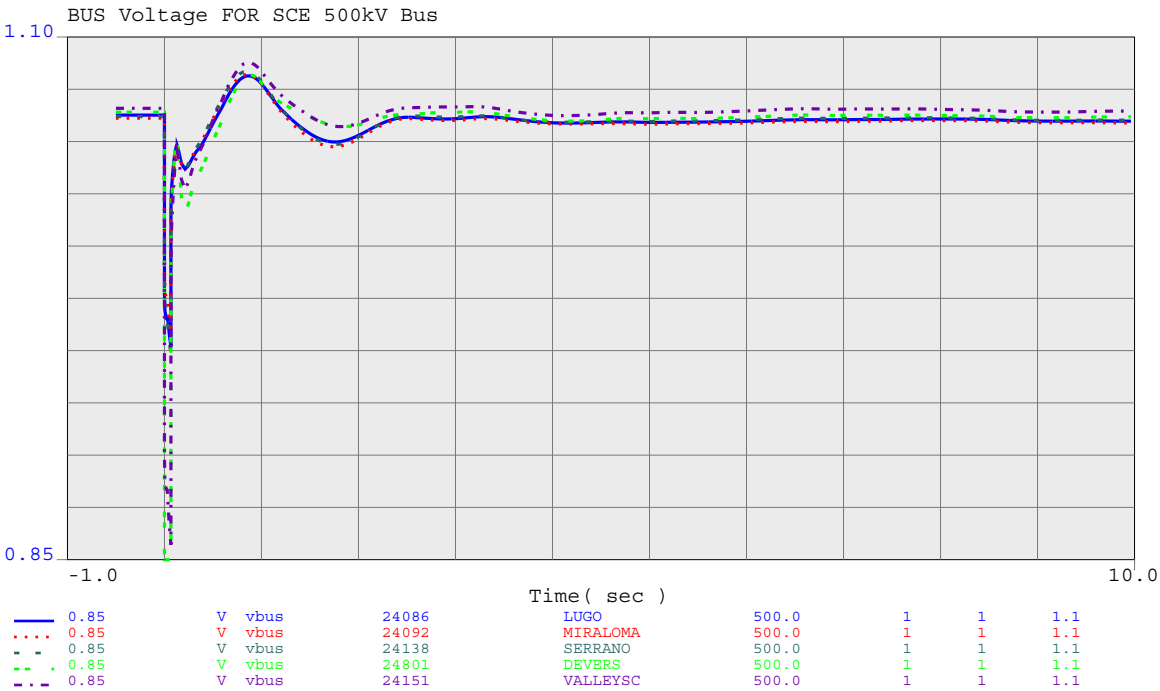
2013 Peak Case

No Fault

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

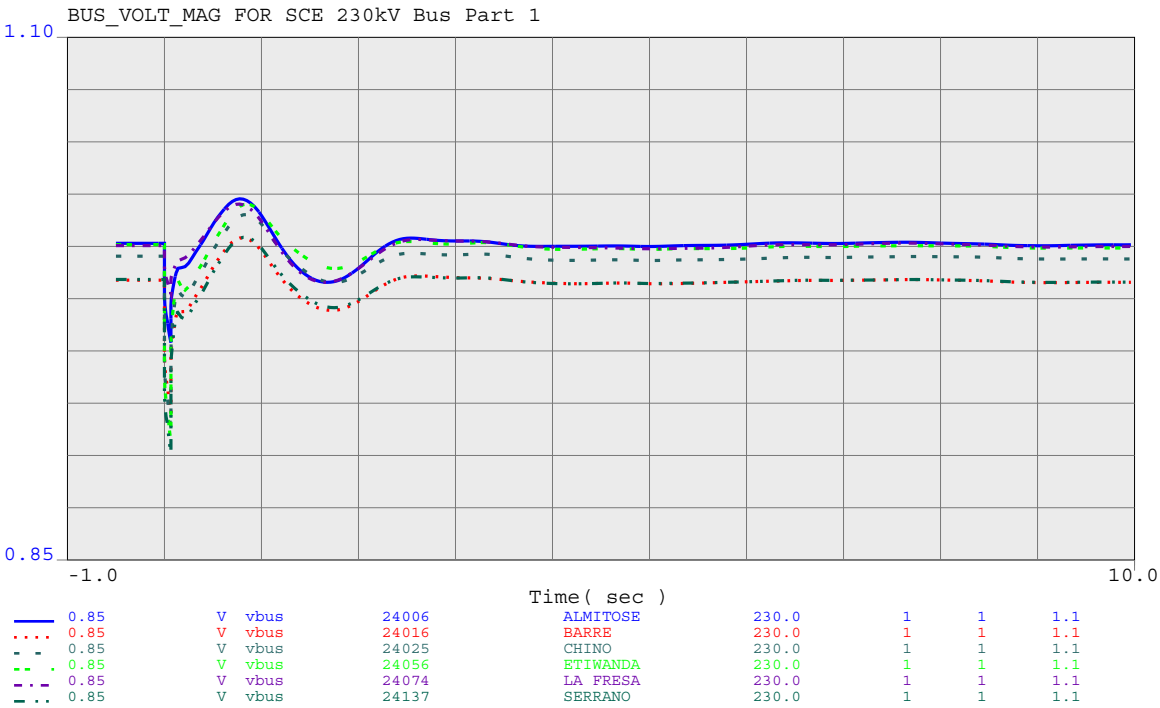
POST PROJECT

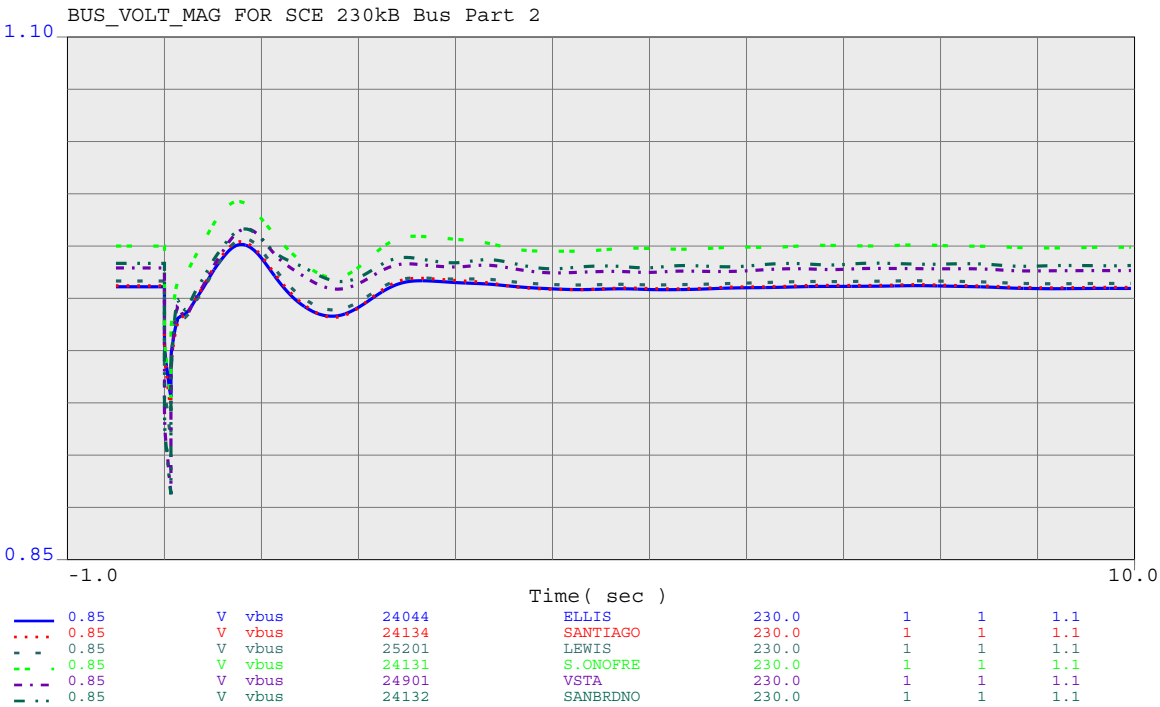
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

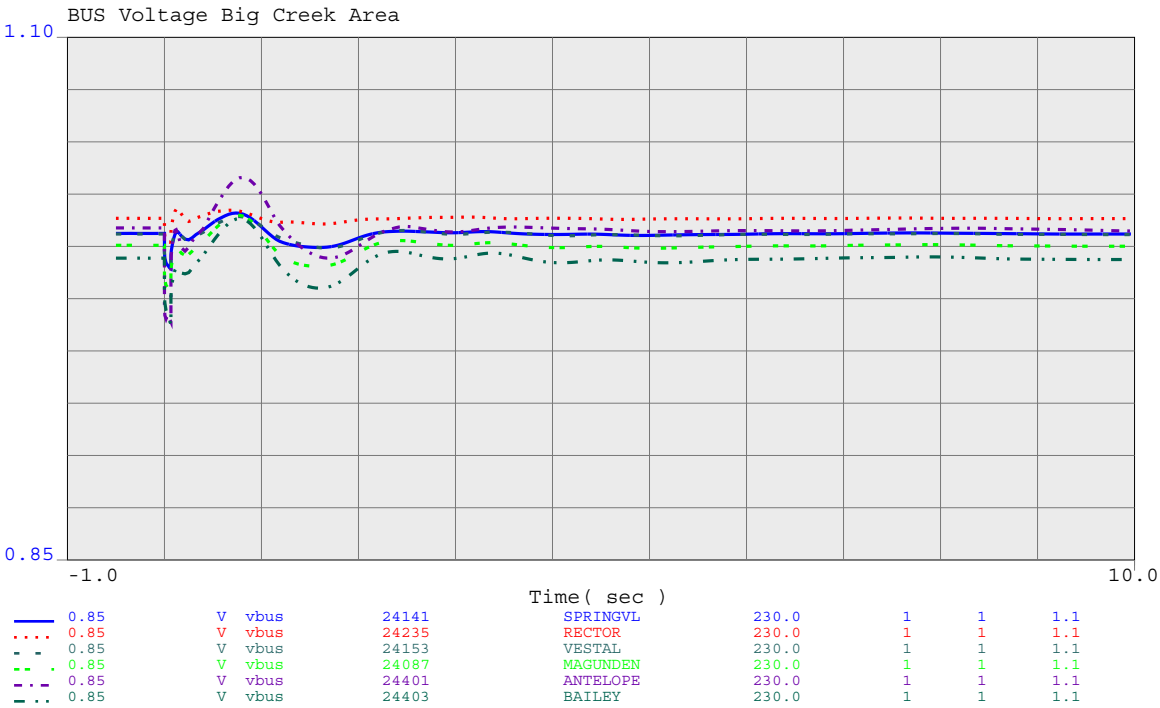
POST PROJECT

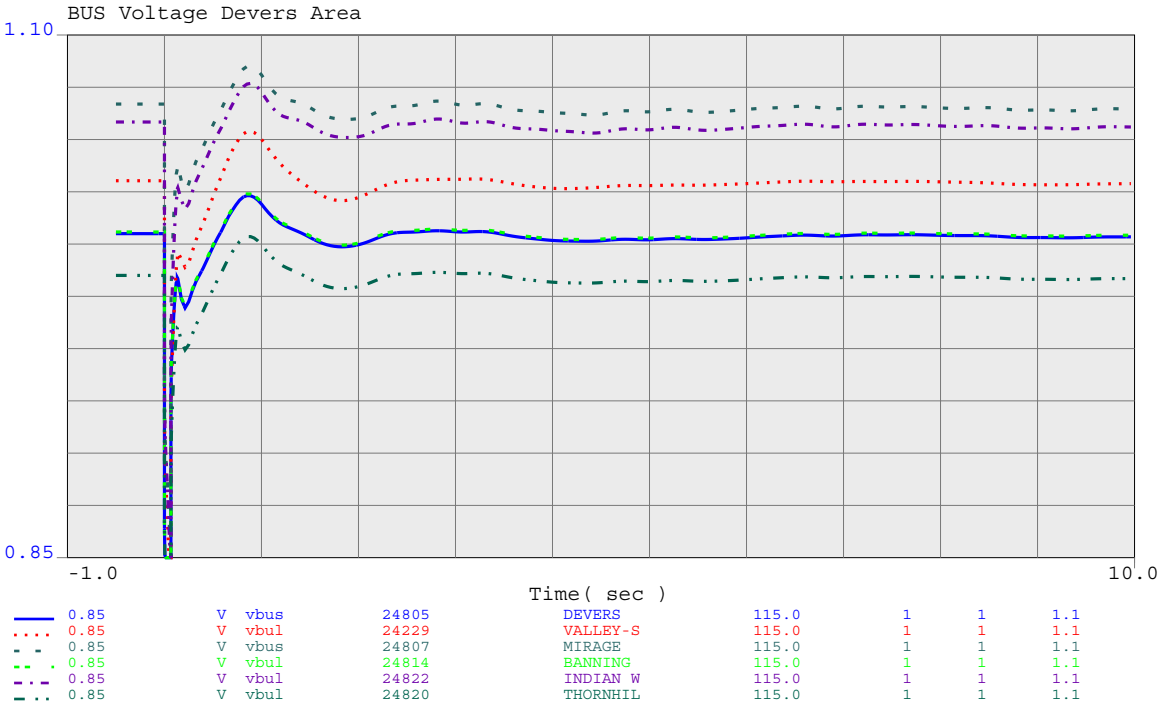
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

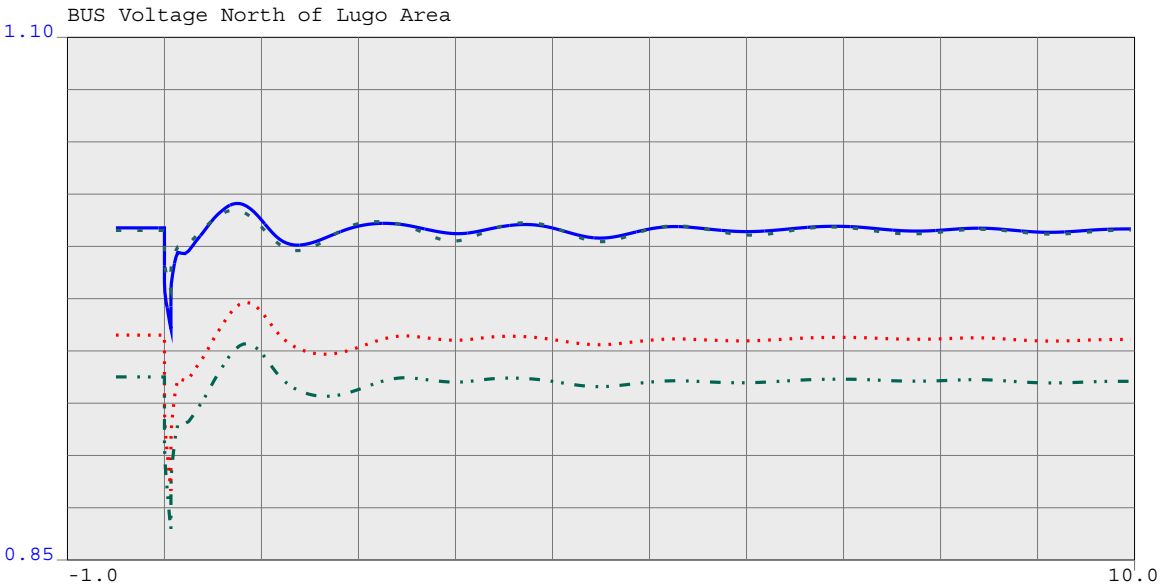
POST PROJECT

2013 Peak Case

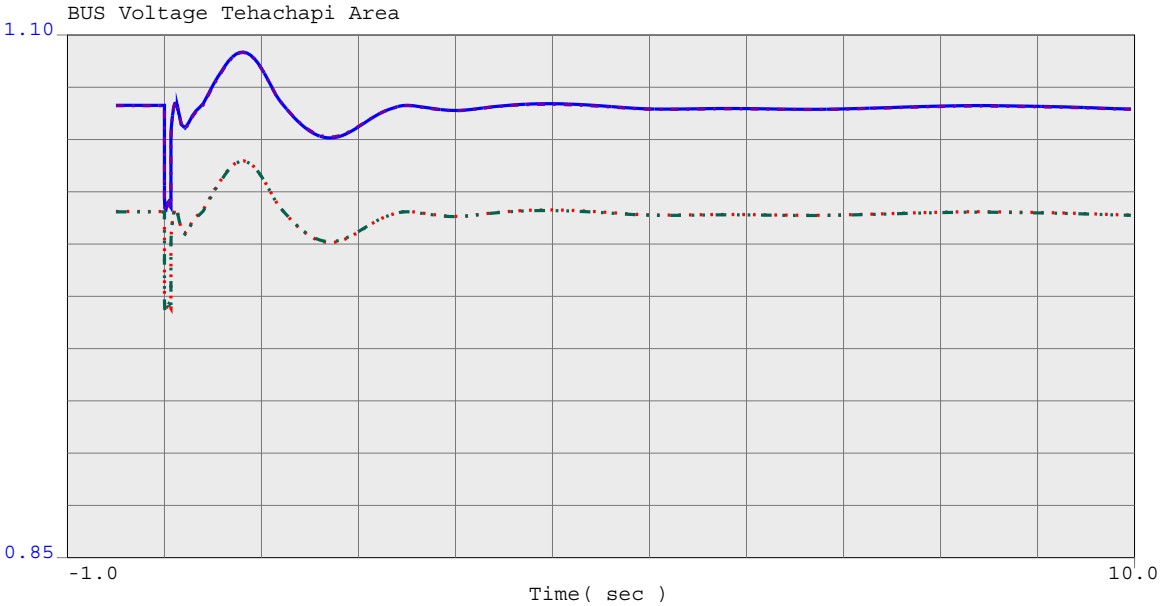
Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

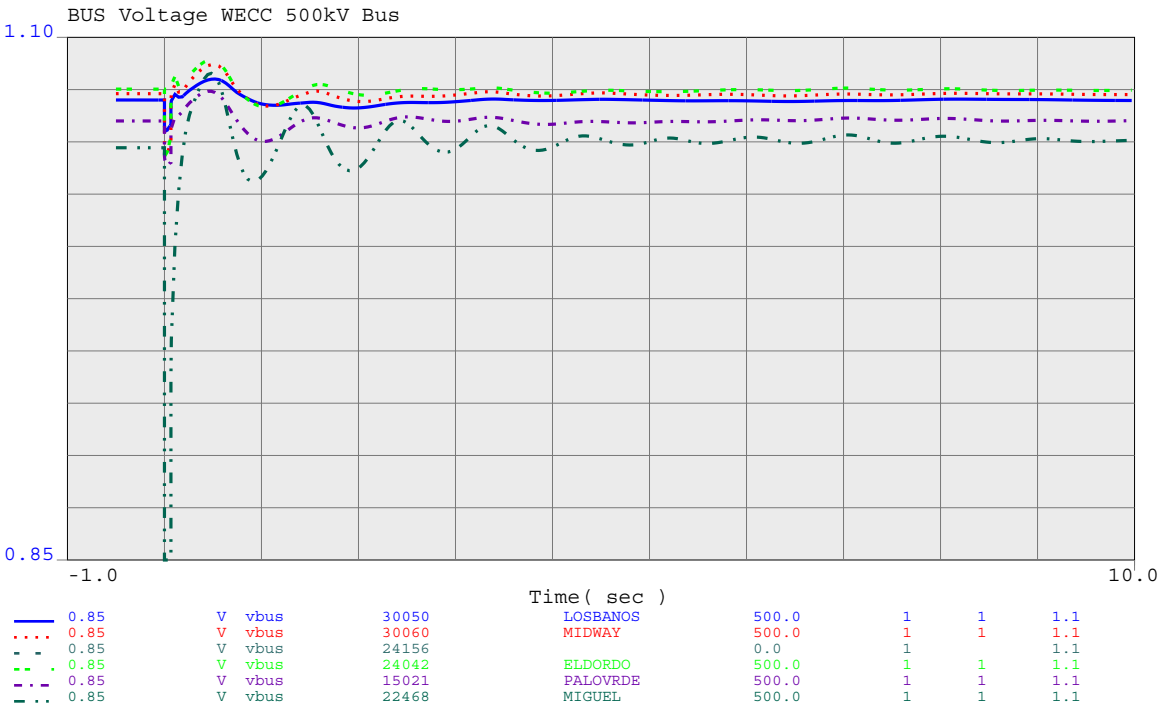
POST PROJECT

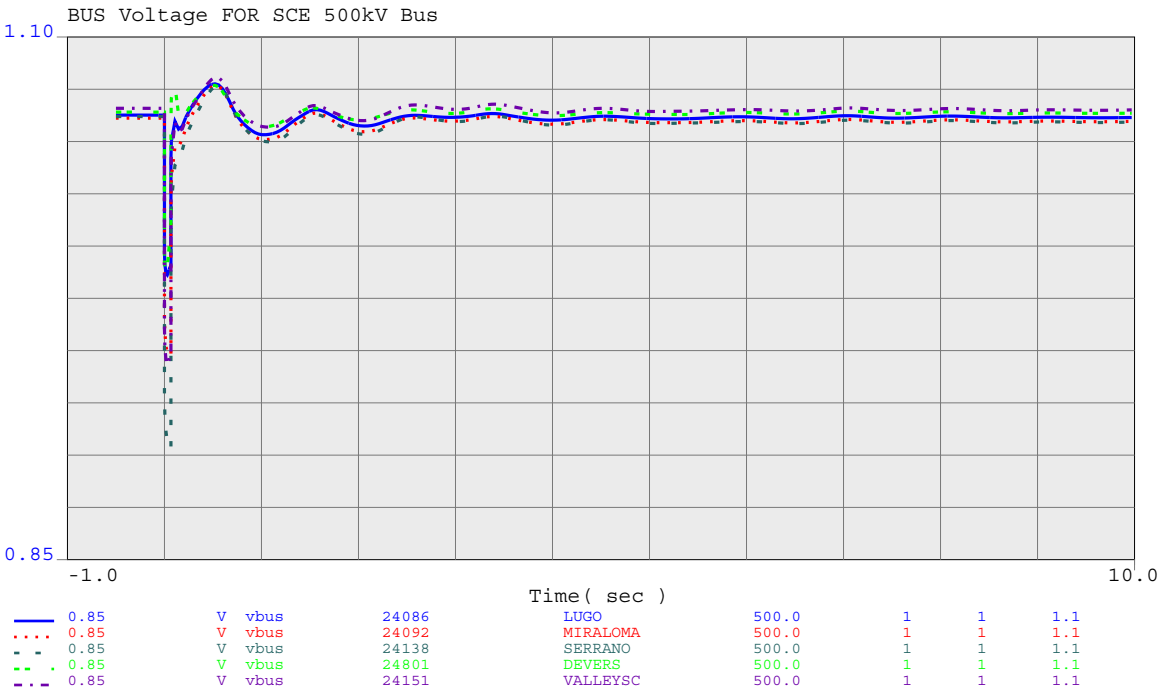
2013 Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

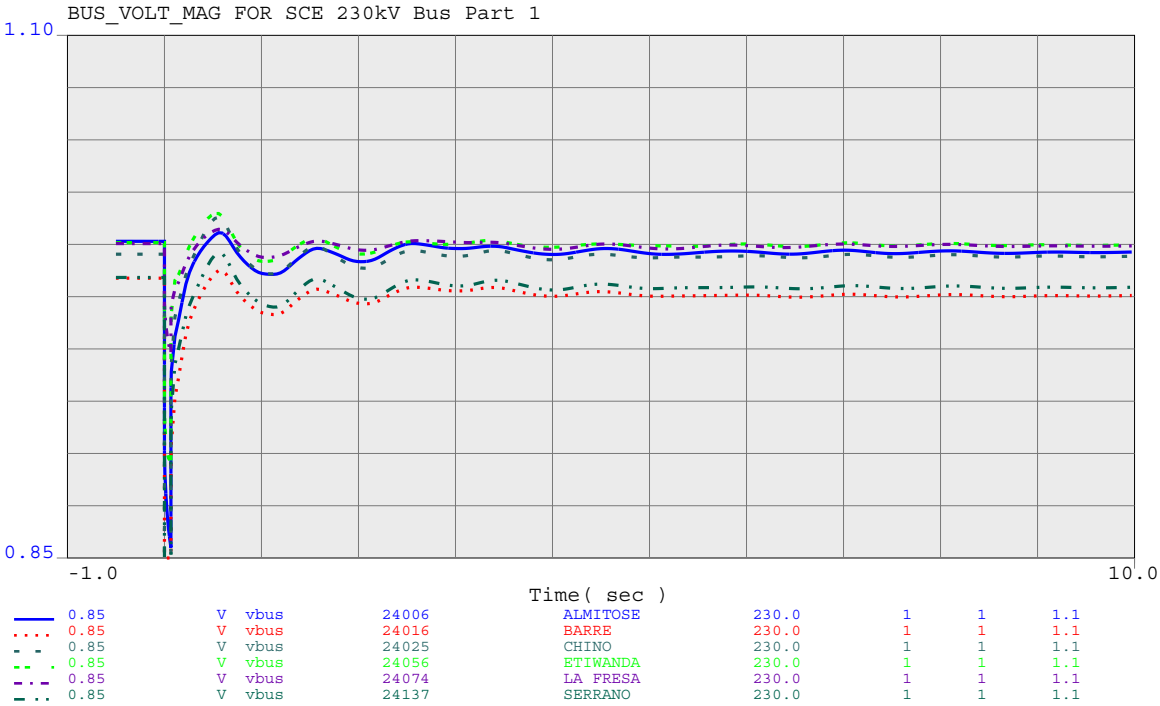
POST PROJECT

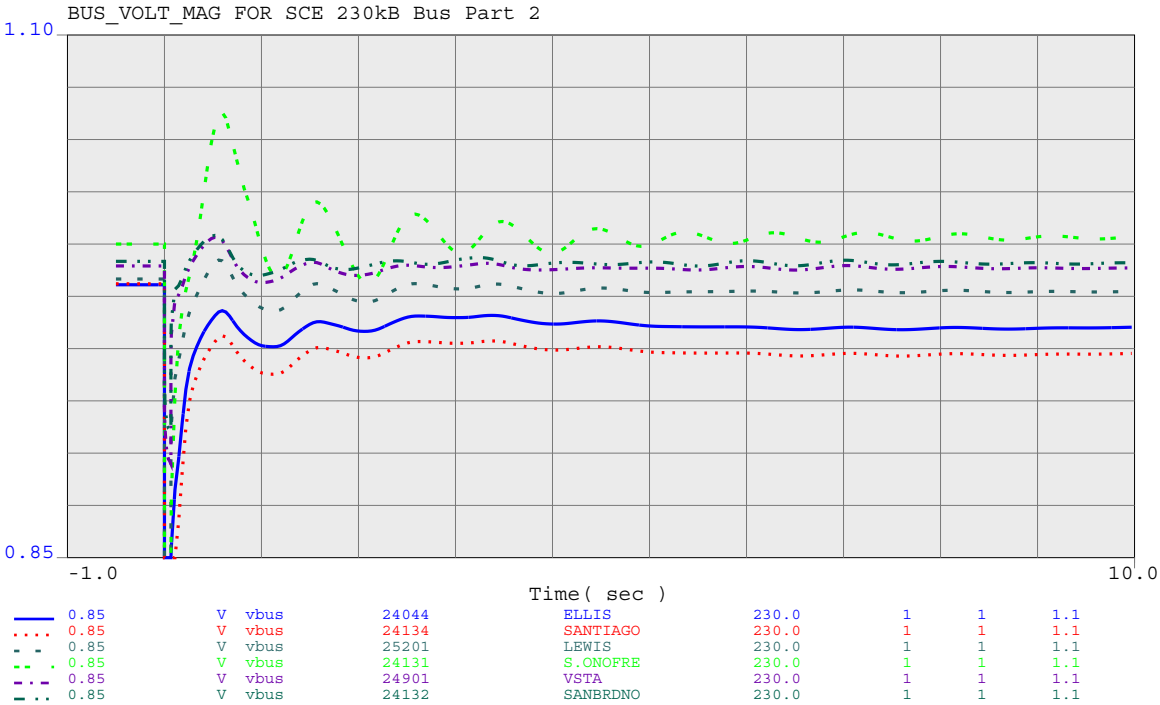
2013 Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

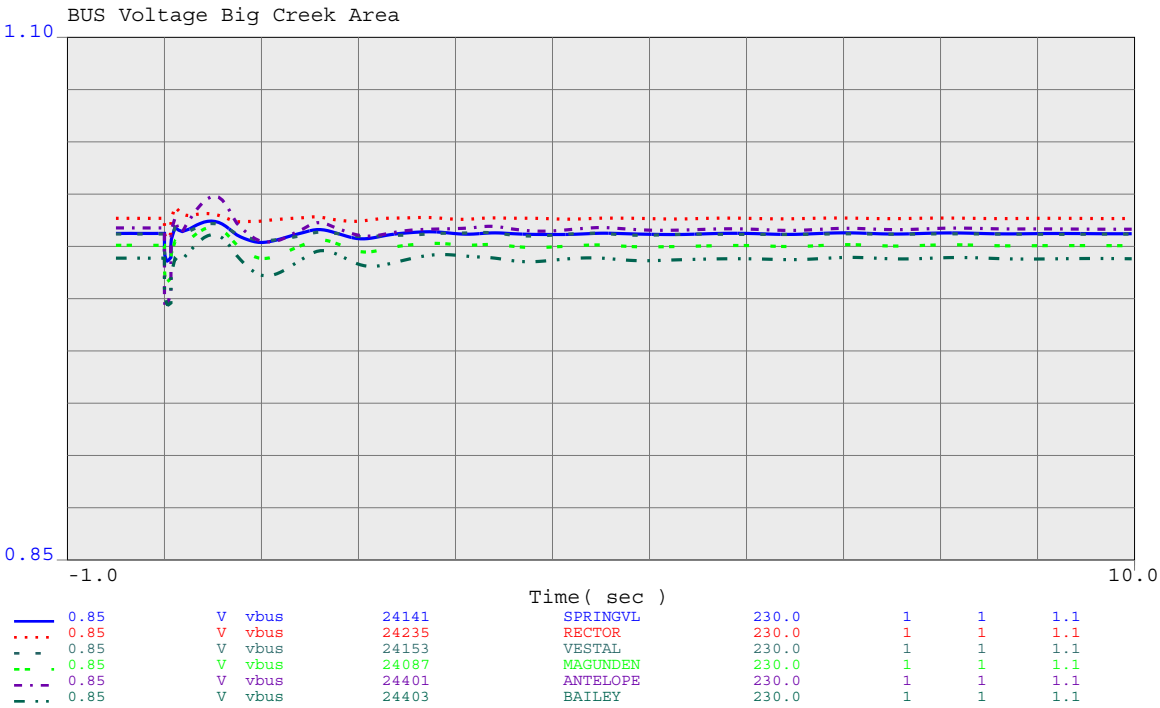
POST PROJECT

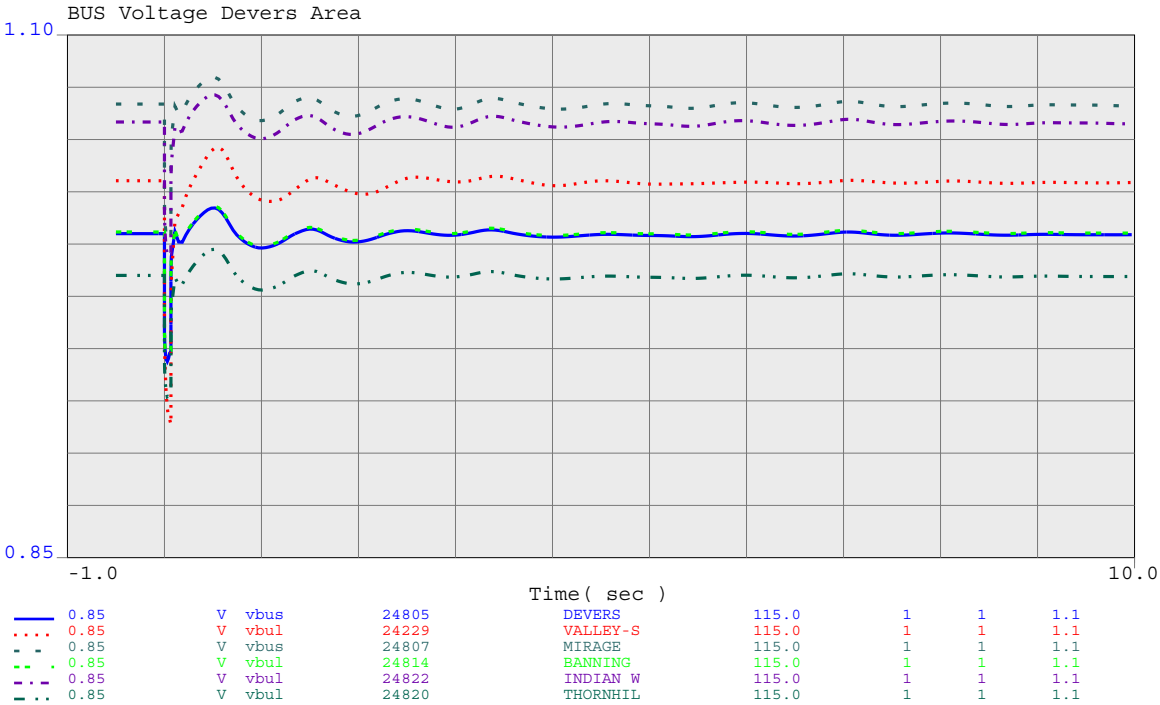
2013 Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

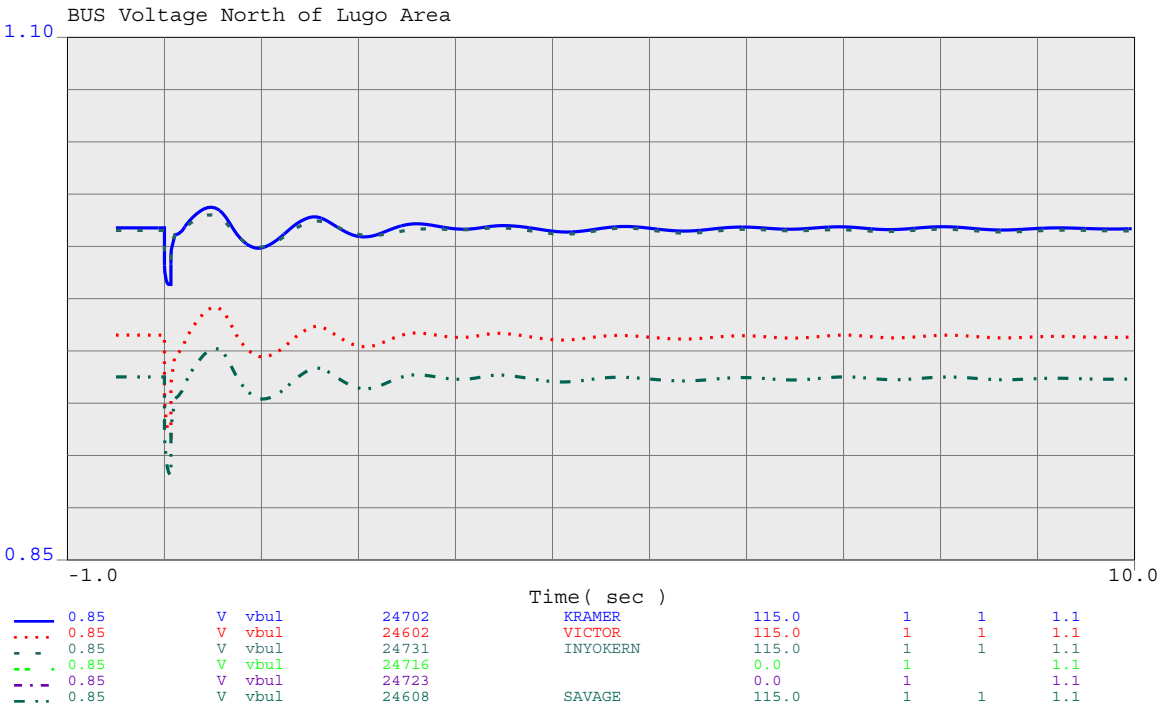
POST PROJECT

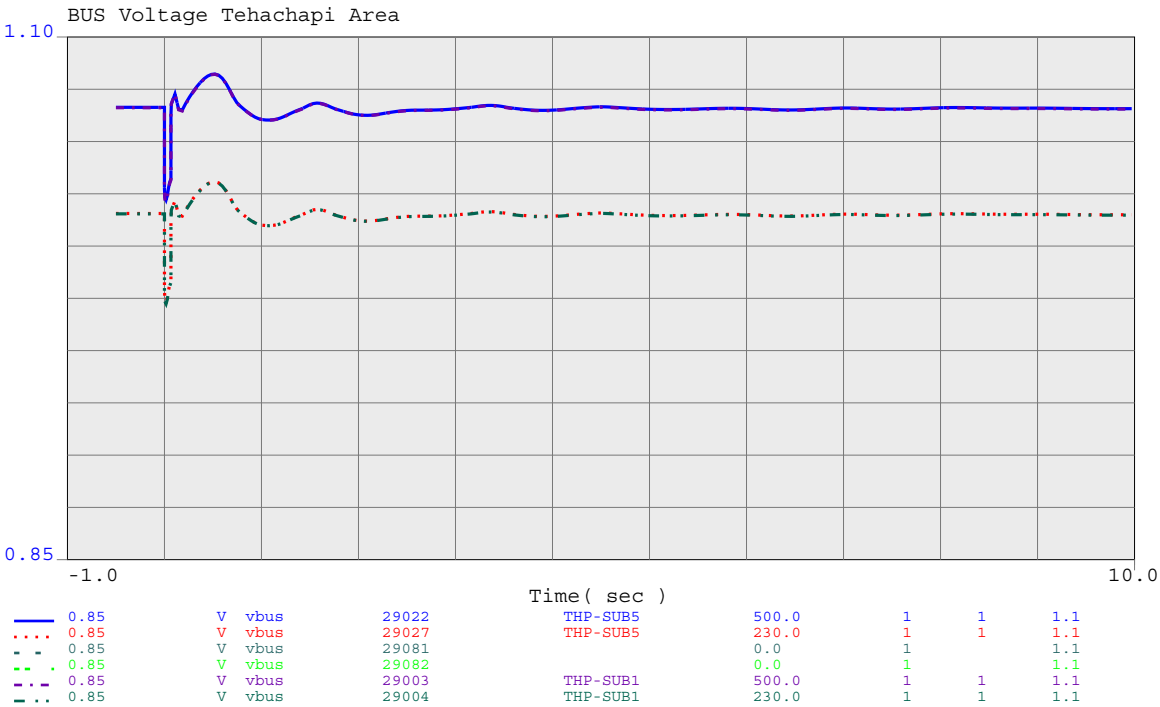
2013 Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

POST PROJECT

2013 Peak Case

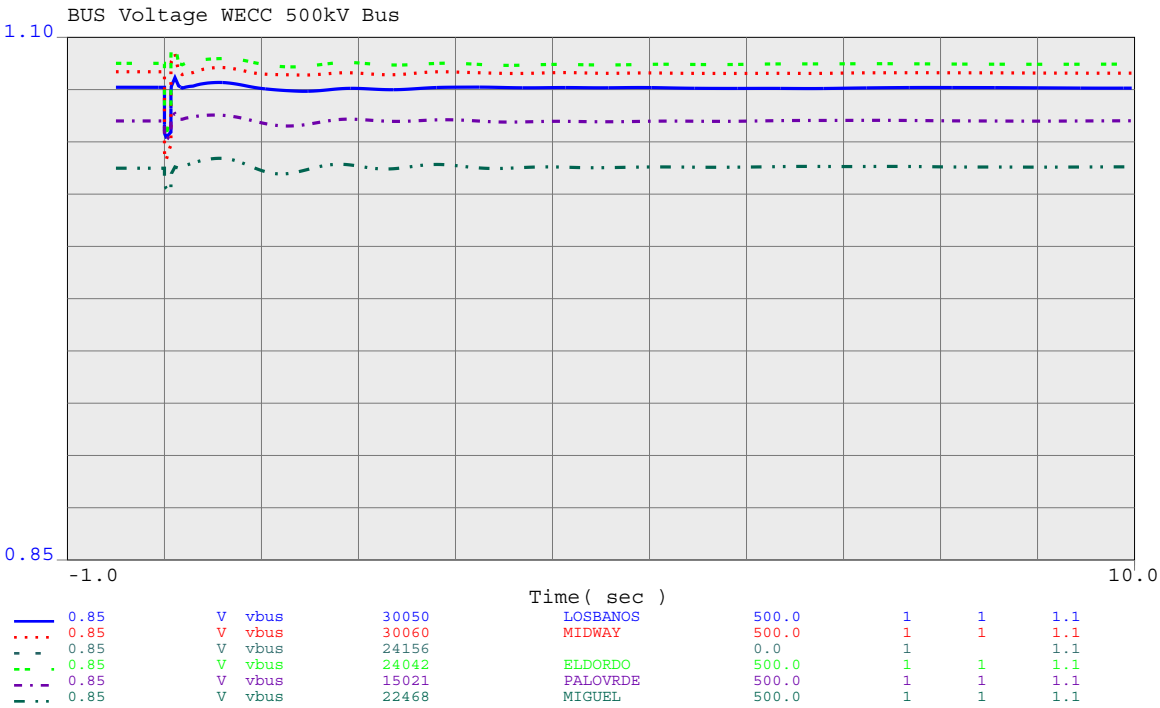
SONGS - Santiago Double Line Outage (fault at SONGS)

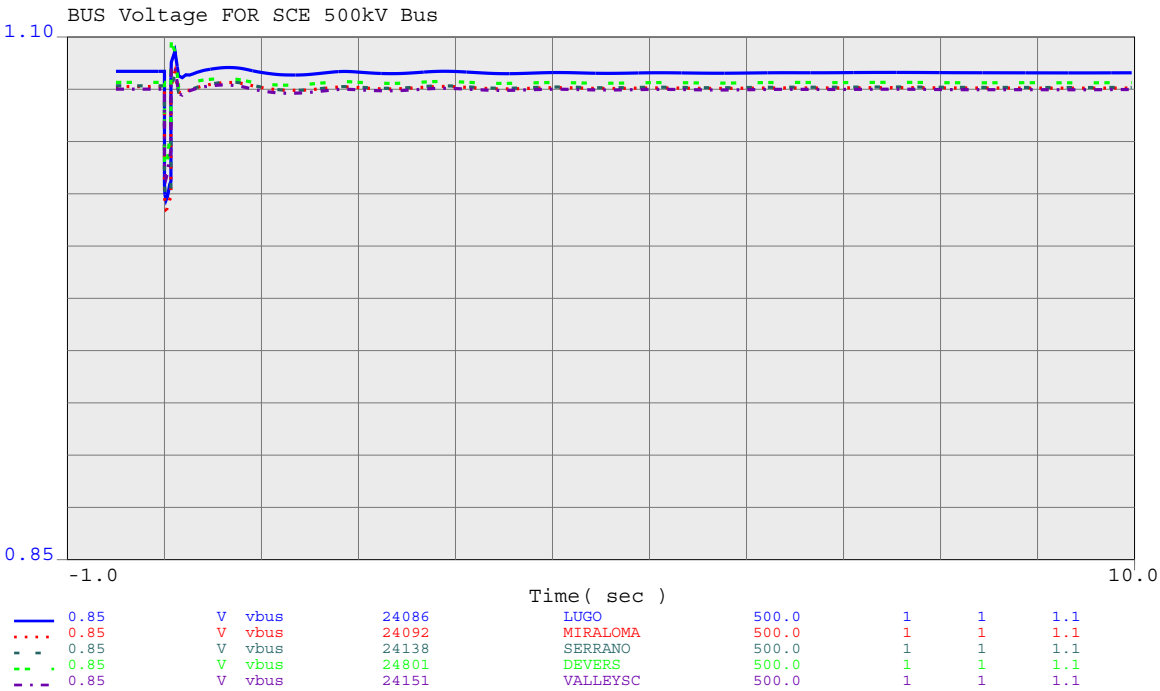
[SYLMAR -219][VIC-LUGO 1043][EL-LUGO 0][MHV-LUGO 364][PV-DV 2435]MW

APPENDIX B

Heavy Spring Stability Plots Pre - Project

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

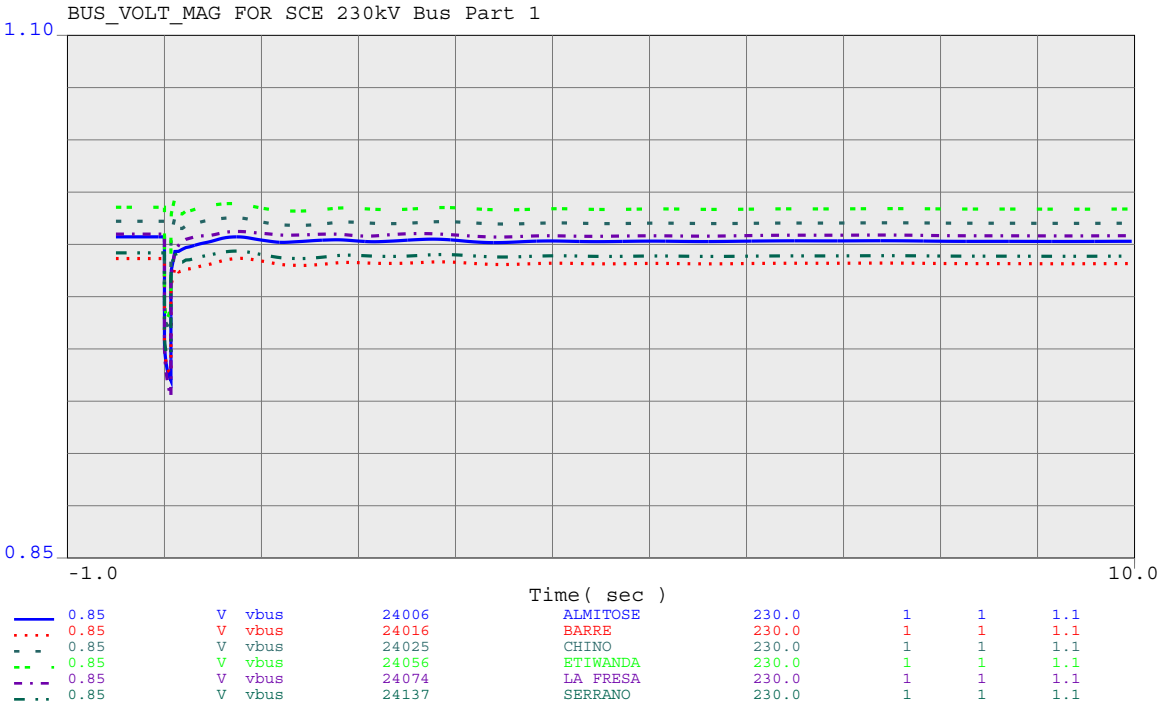
PRE PROJECT

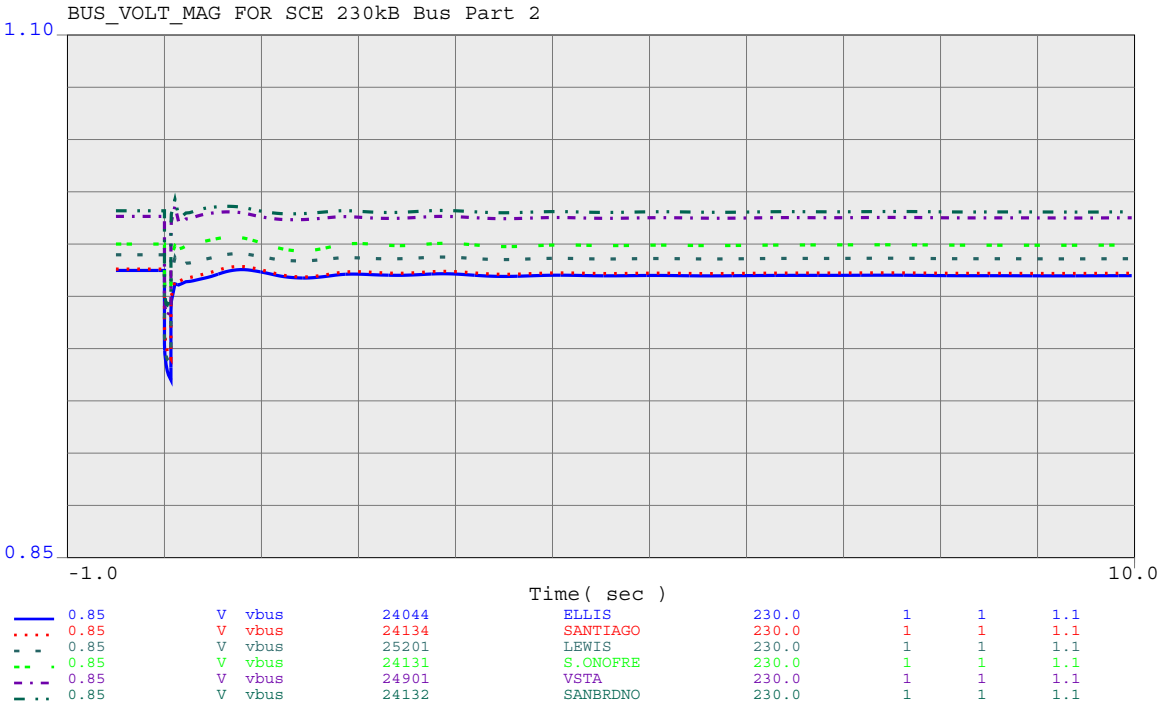
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

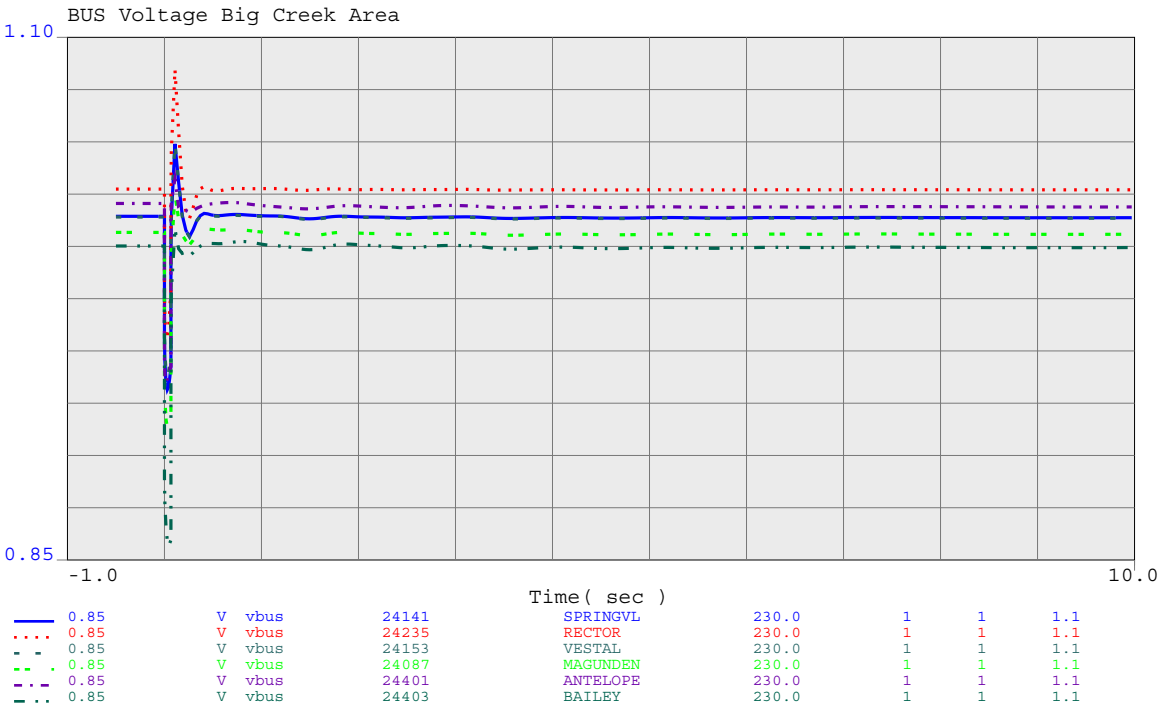
PRE PROJECT

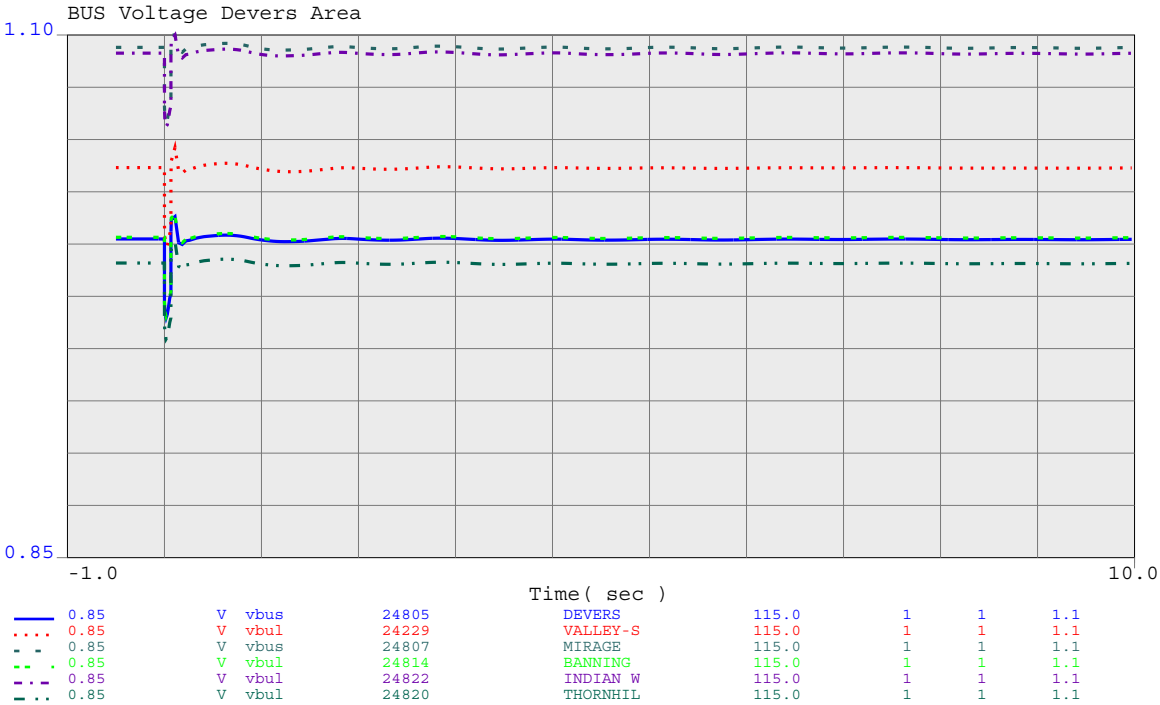
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

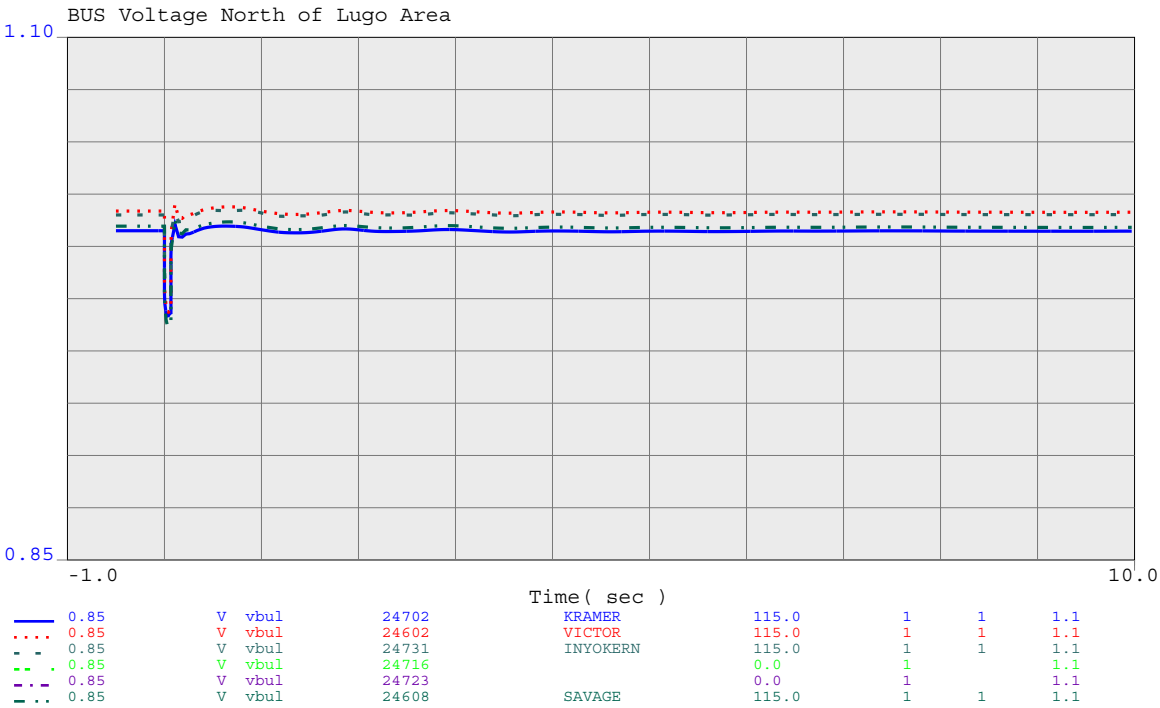
PRE PROJECT

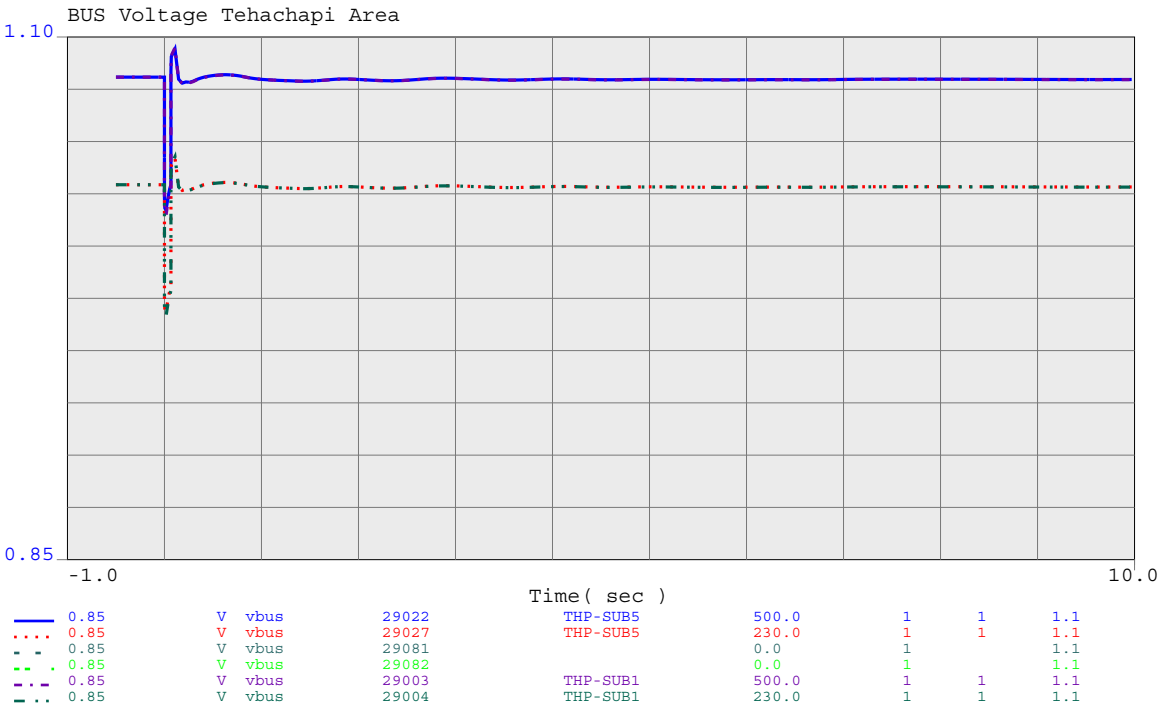
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

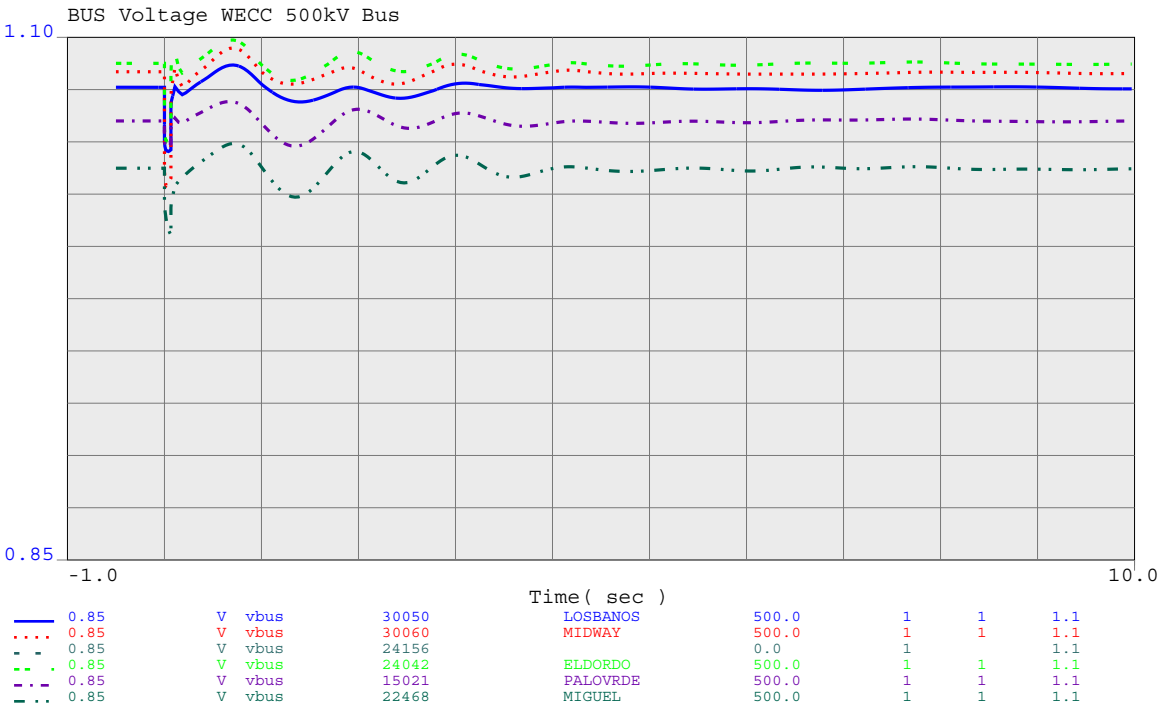
PRE PROJECT

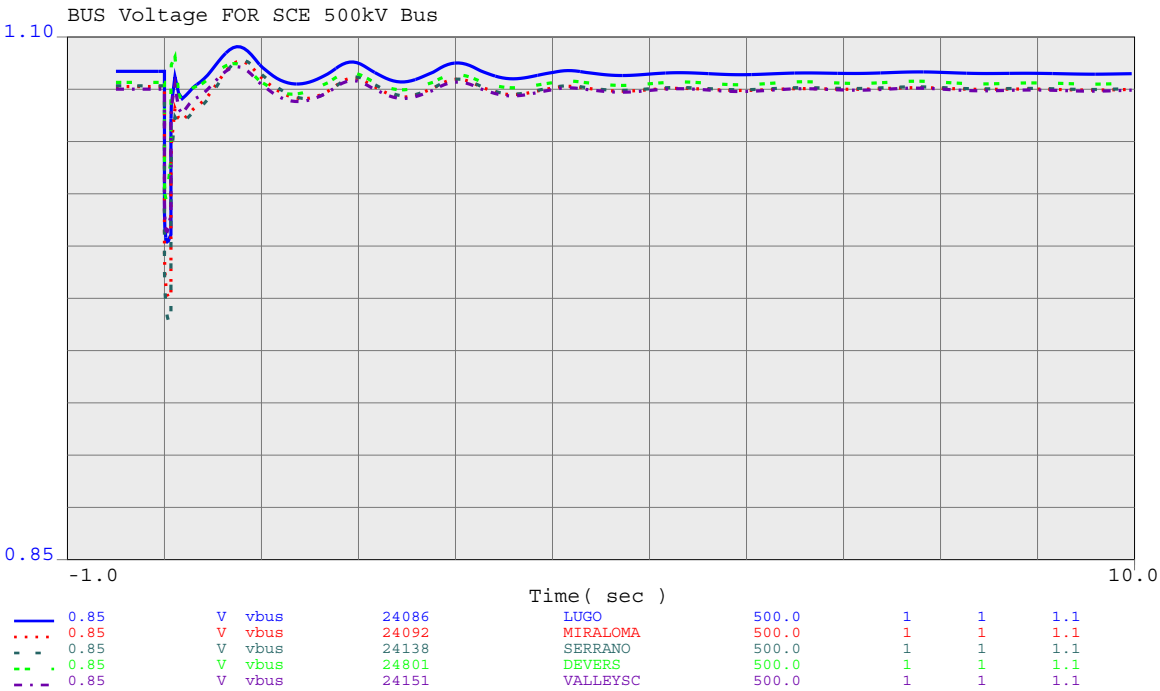
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

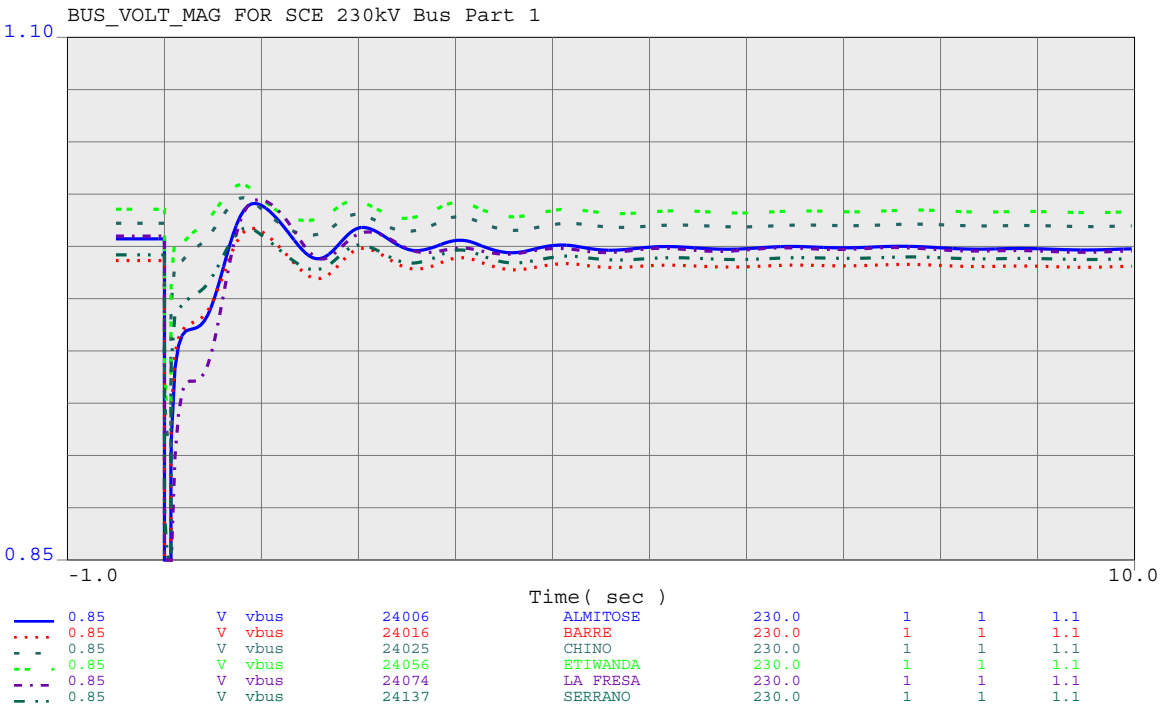
PRE PROJECT

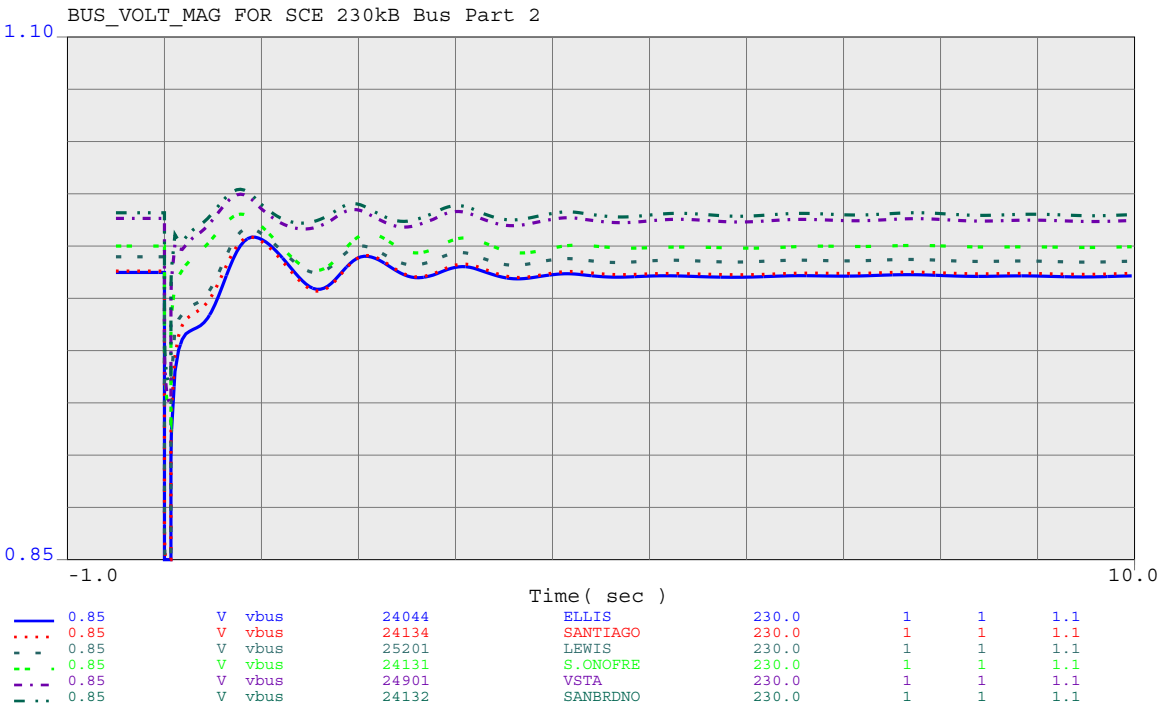
2013 Off Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

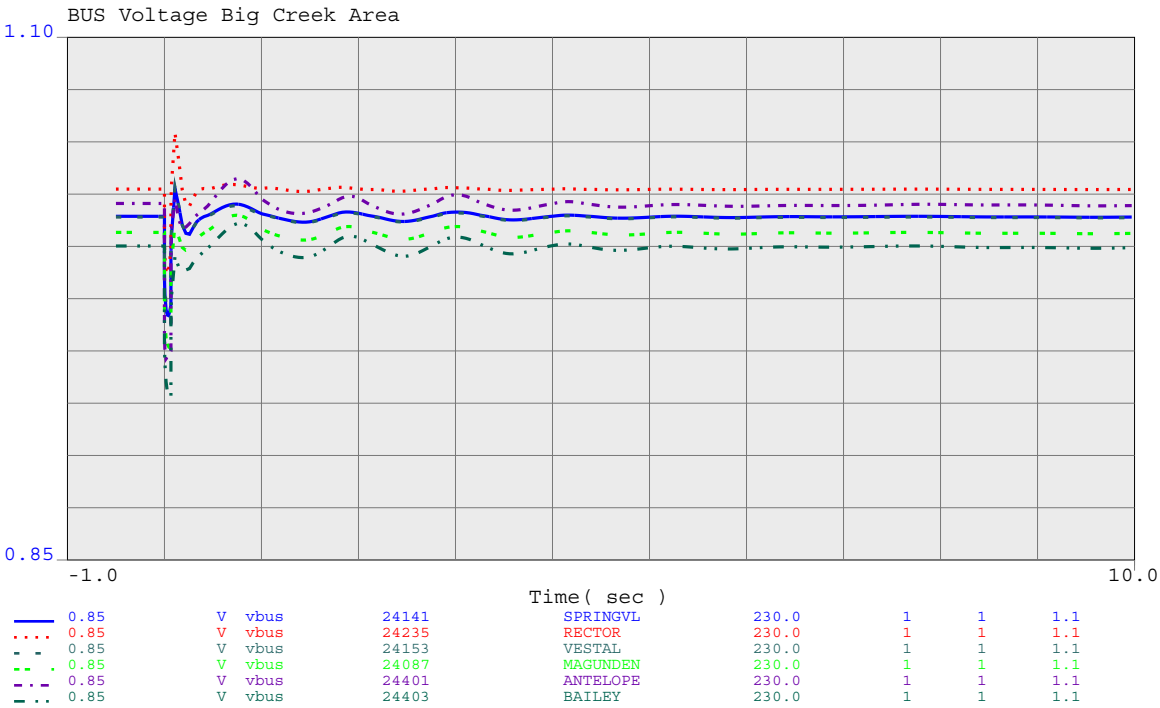
PRE PROJECT

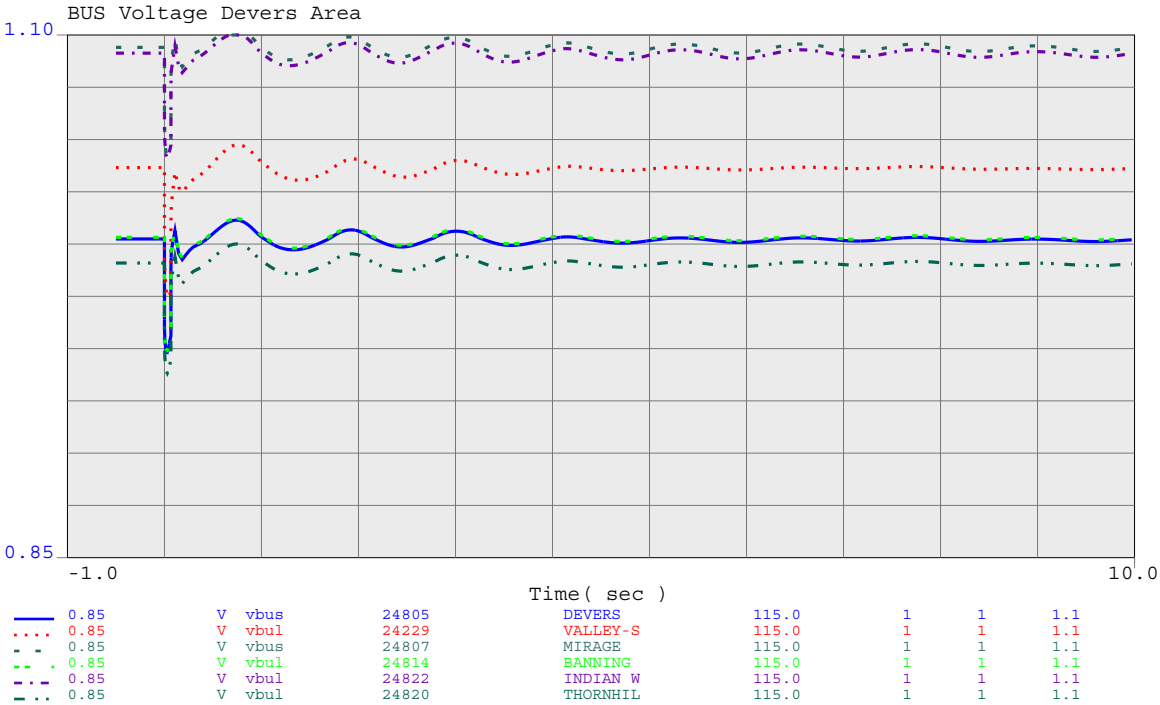
2013 Off Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

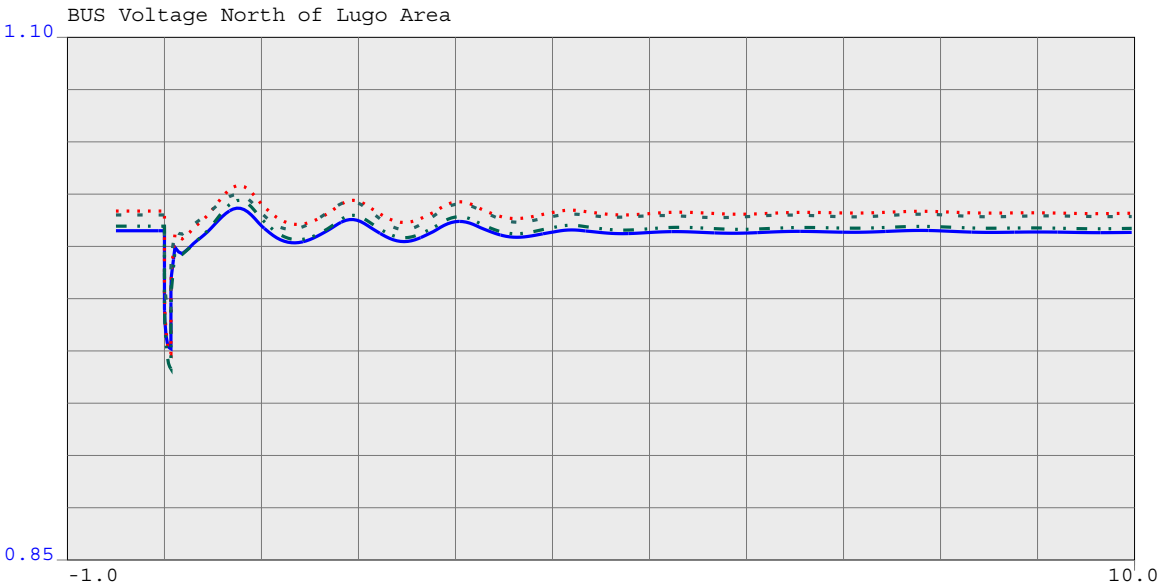
PRE PROJECT

2013 Off Peak Case

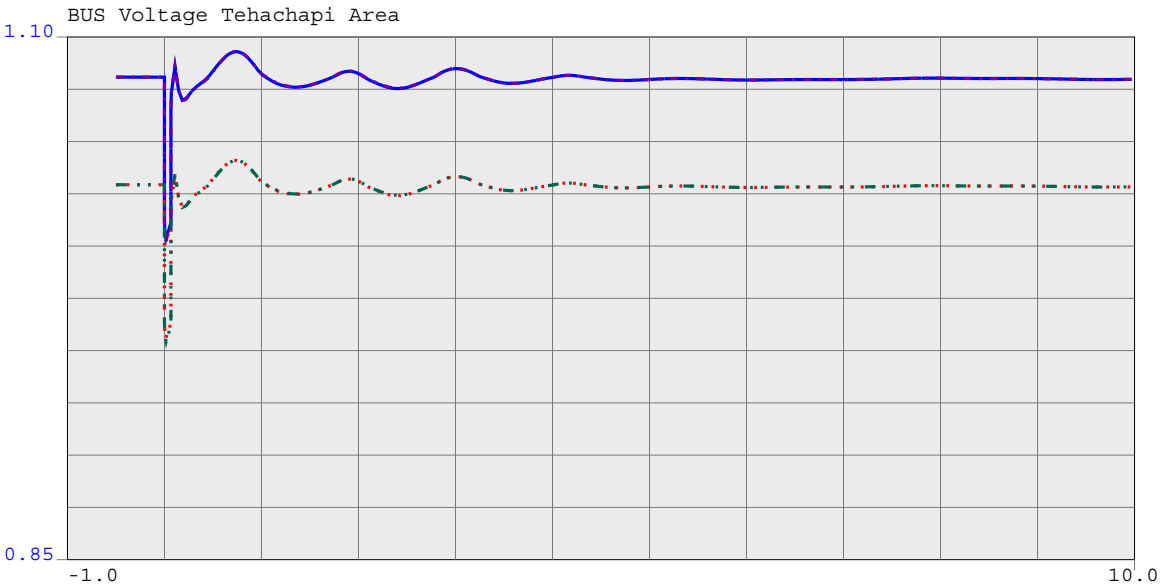
HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

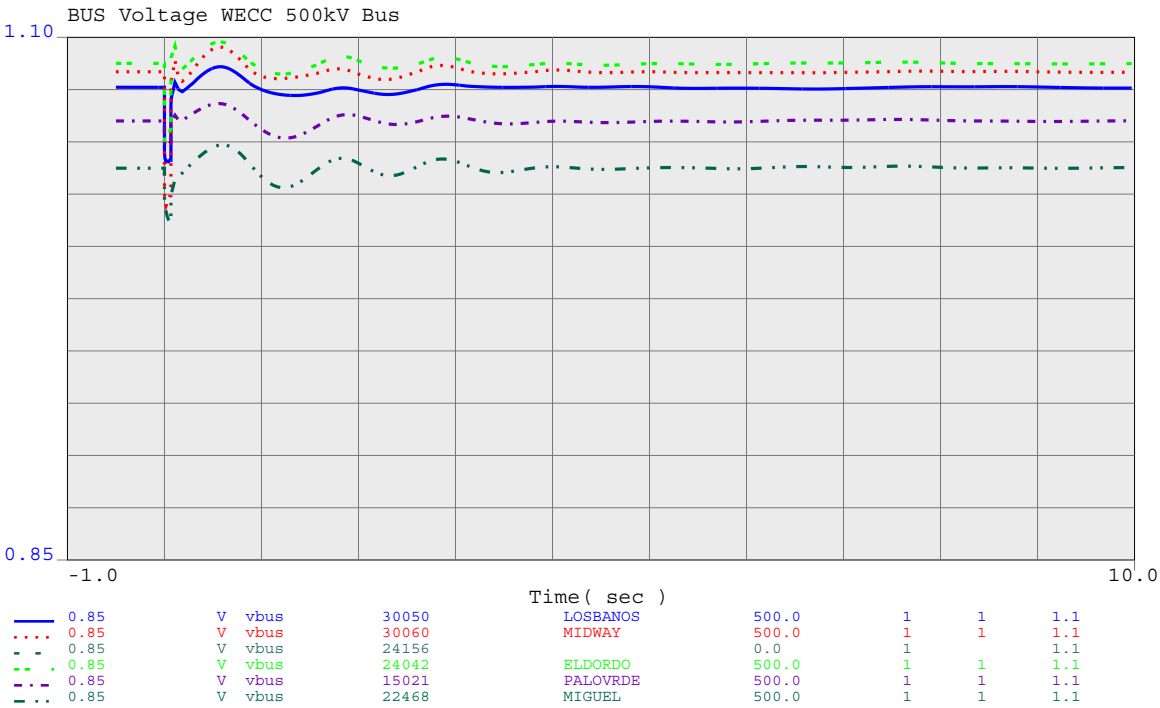
PRE PROJECT

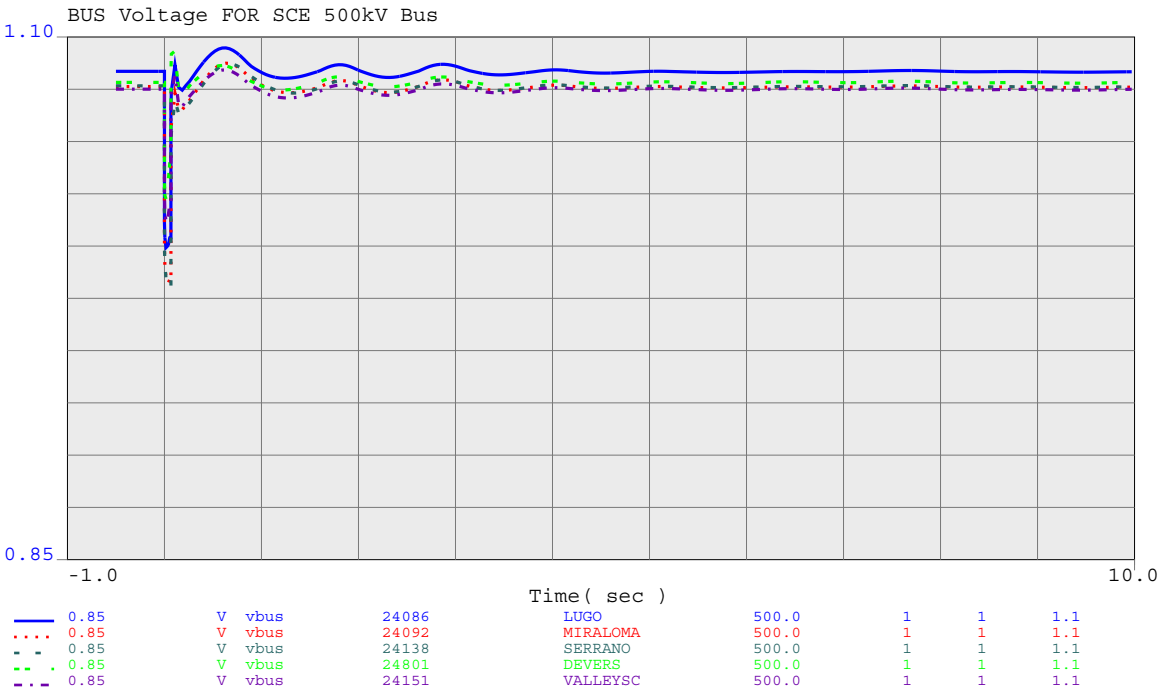
2013 Off Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

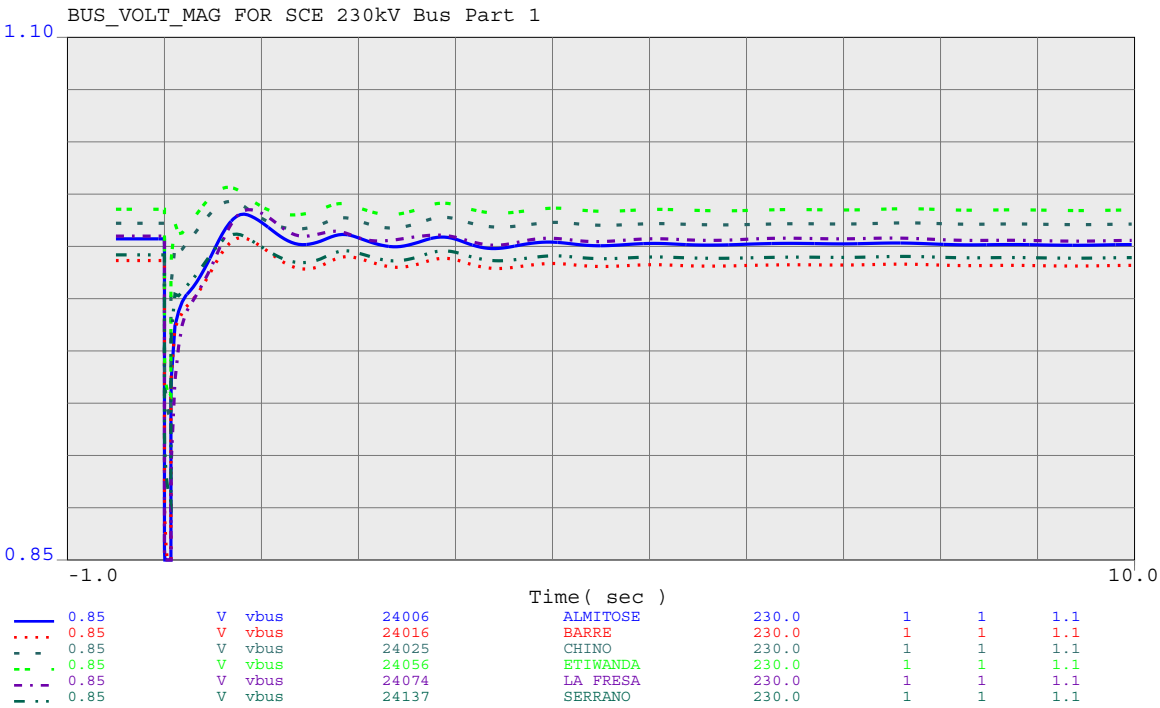
PRE PROJECT

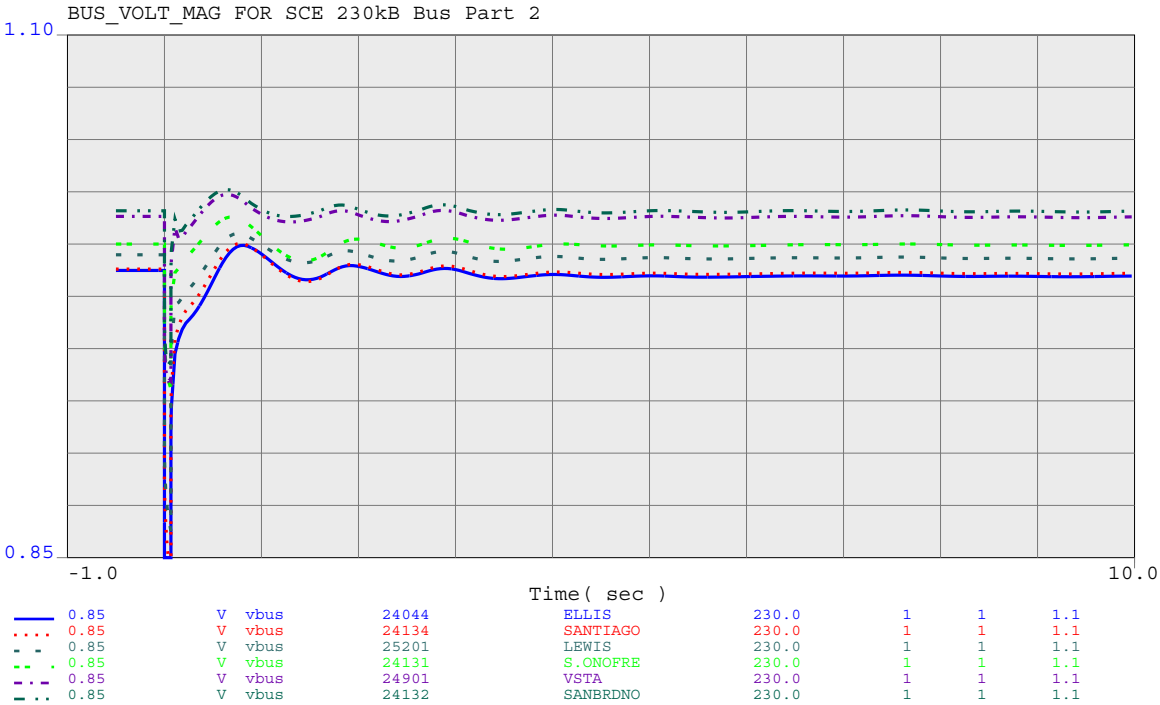
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

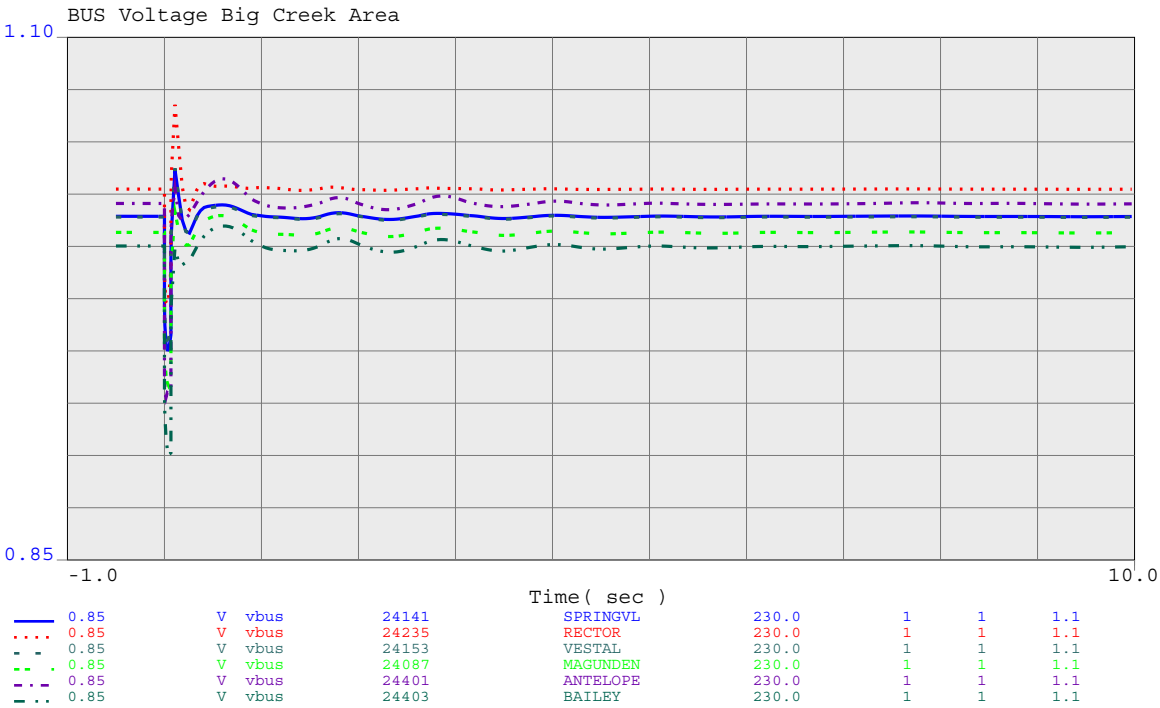
PRE PROJECT

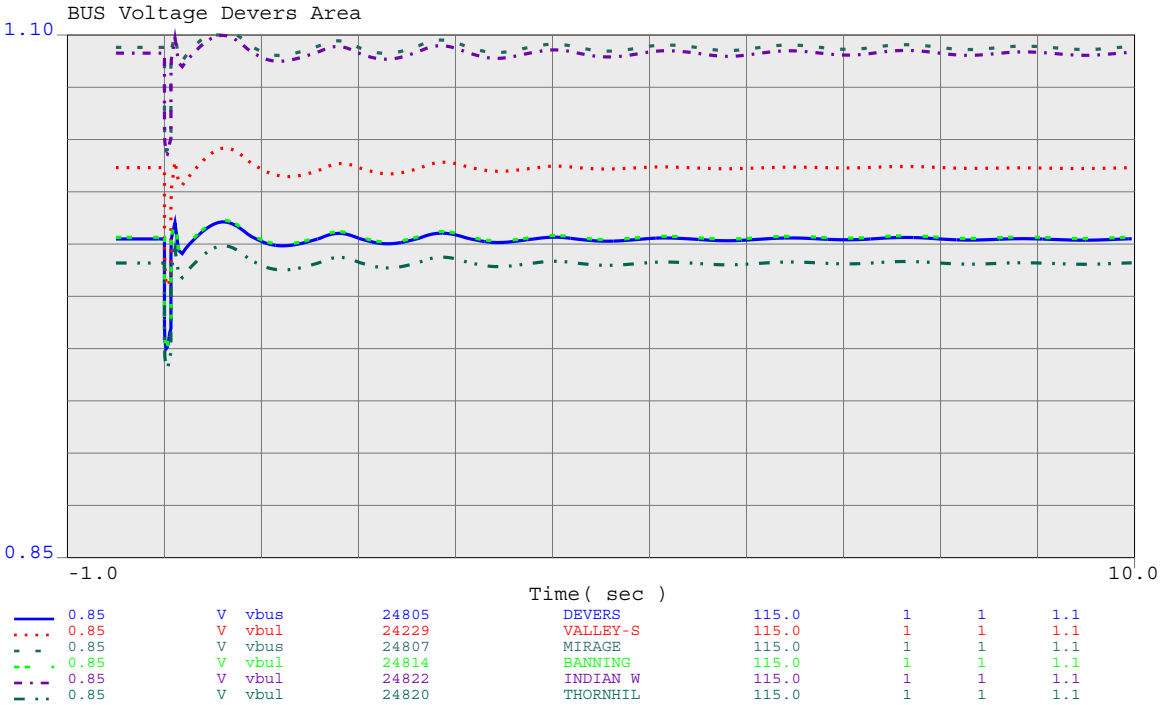
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

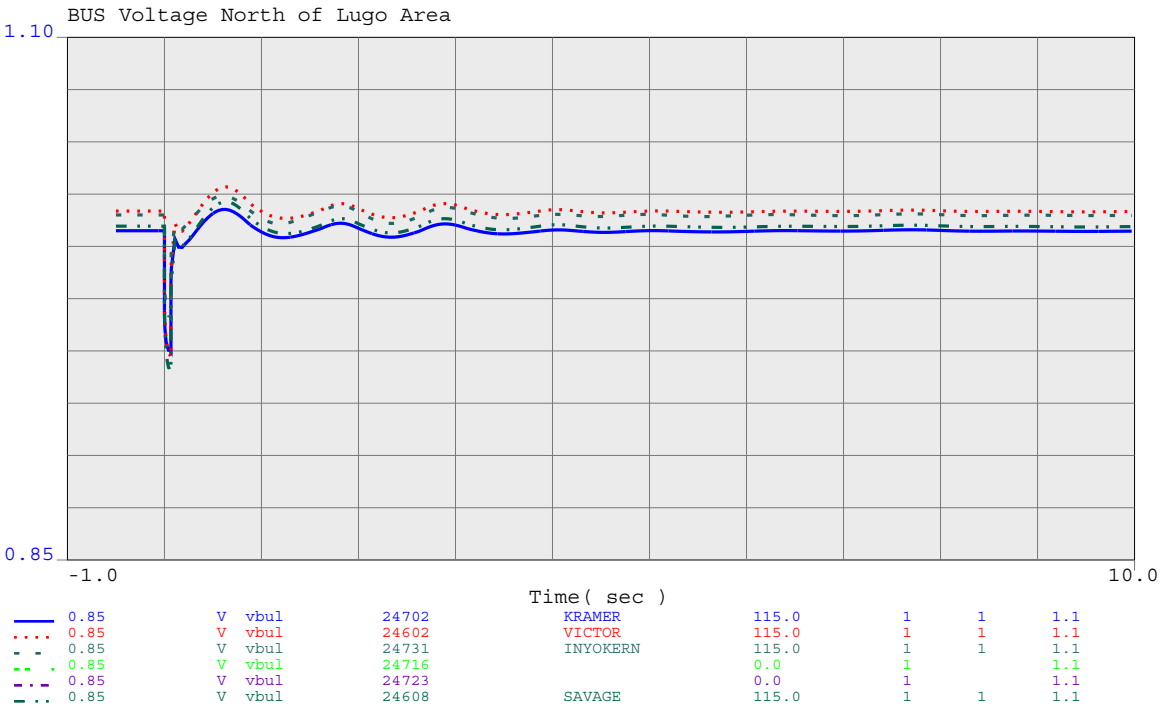
PRE PROJECT

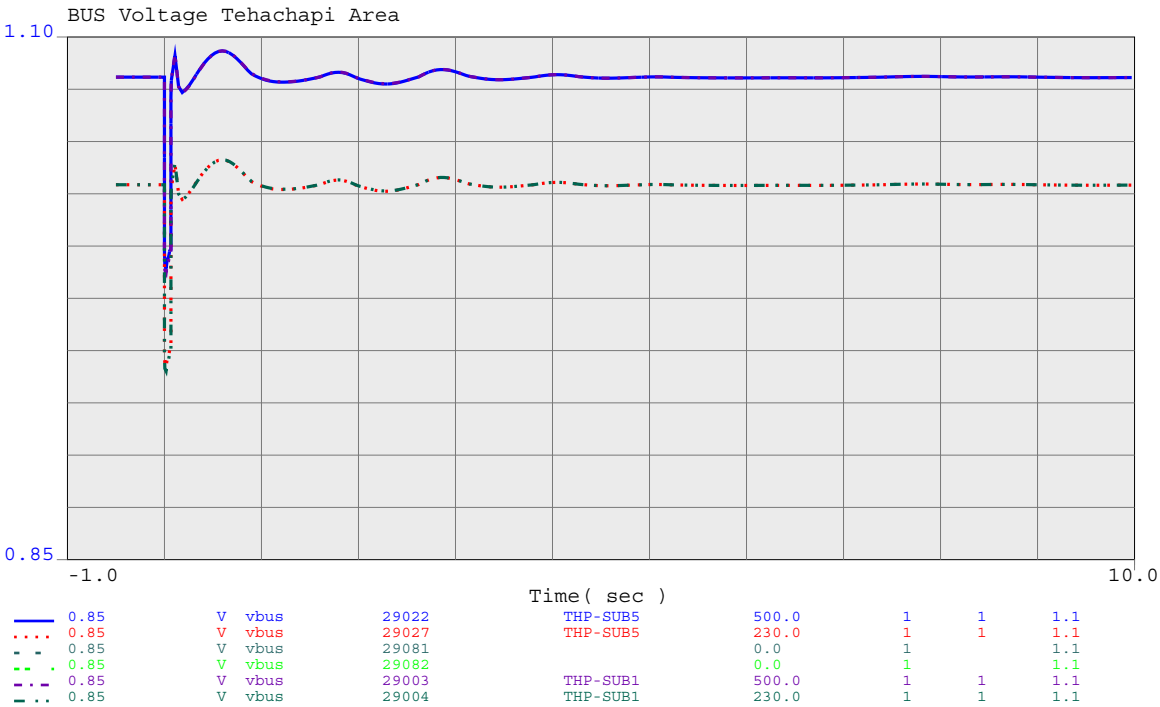
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

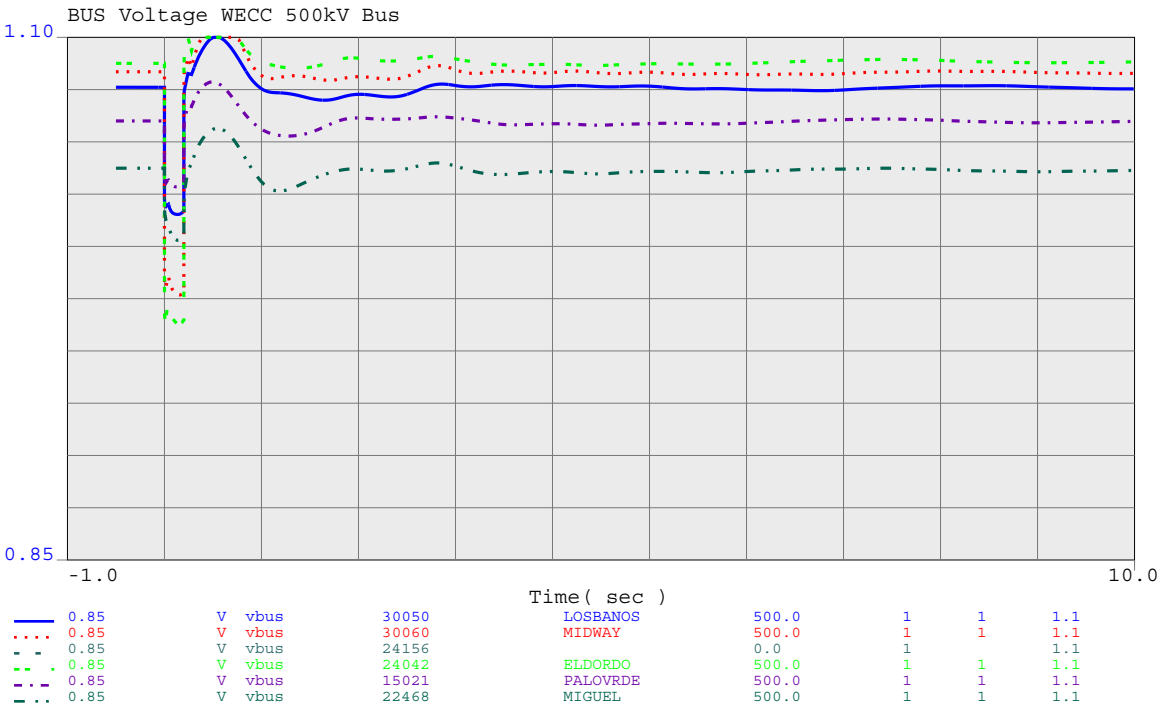
PRE PROJECT

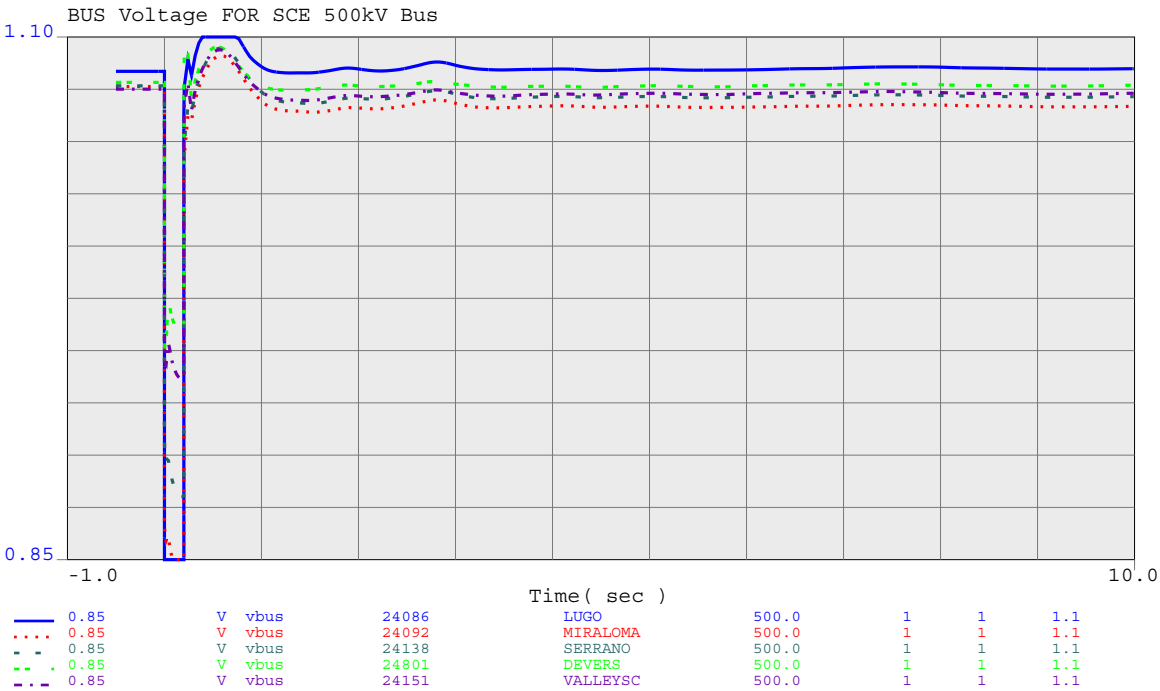
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

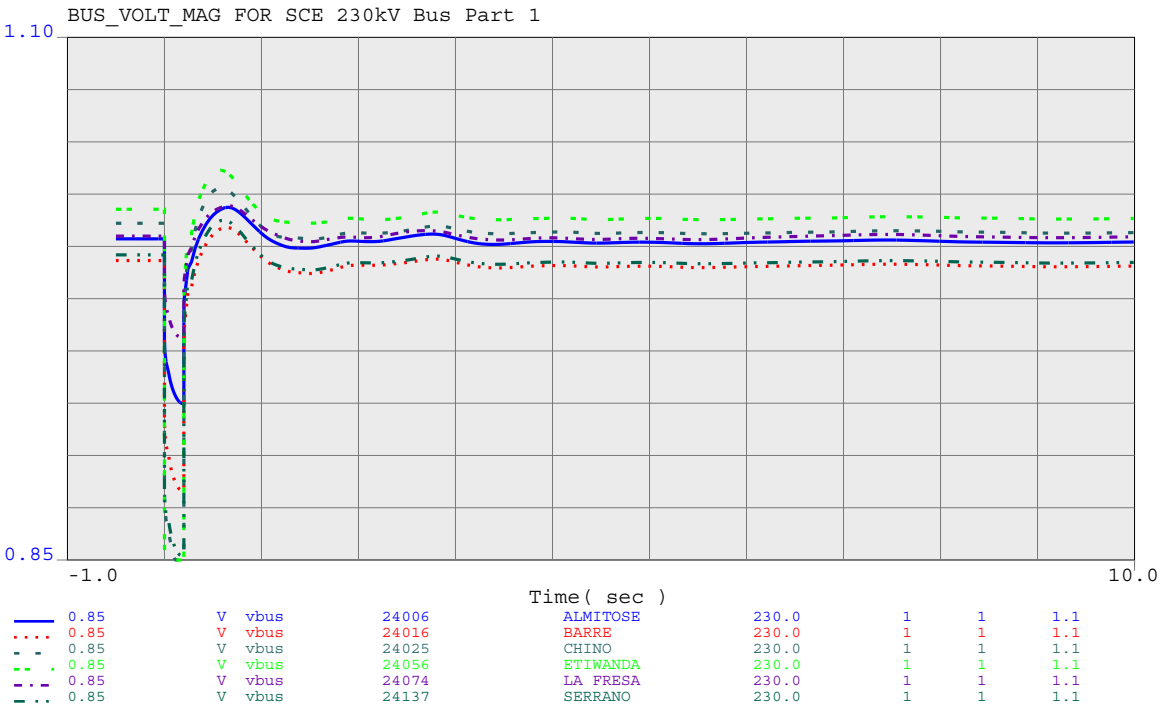
PRE PROJECT

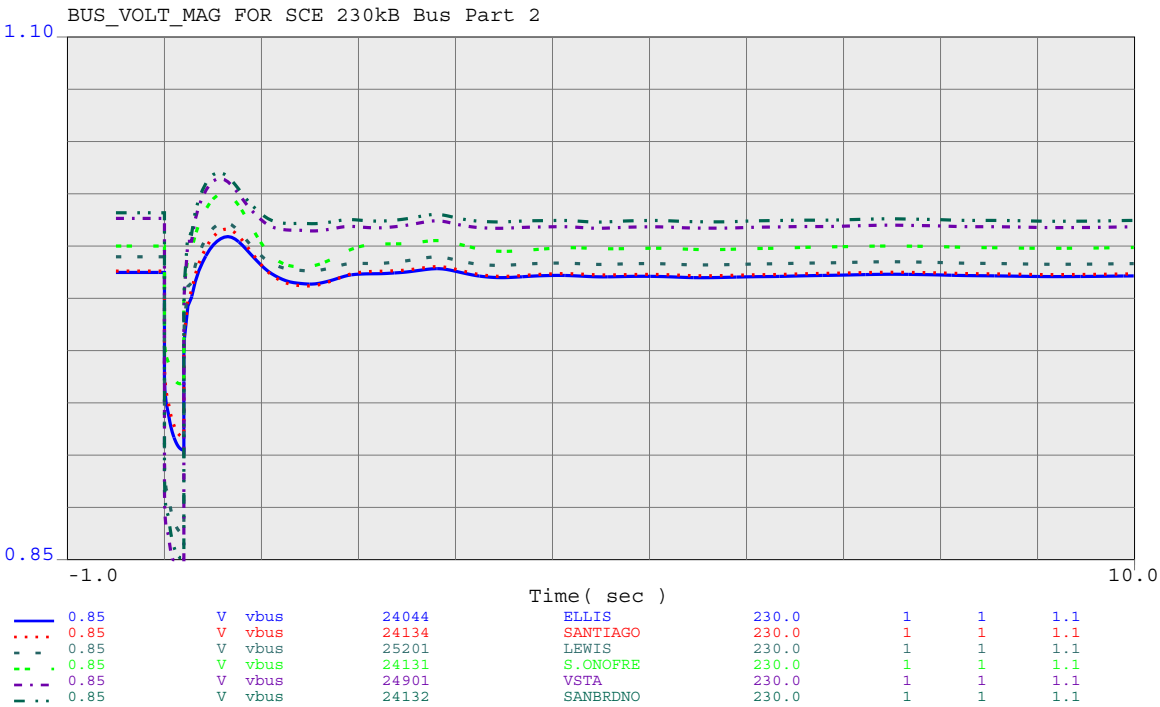
2013 Off Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

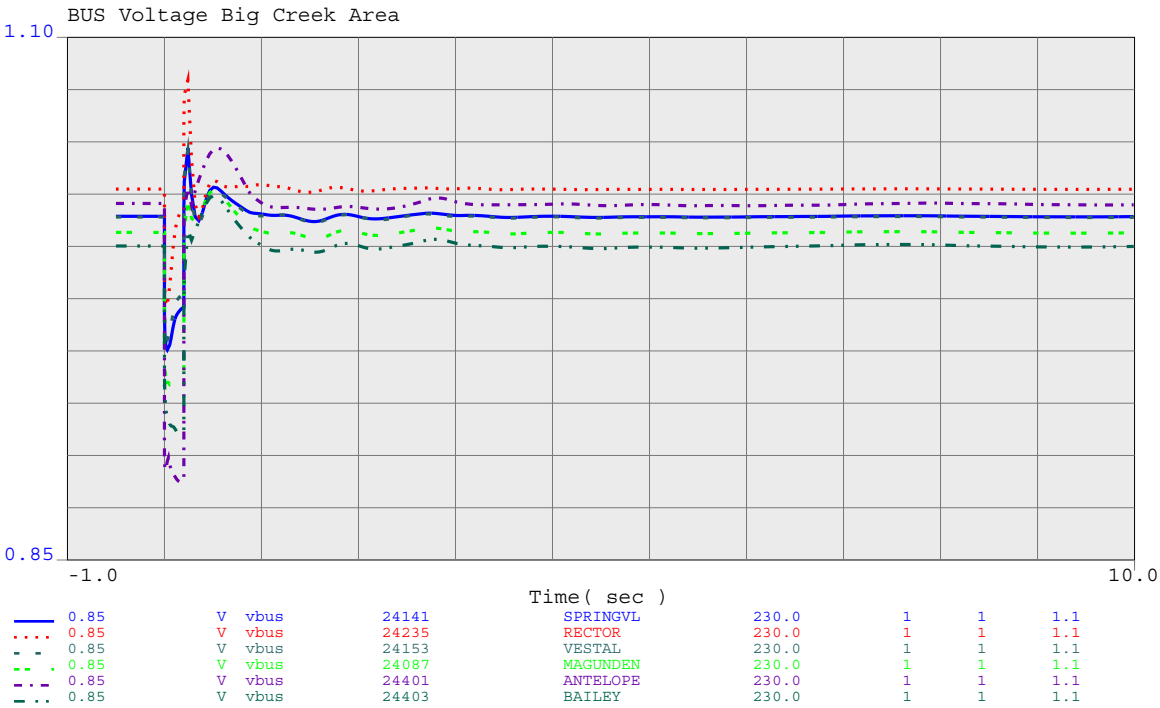
PRE PROJECT

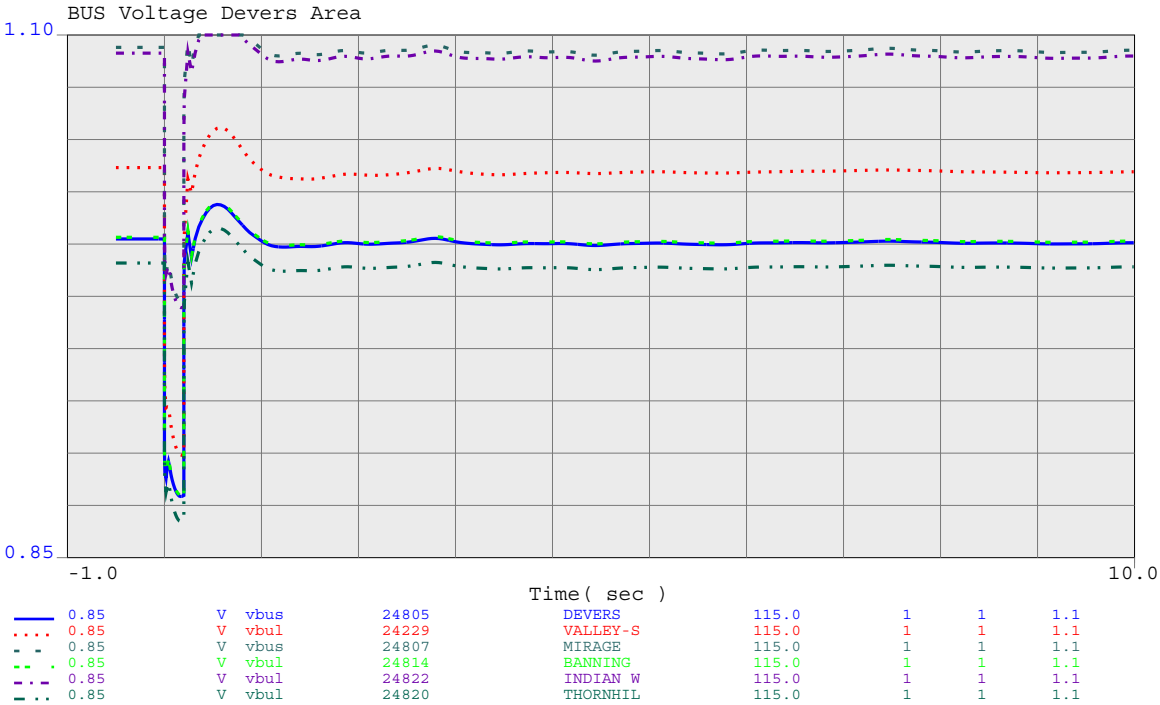
2013 Off Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

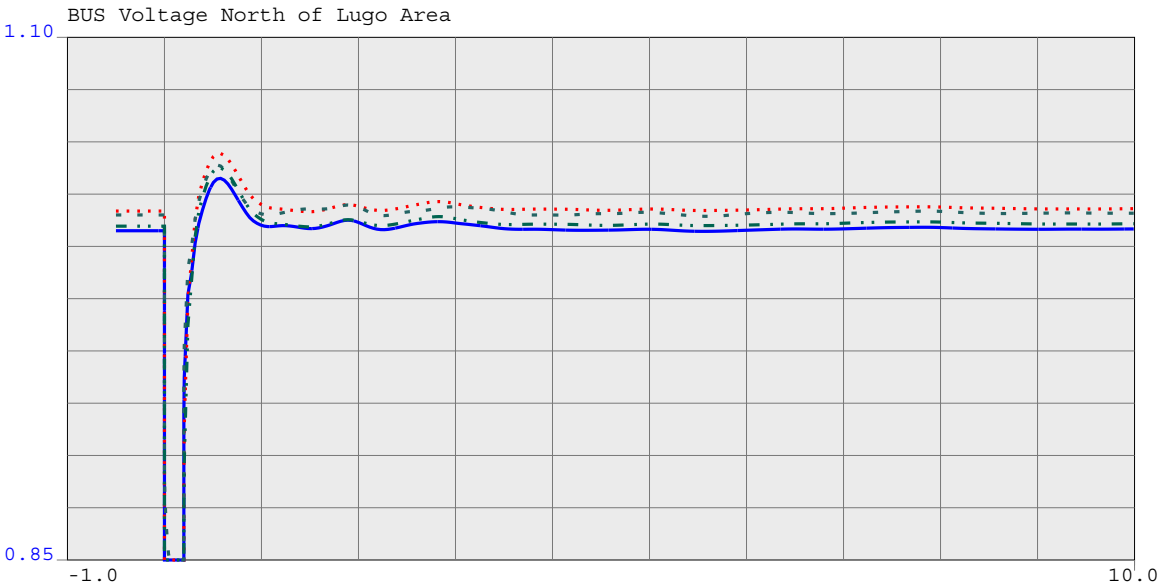
PRE PROJECT

2013 Off Peak Case

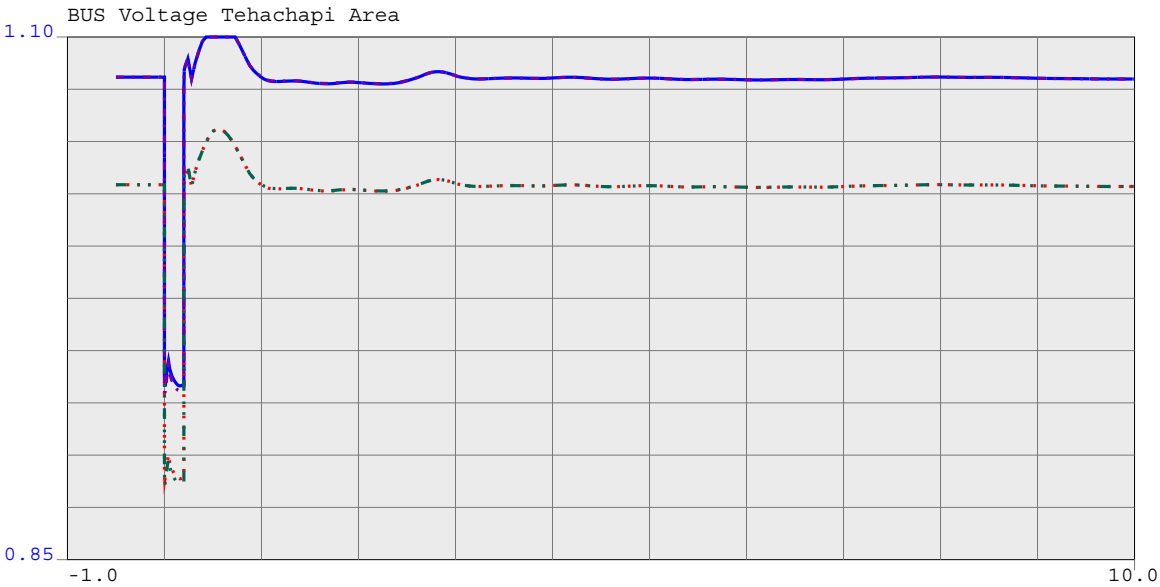
Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

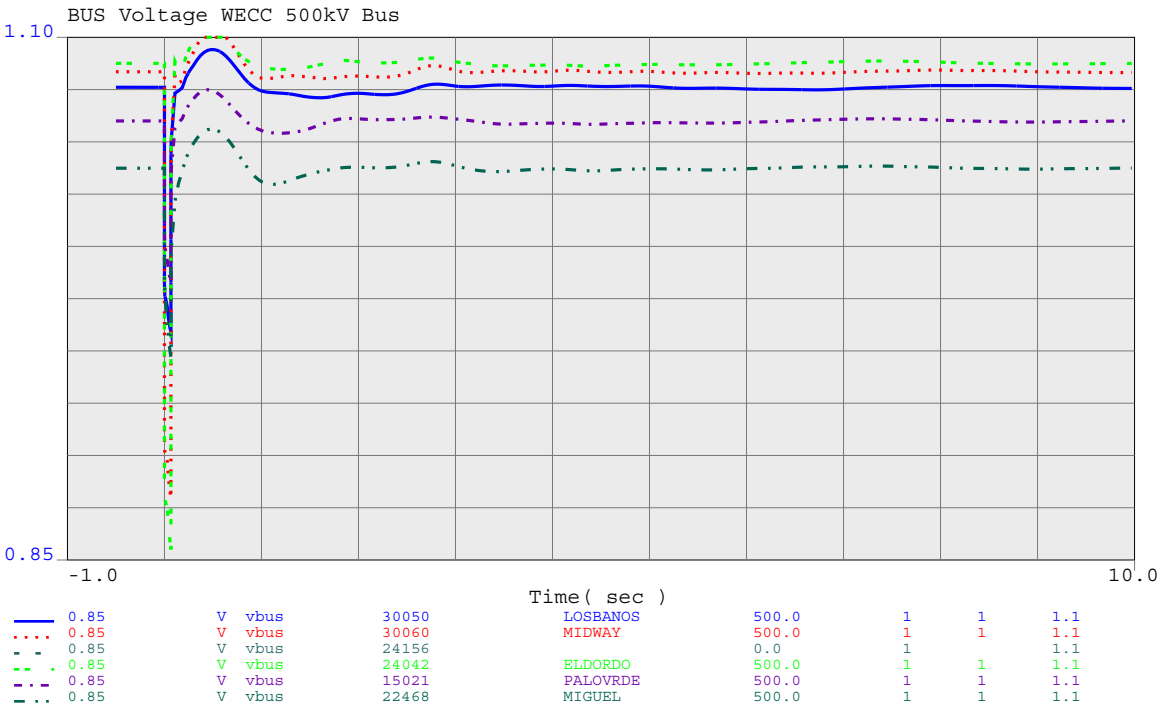
PRE PROJECT

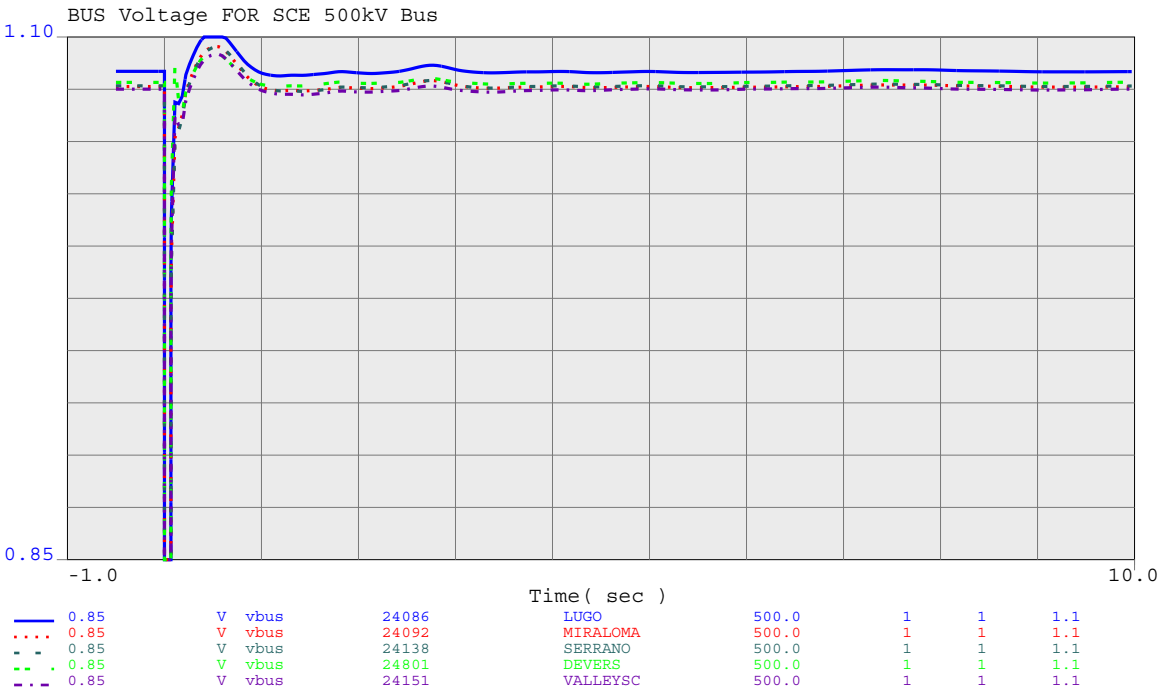
2013 Off Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

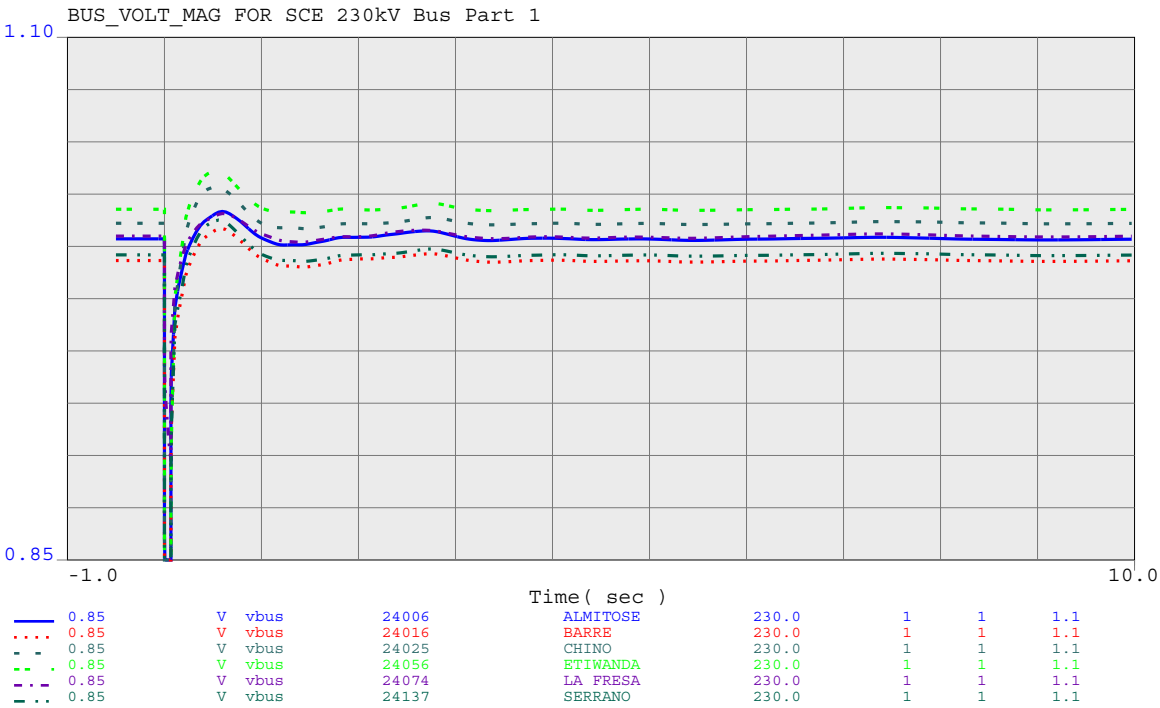
PRE PROJECT

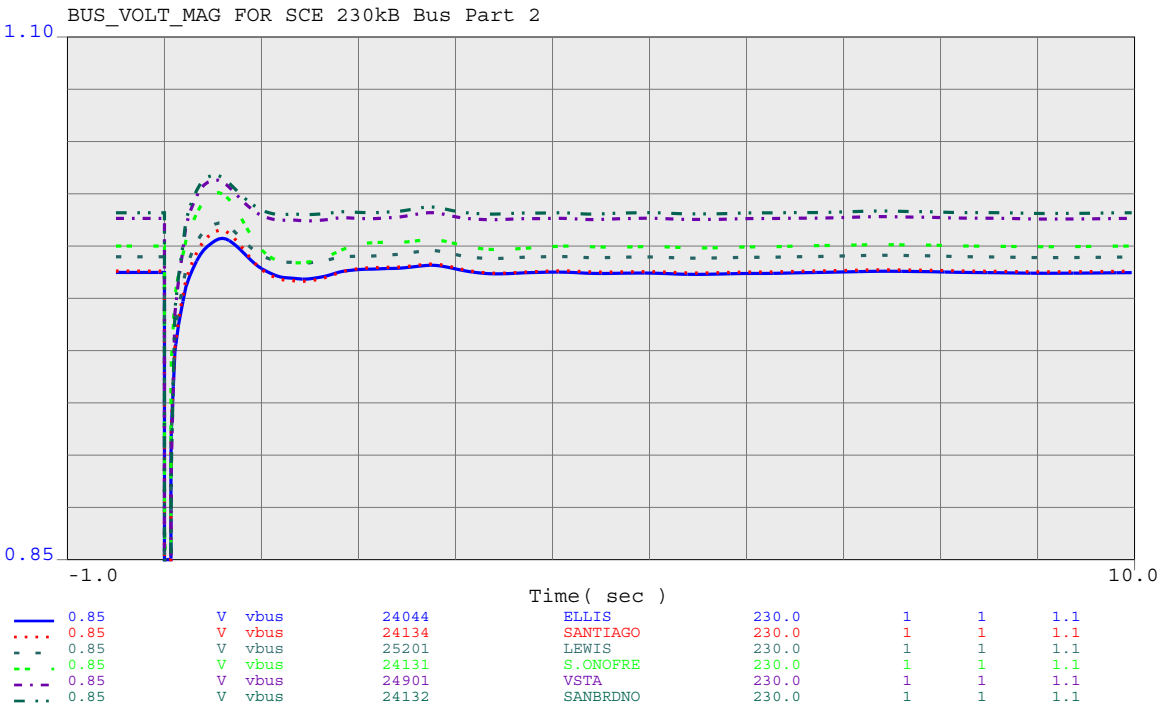
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

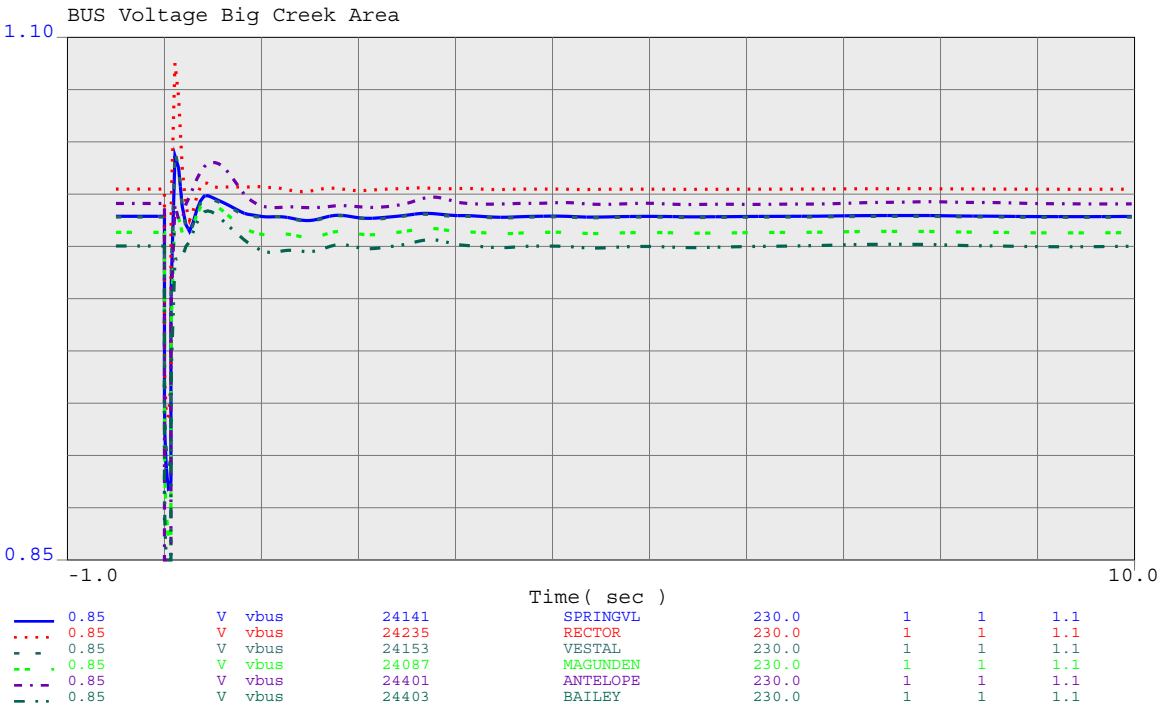
PRE PROJECT

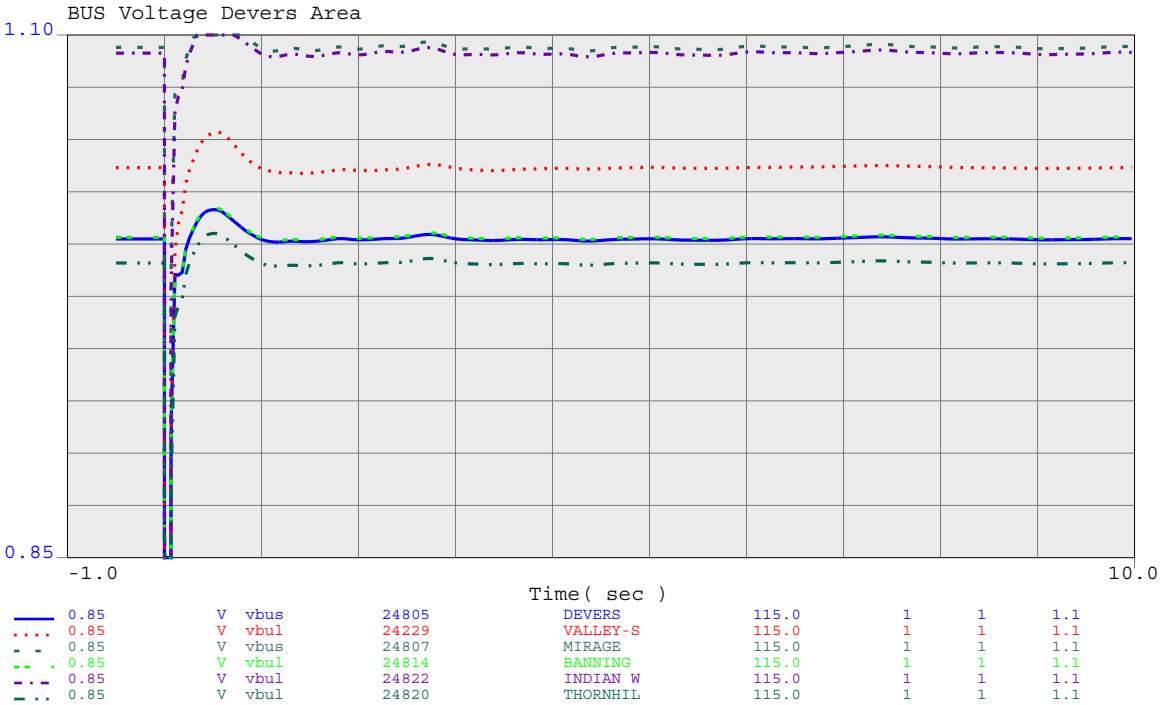
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

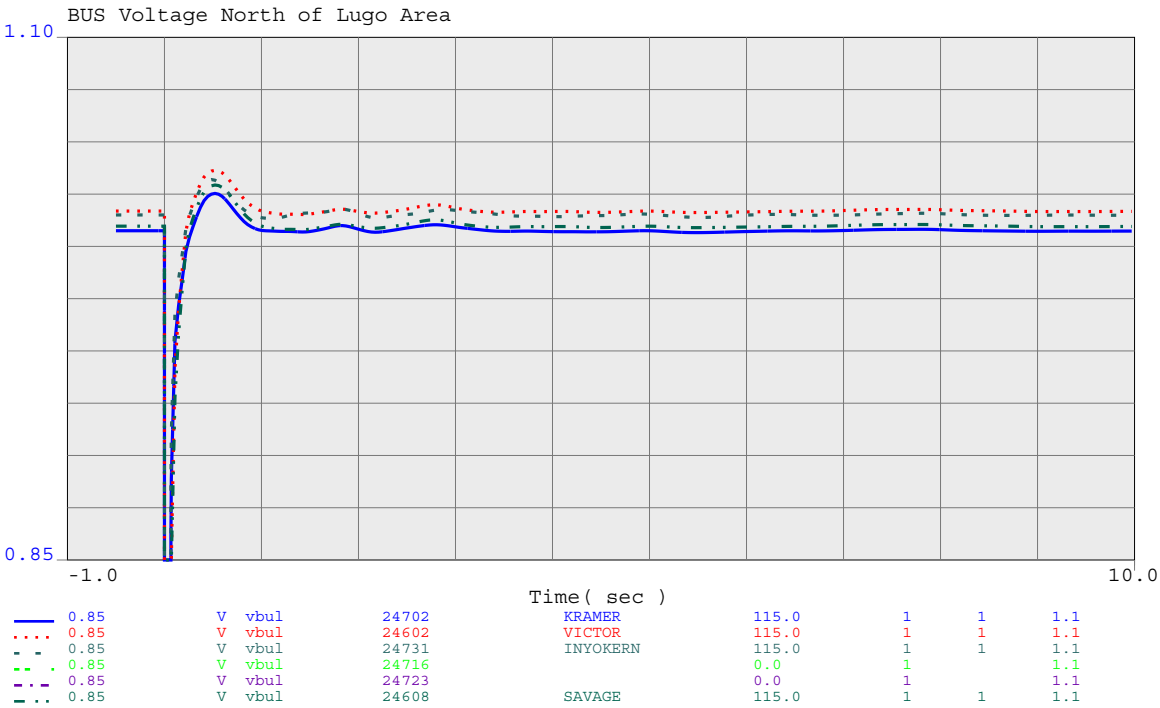
PRE PROJECT

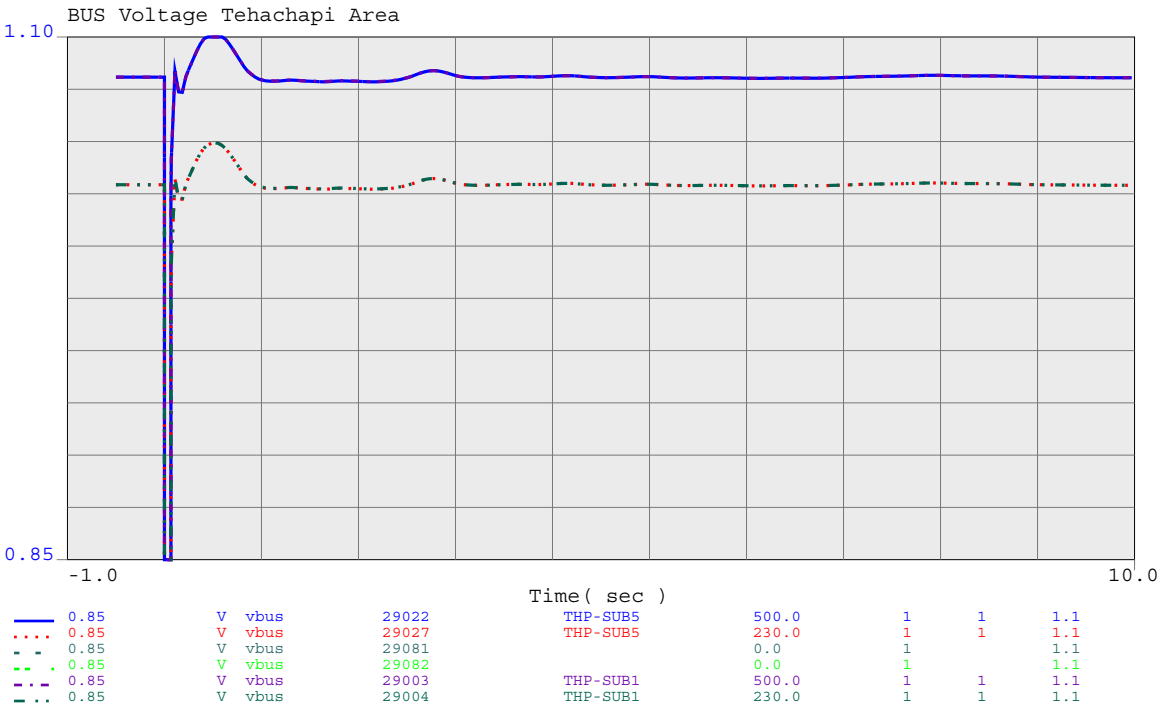
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

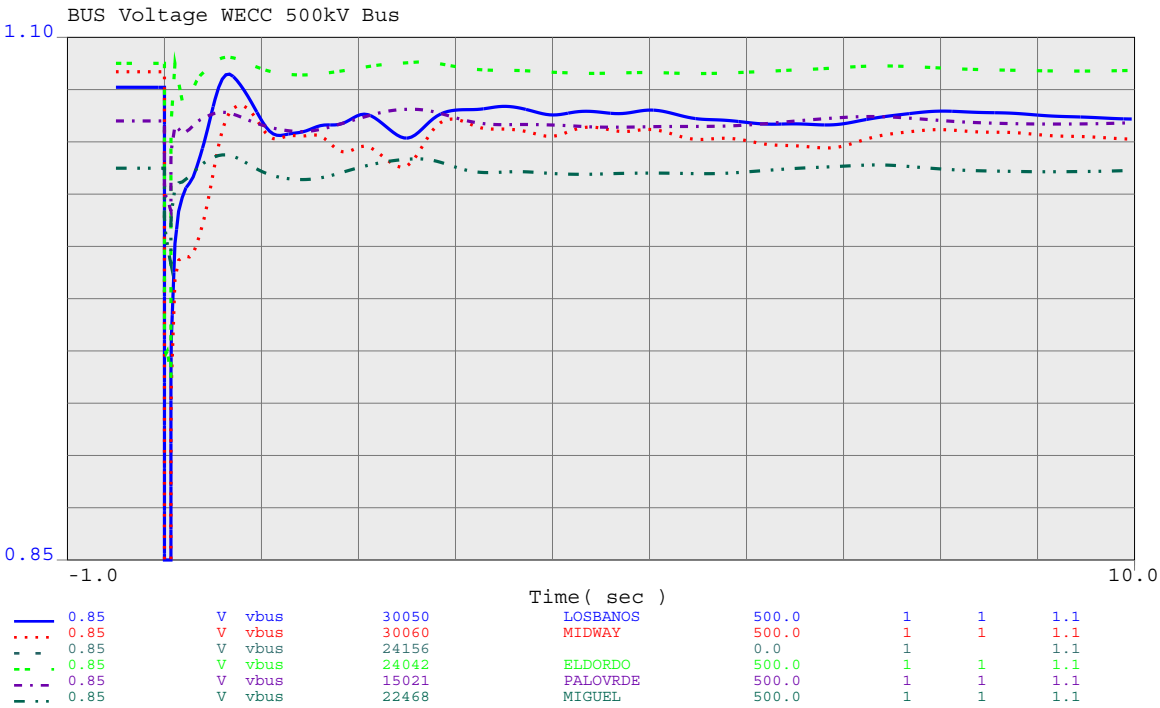
PRE PROJECT

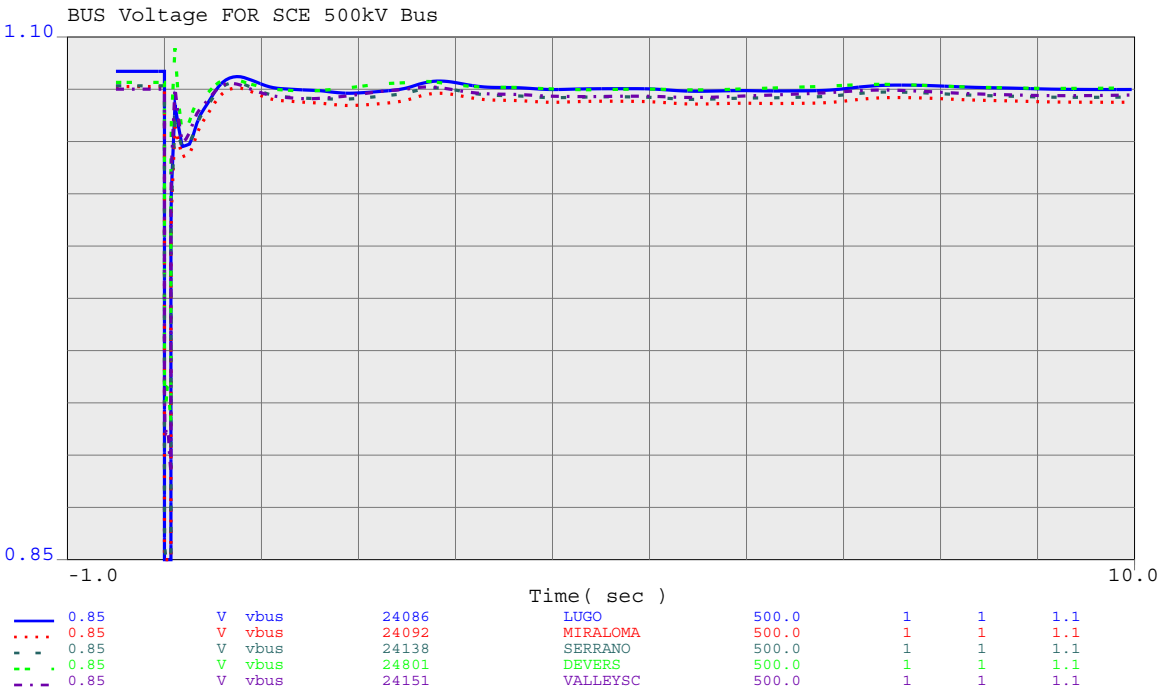
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

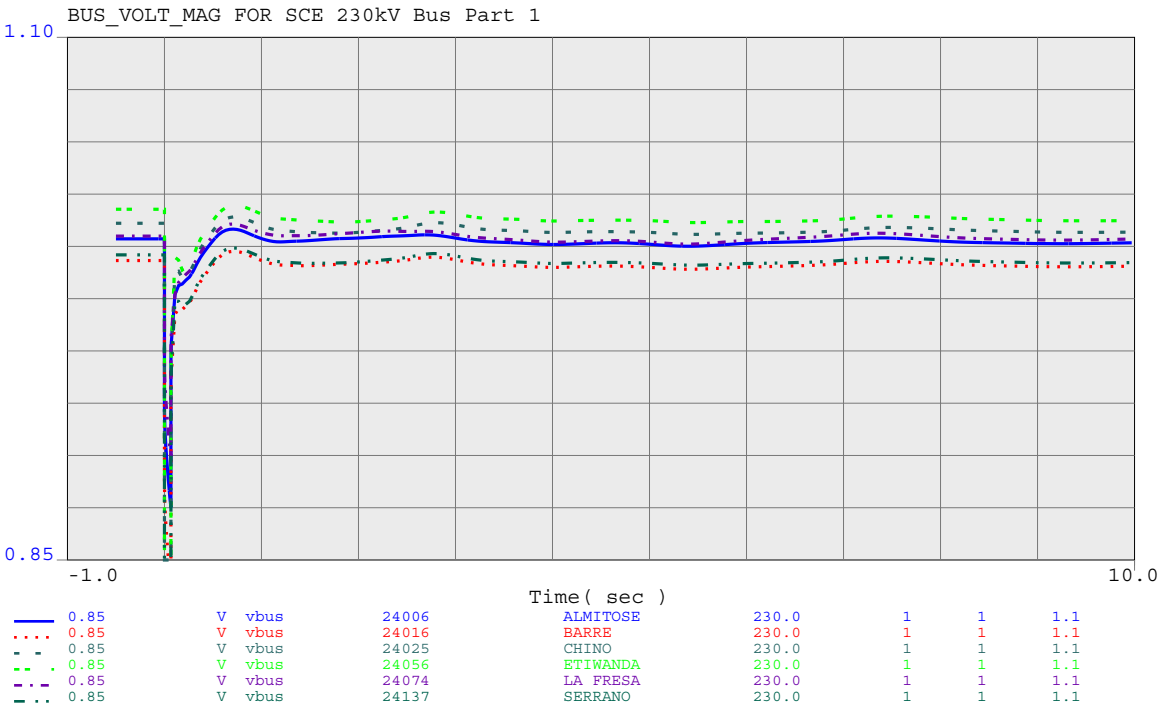
PRE PROJECT

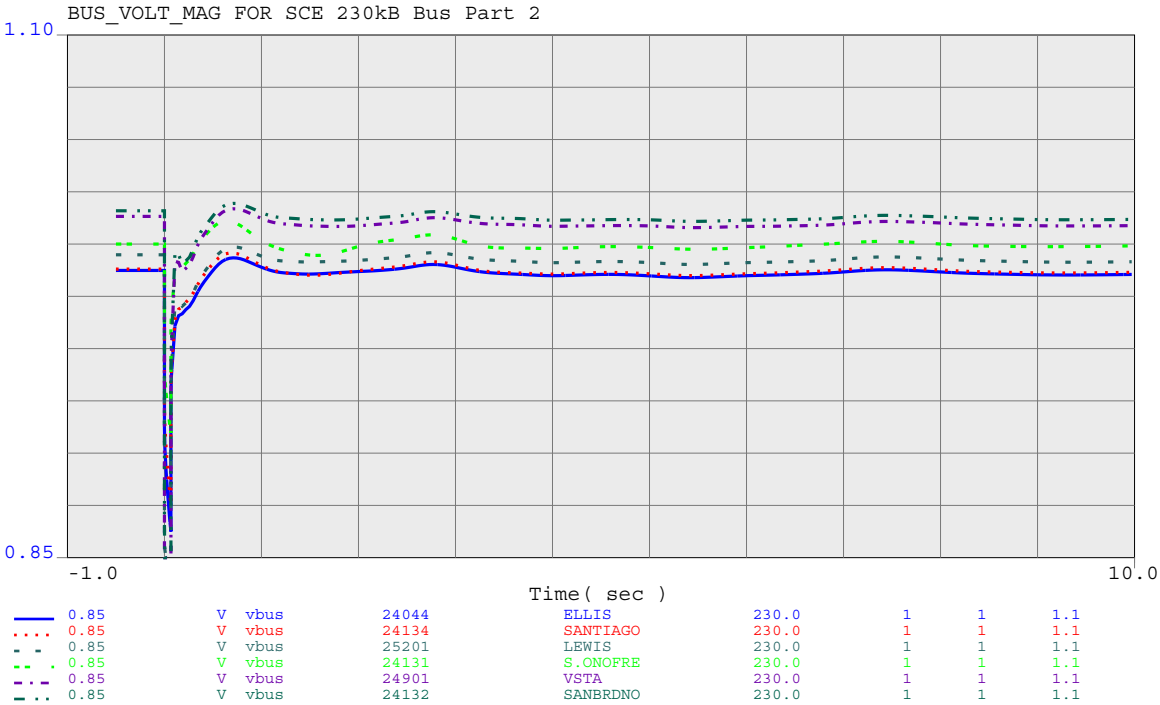
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

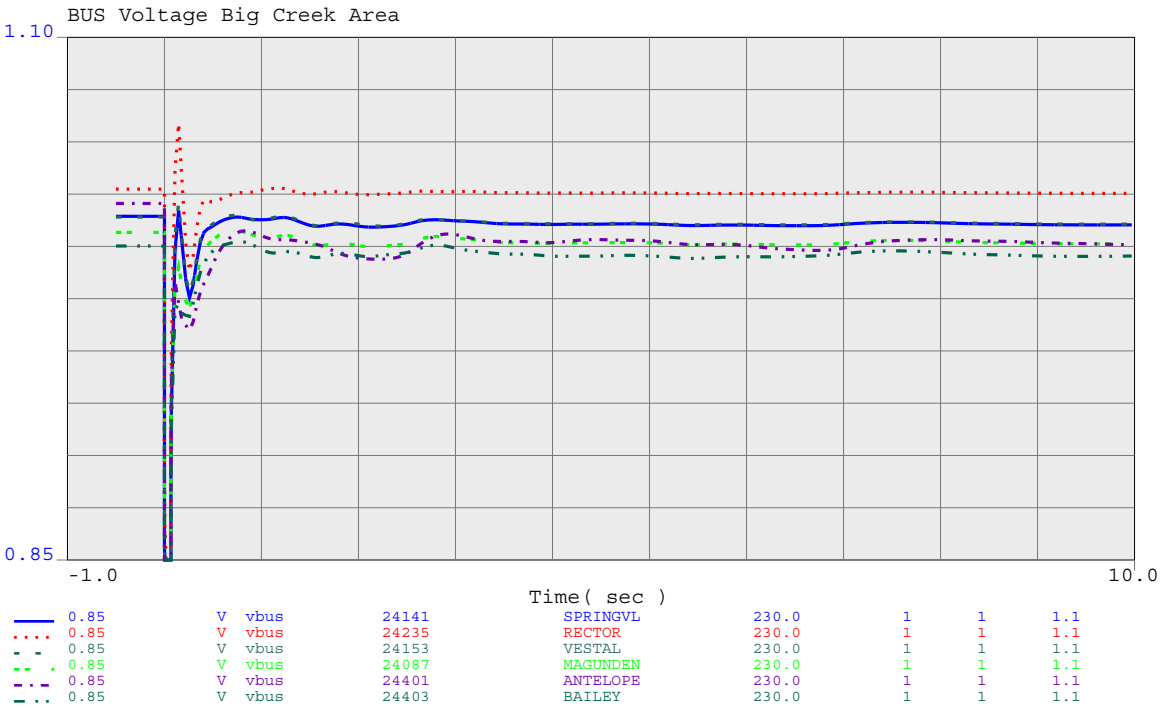
PRE PROJECT

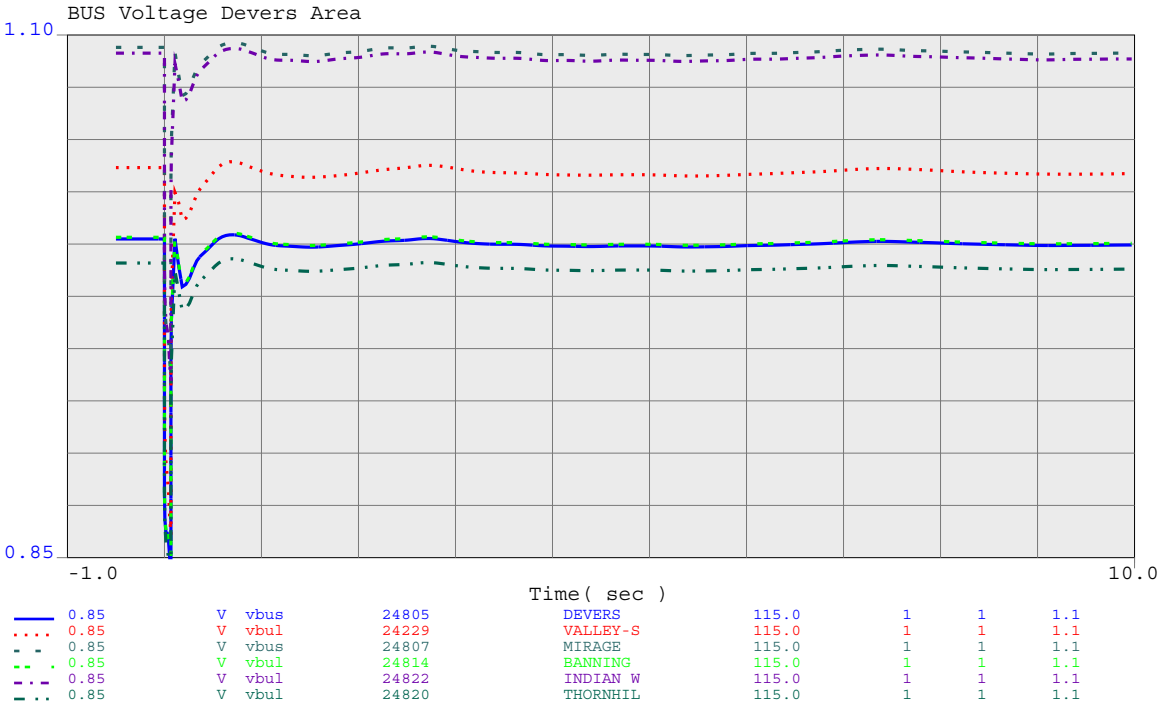
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

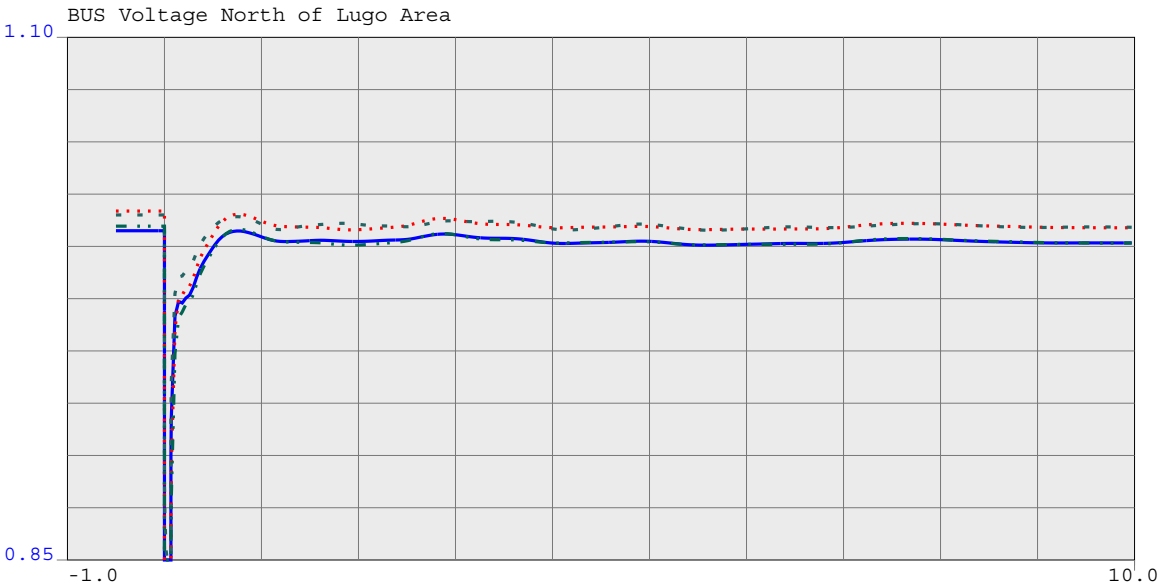
PRE PROJECT

2013 Off Peak Case

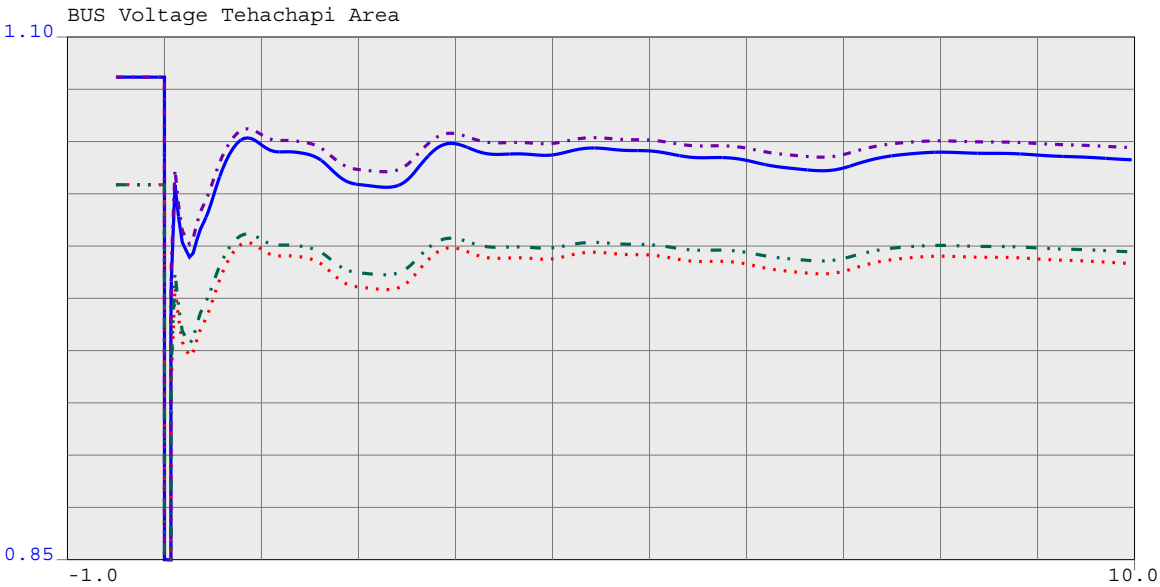
Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

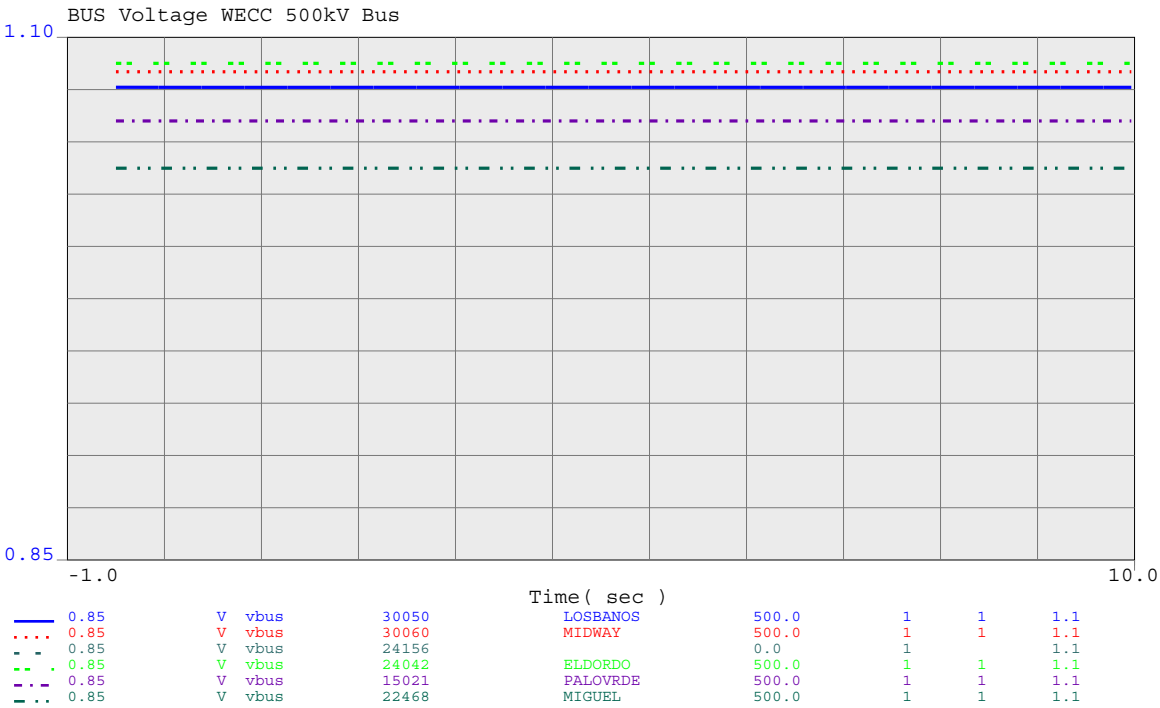
PRE PROJECT

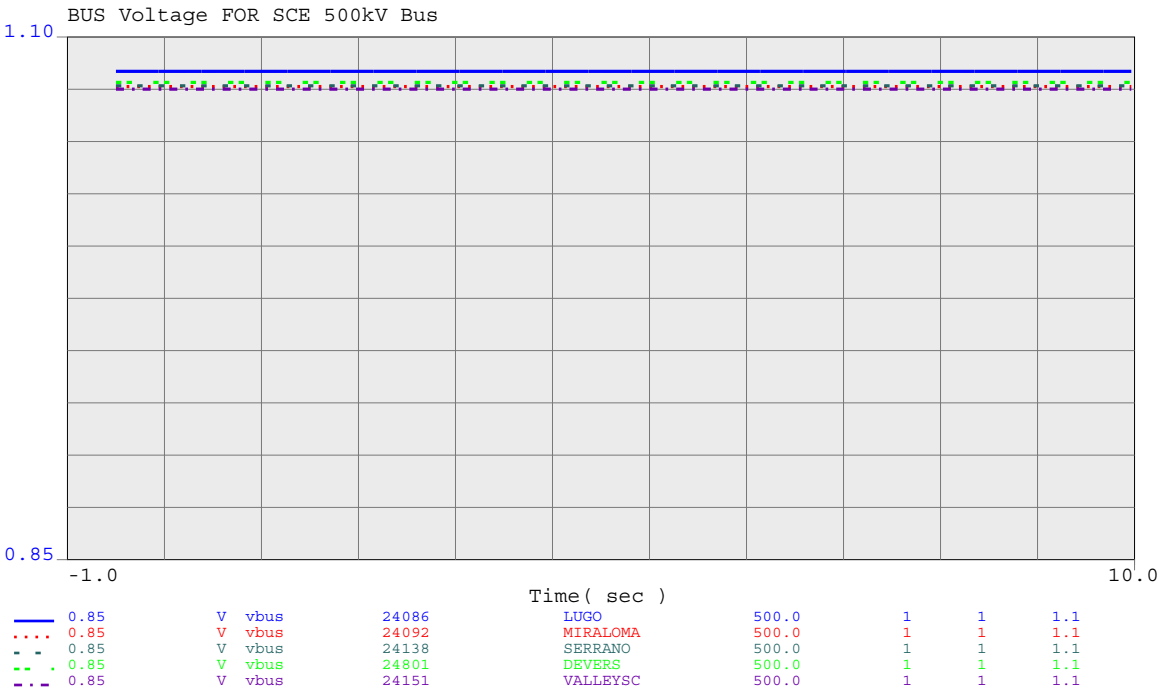
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

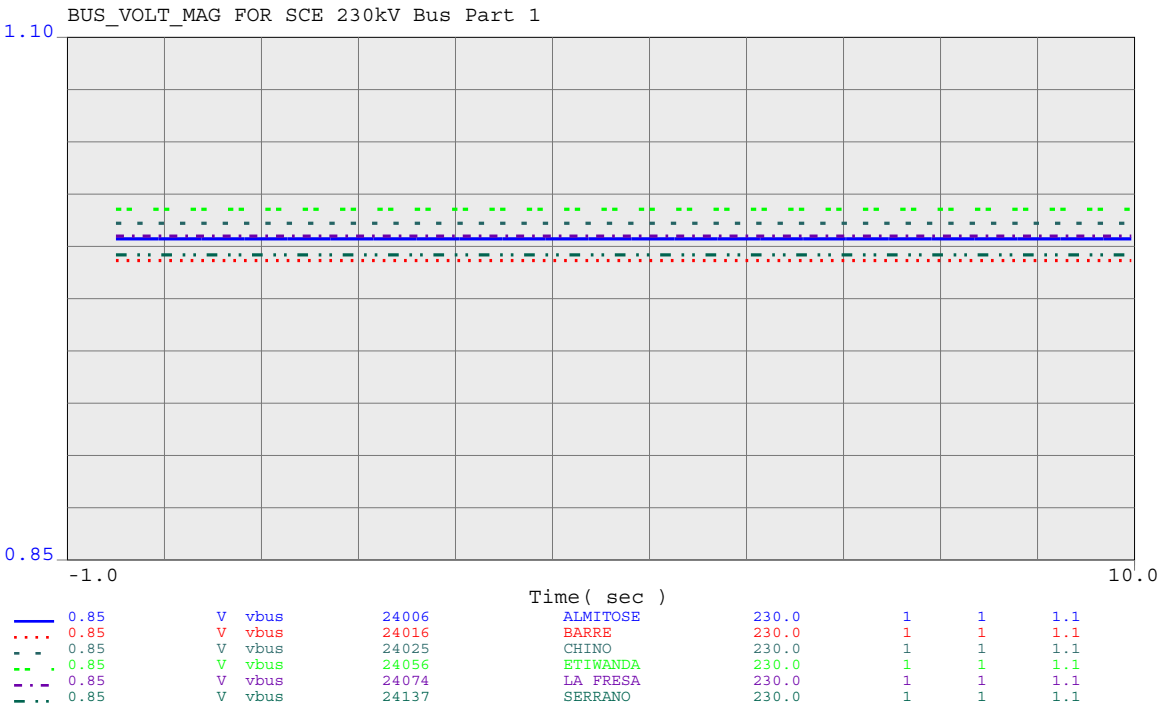
PRE PROJECT

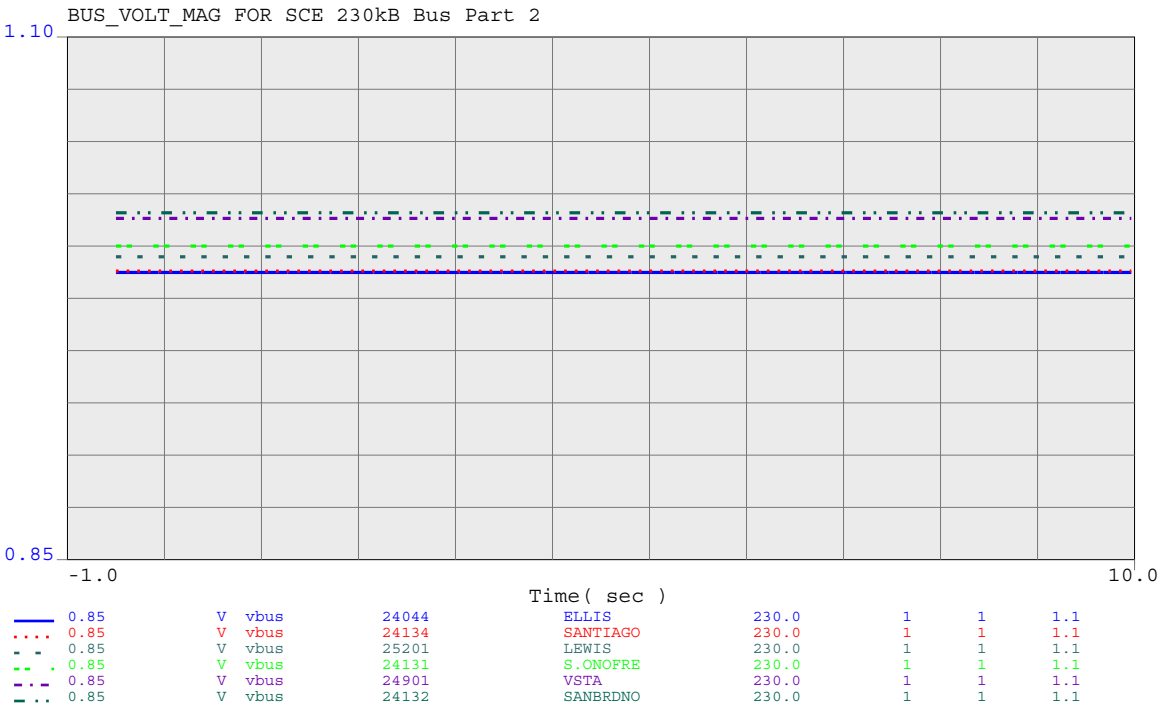
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

PRE PROJECT

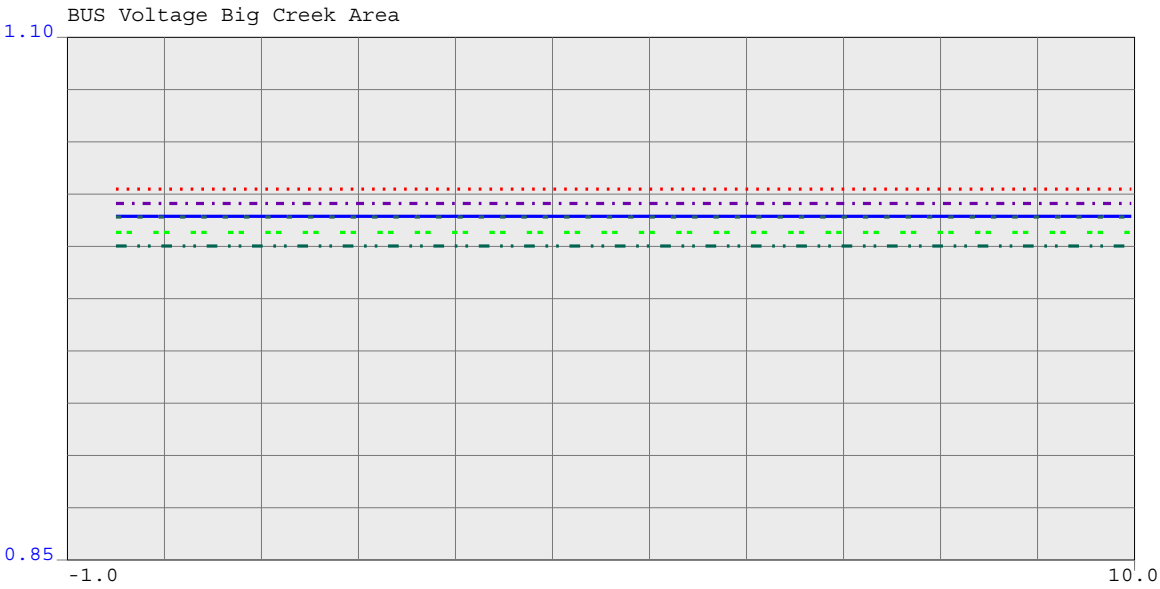
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

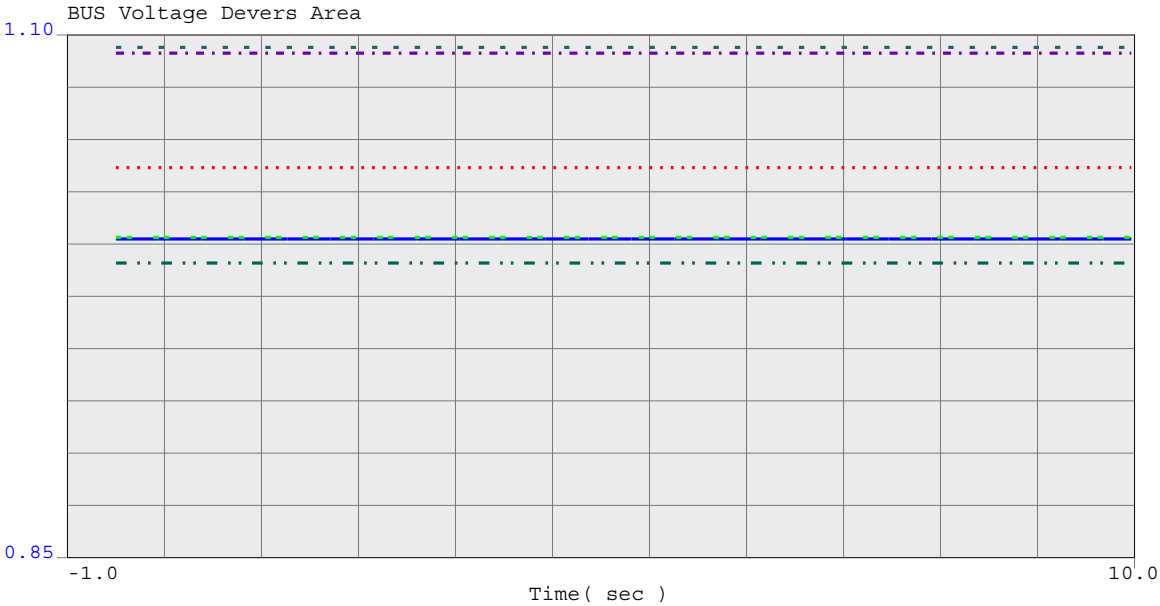
Stability Plots in SCE Area

BUS Voltage Big Creek Area



0.85	V	vbus	24141	SPRINGVL	230.0	1	1	1.1
0.85	V	vbus	24235	RECTOR	230.0	1	1	1.1
0.85	V	vbus	24153	VESTAL	230.0	1	1	1.1
0.85	V	vbus	24087	MAGUNDEN	230.0	1	1	1.1
0.85	V	vbus	24401	ANTELOPE	230.0	1	1	1.1
0.85	V	vbus	24403	BAILEY	230.0	1	1	1.1

BUS Voltage Devers Area



0.85	V	vbus	24805	DEVERS	115.0	1	1	1.1
0.85	V	vbul	24229	VALLEY-S	115.0	1	1	1.1
0.85	V	vbus	24807	MIRAGE	115.0	1	1	1.1
0.85	V	vbul	24814	BANNING	115.0	1	1	1.1
0.85	V	vbul	24822	INDIAN W	115.0	1	1	1.1
0.85	V	vbul	24820	THORNHIL	115.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

PRE PROJECT

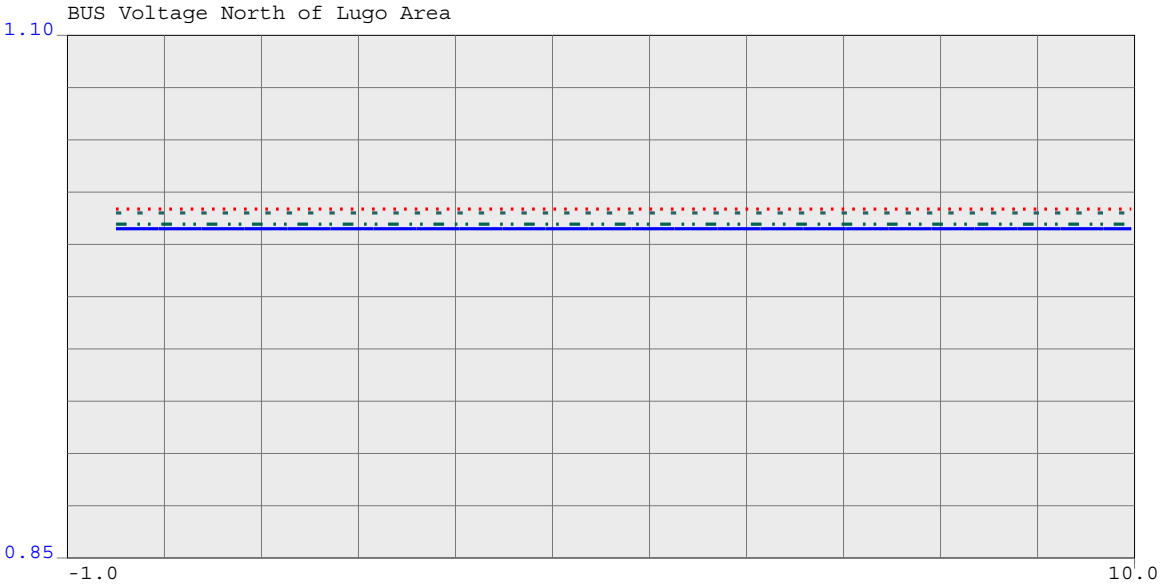
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

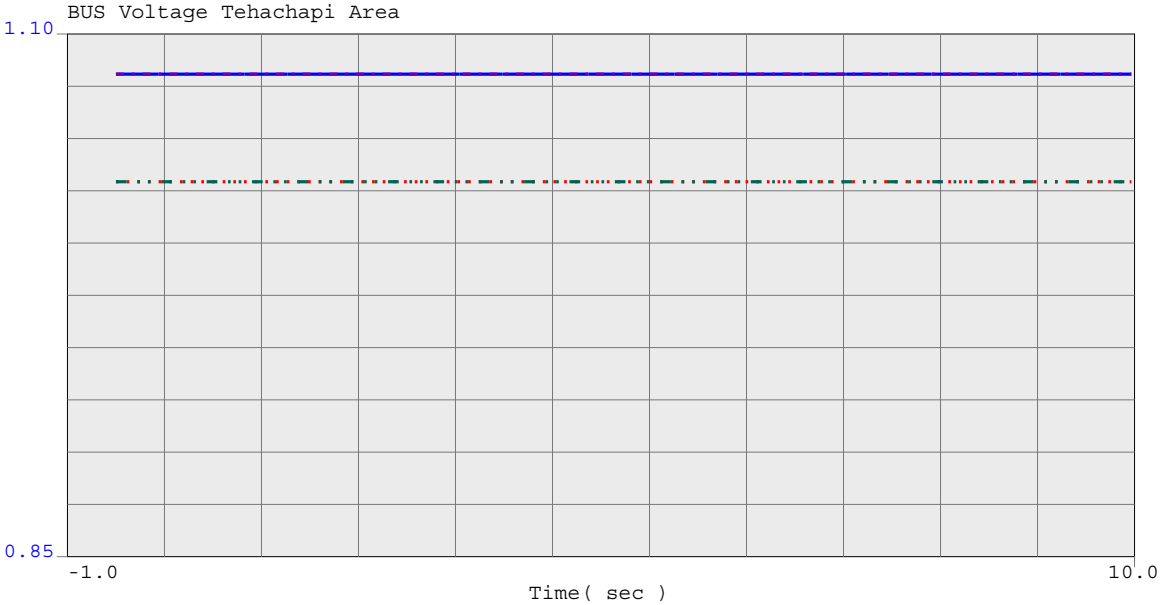
Stability Plots in SCE Area

BUS Voltage North of Lugo Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1

BUS Voltage Tehachapi Area



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

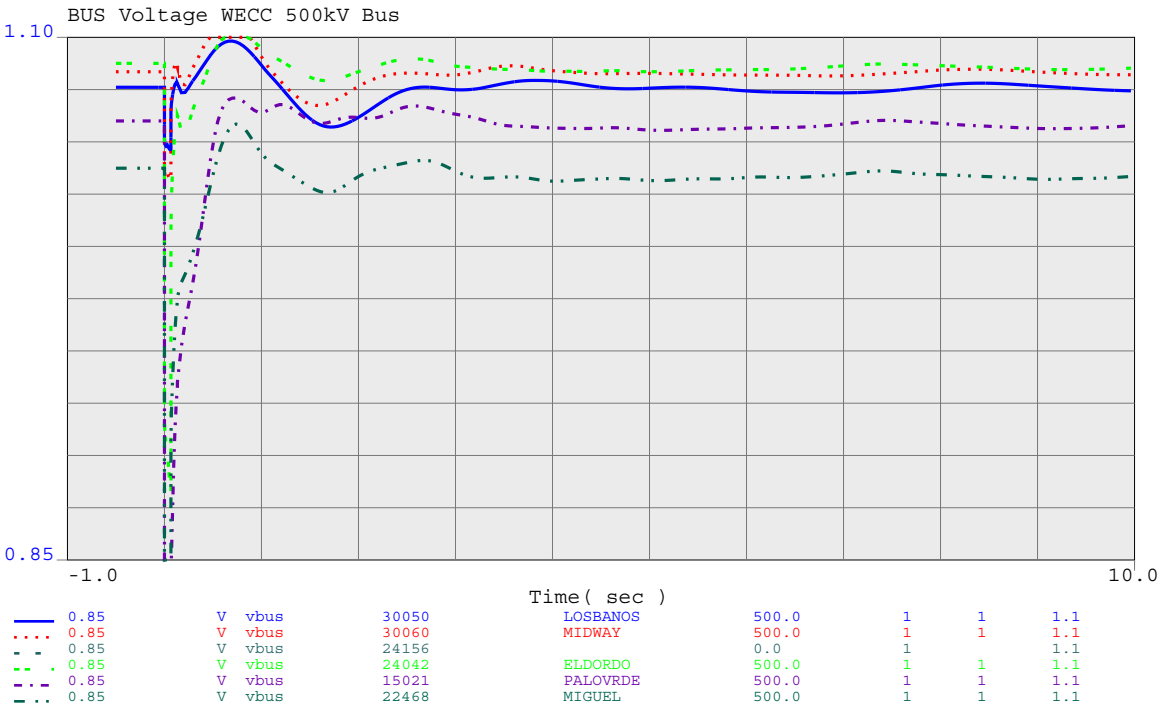
PRE PROJECT

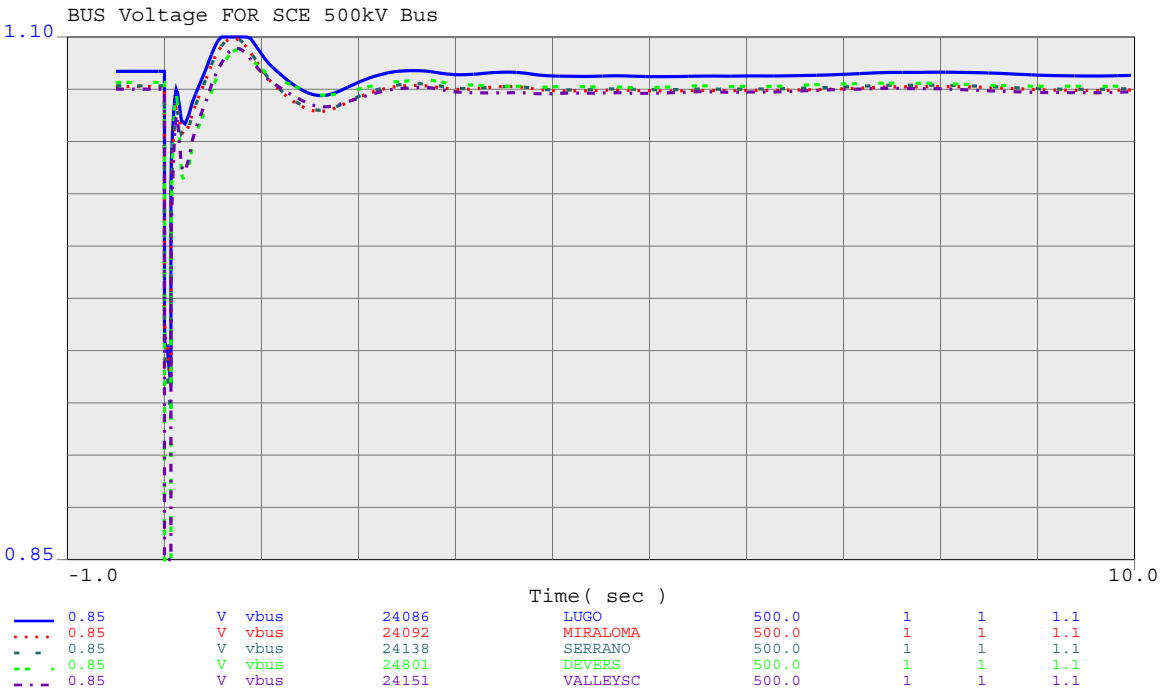
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

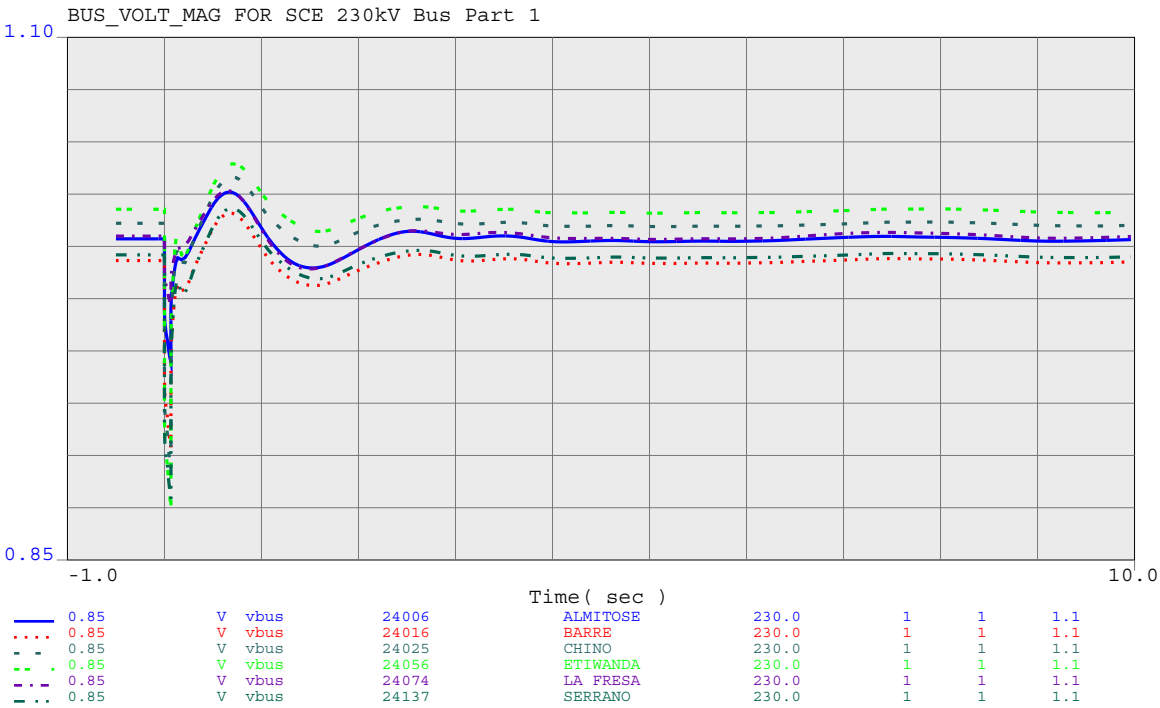
PRE PROJECT

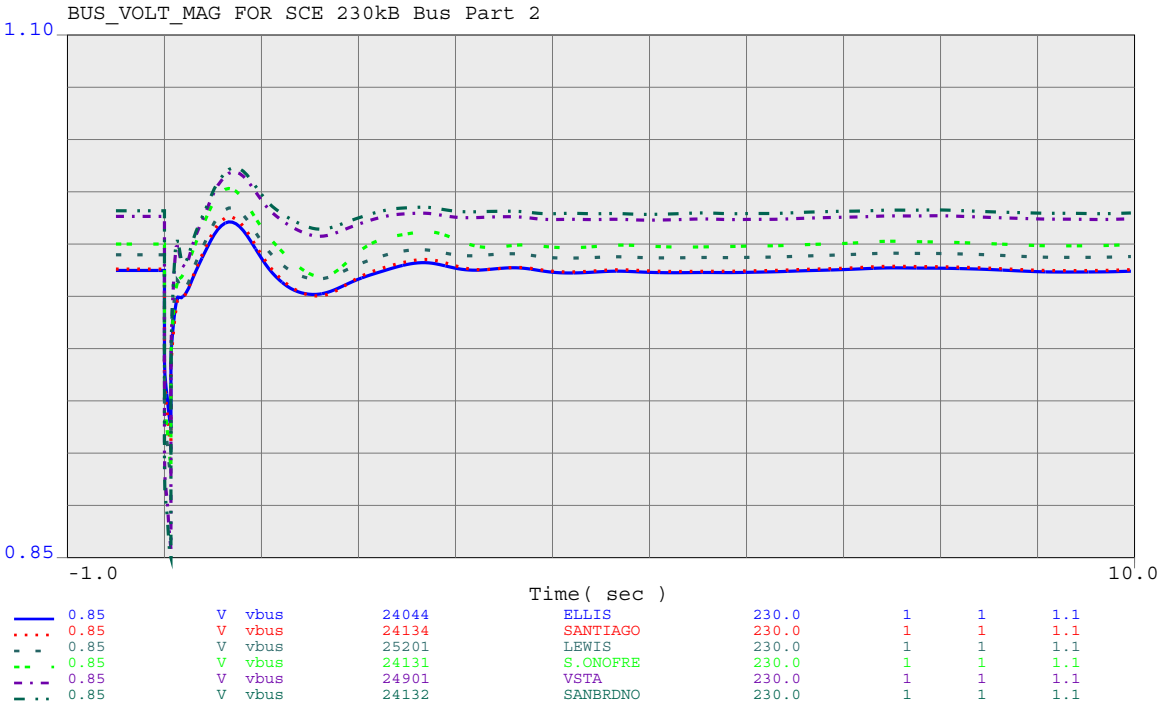
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

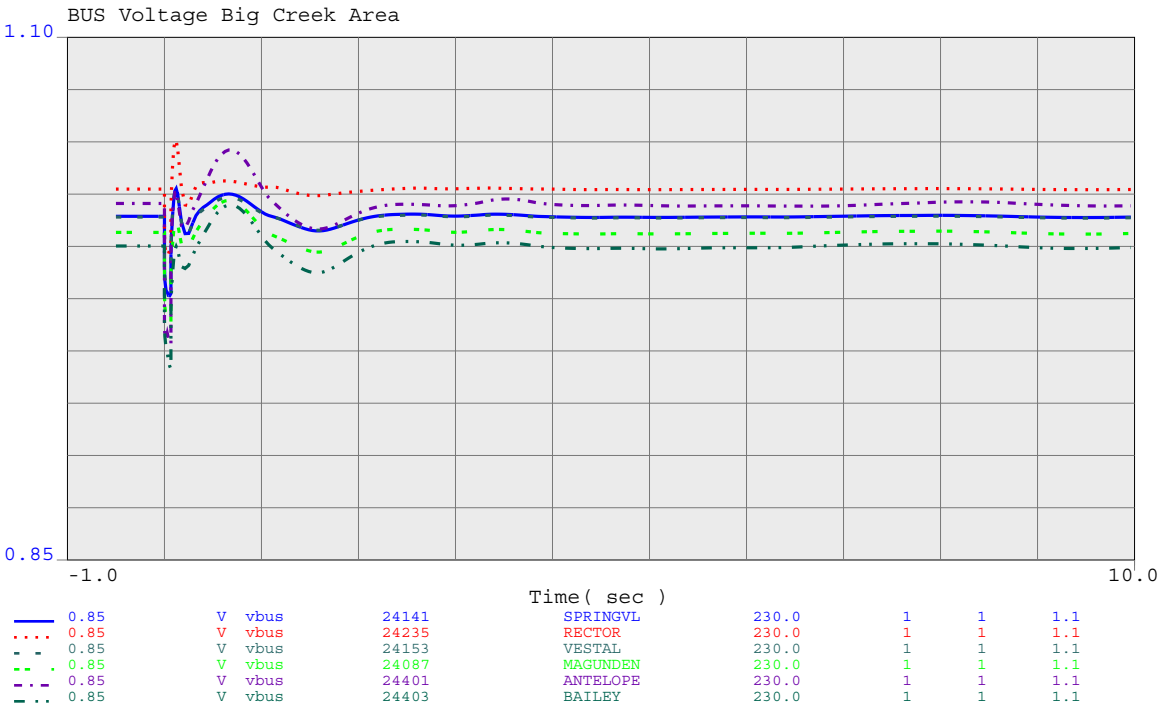
PRE PROJECT

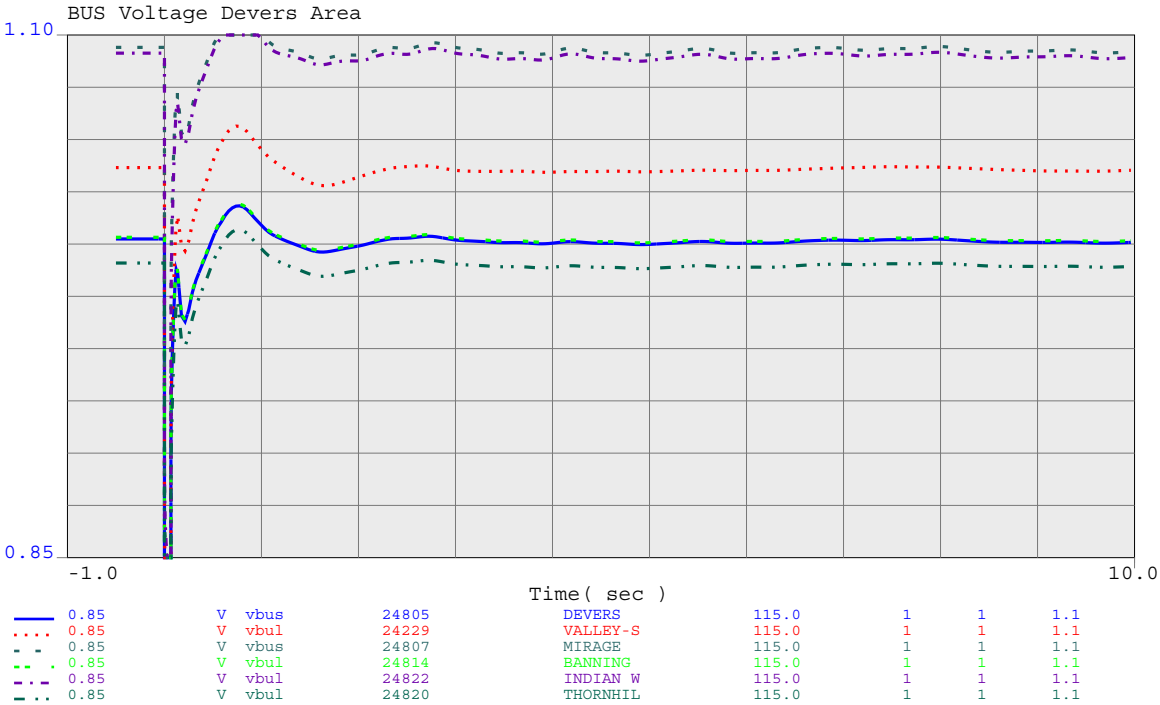
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

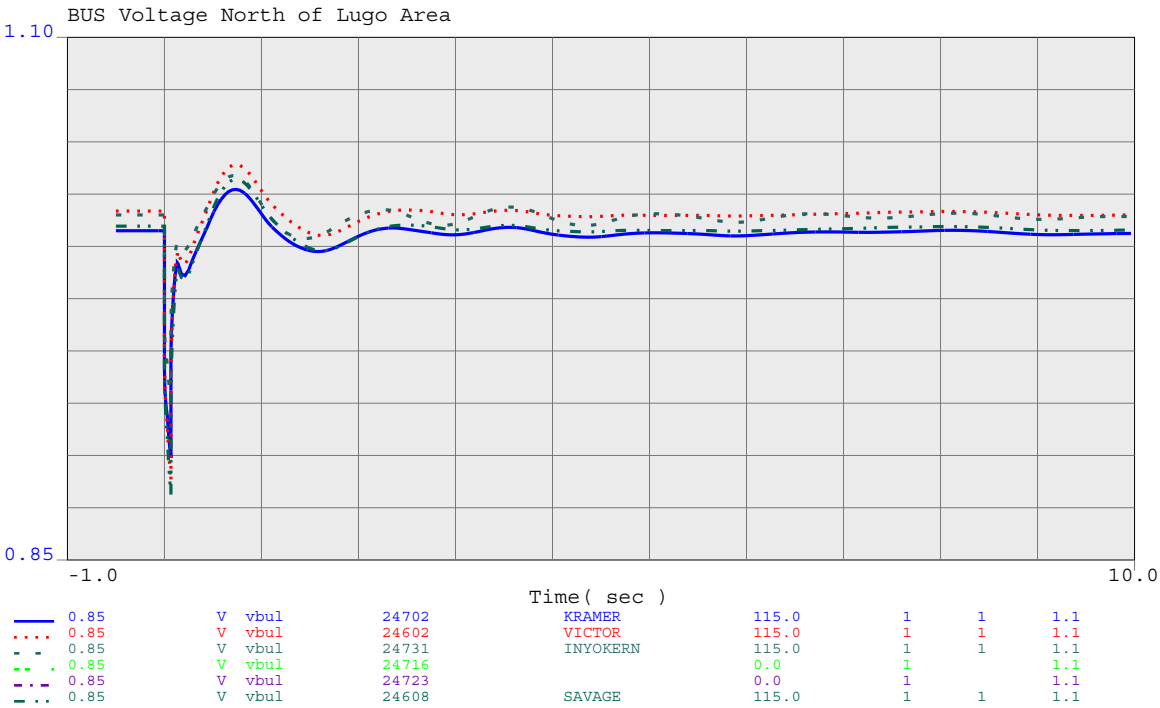
PRE PROJECT

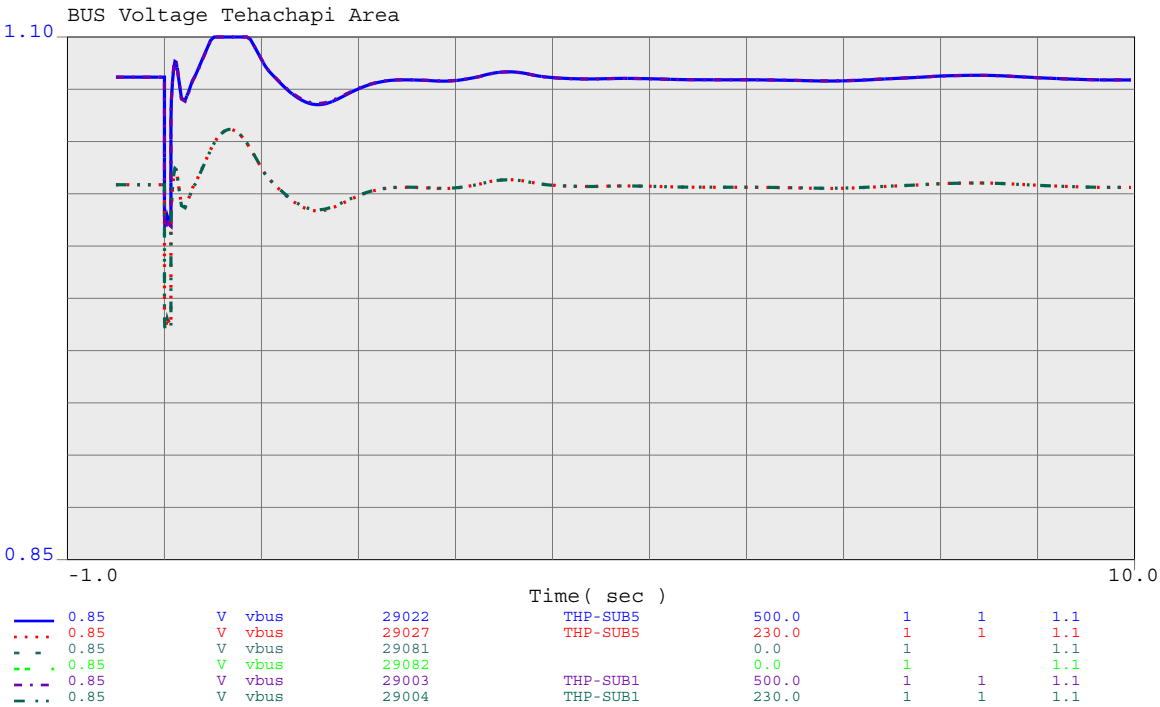
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

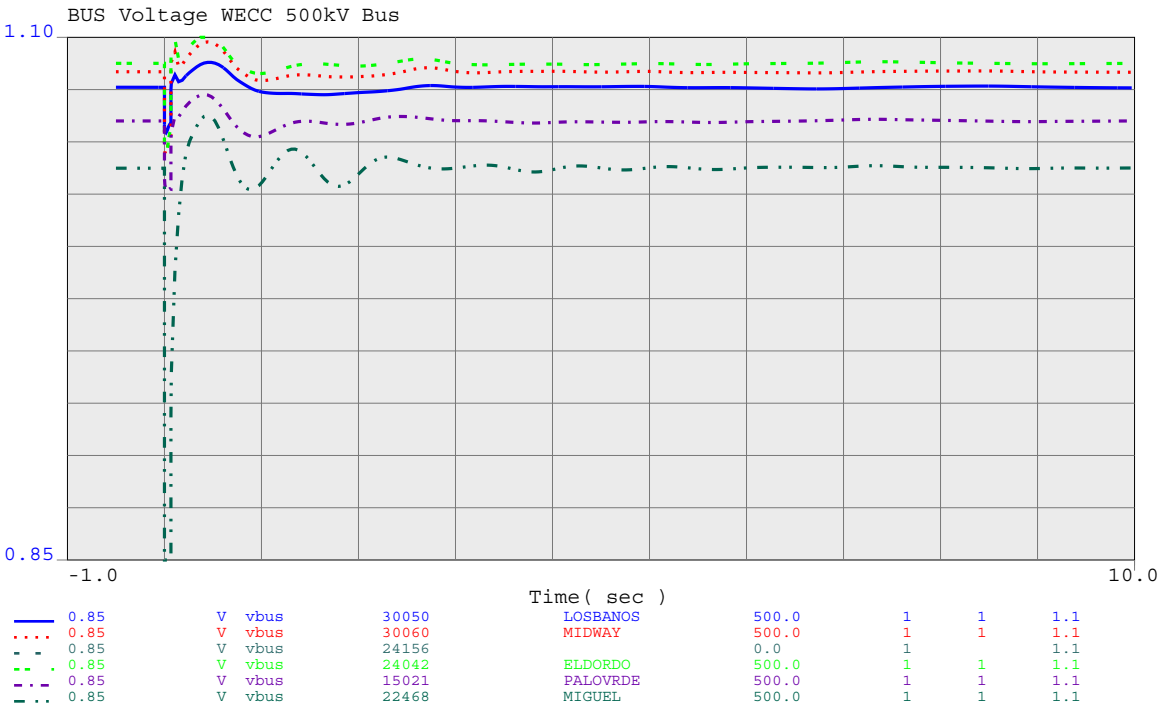
PRE PROJECT

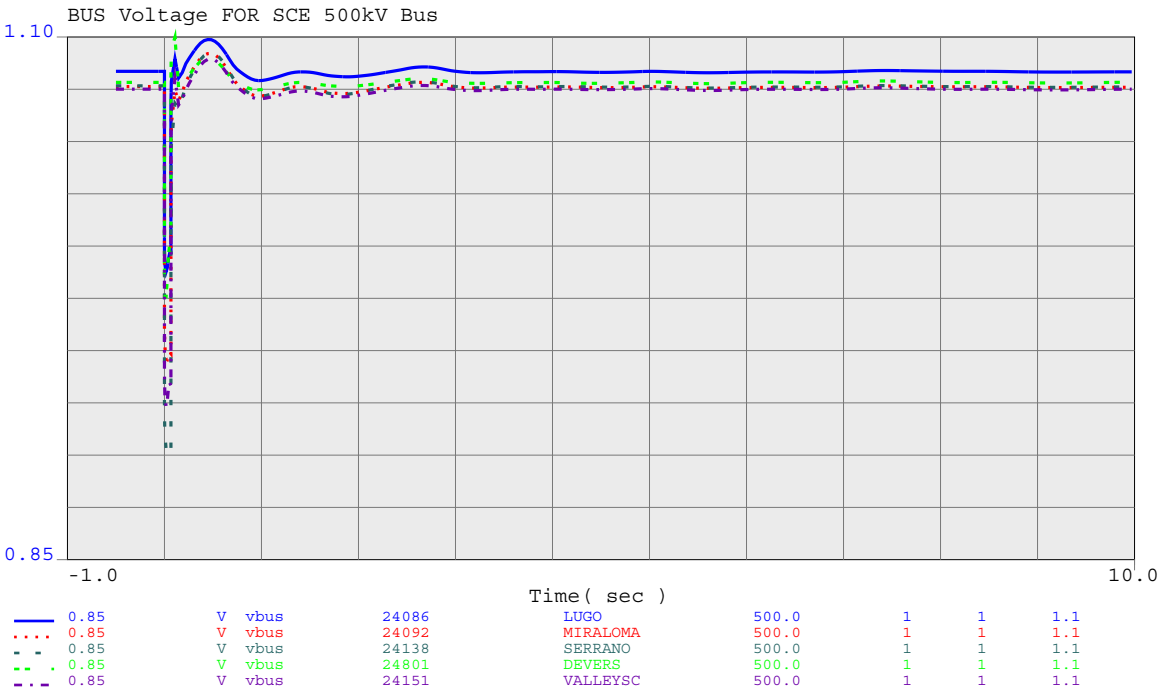
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

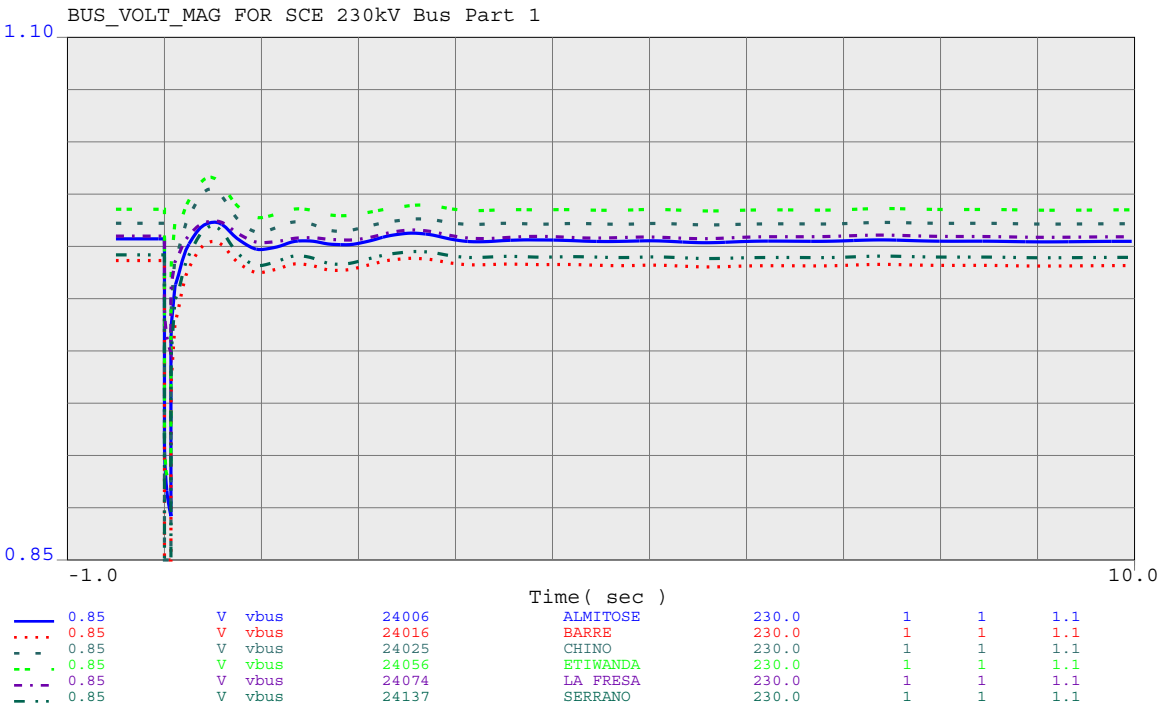
PRE PROJECT

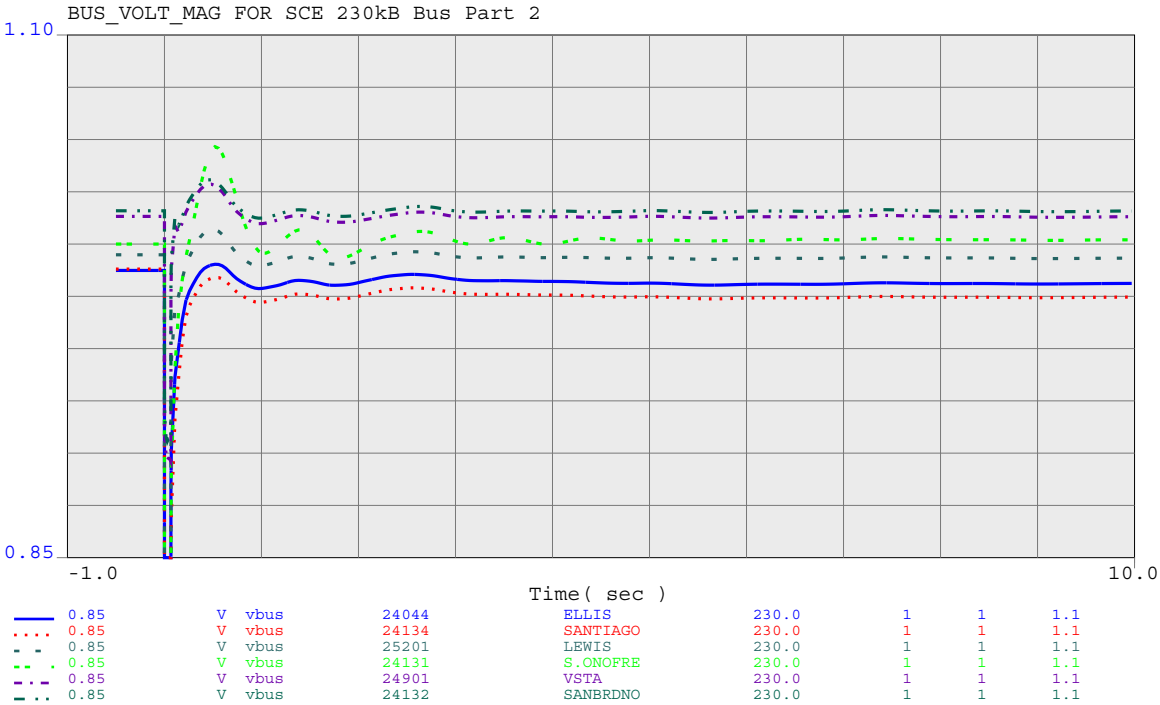
2013 Off Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

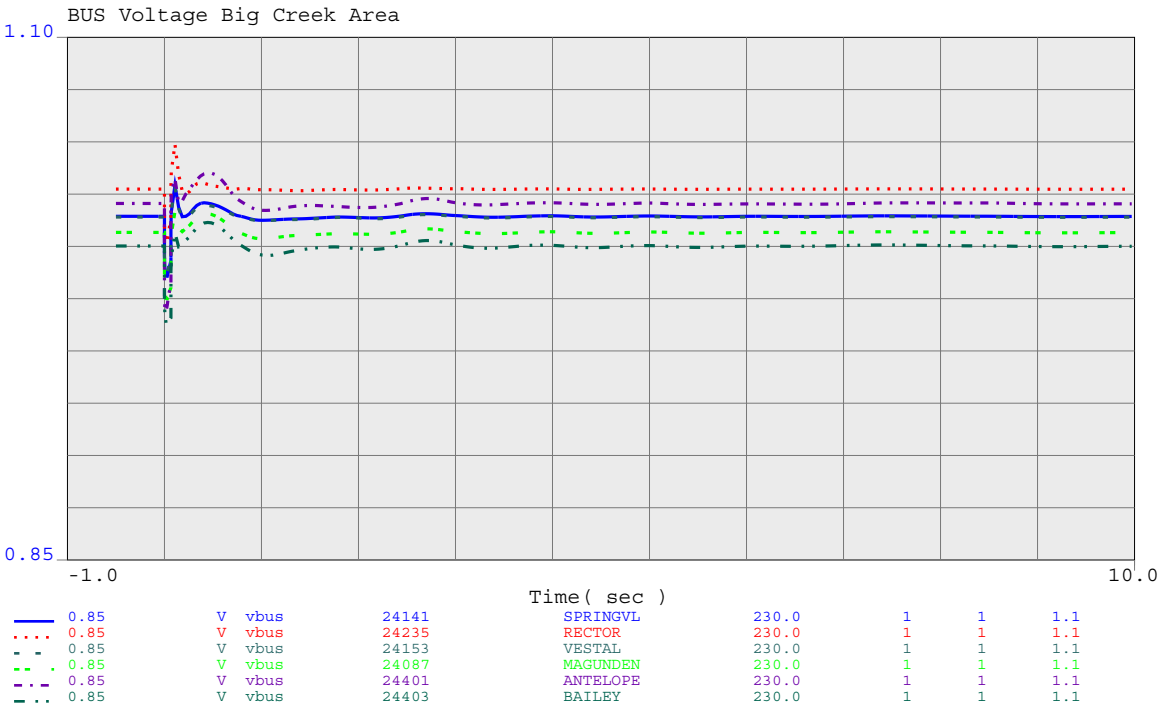
PRE PROJECT

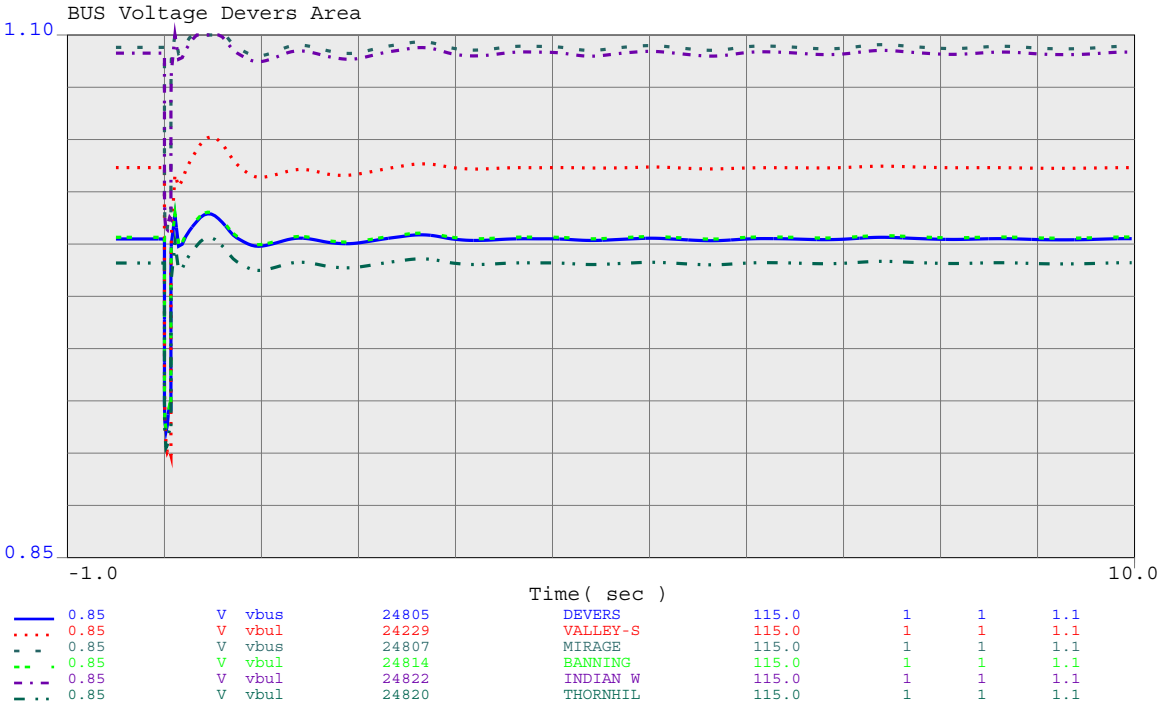
2013 Off Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

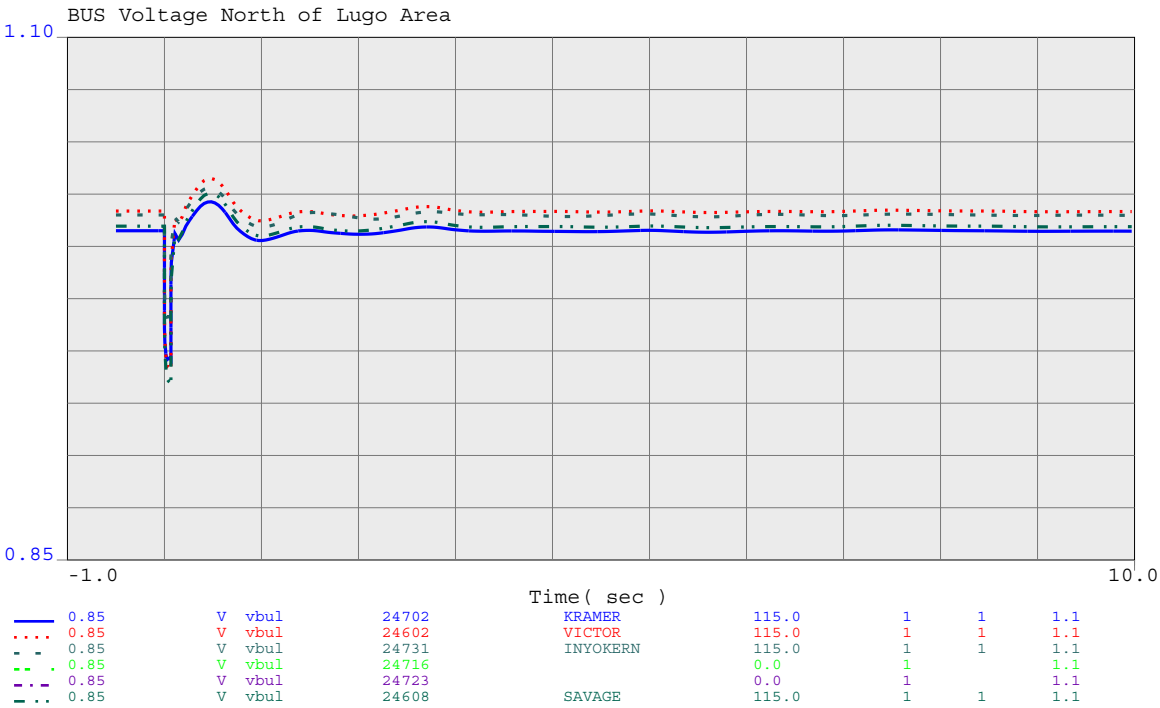
PRE PROJECT

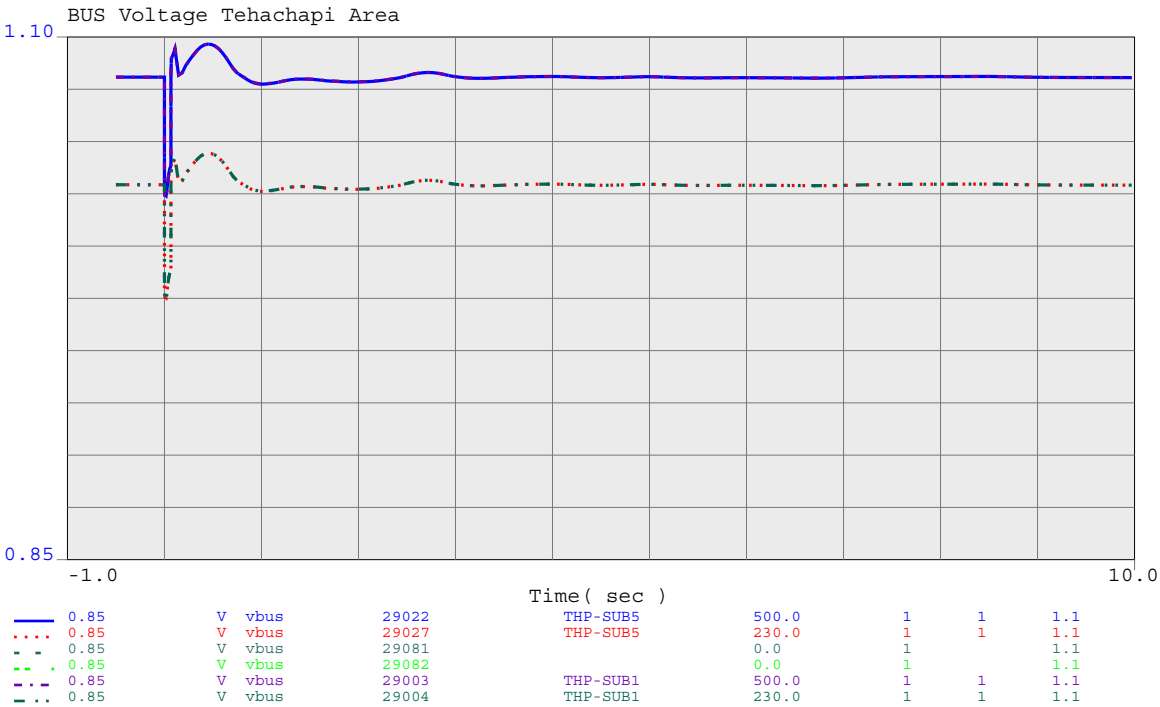
2013 Off Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

PRE PROJECT

2013 Off Peak Case

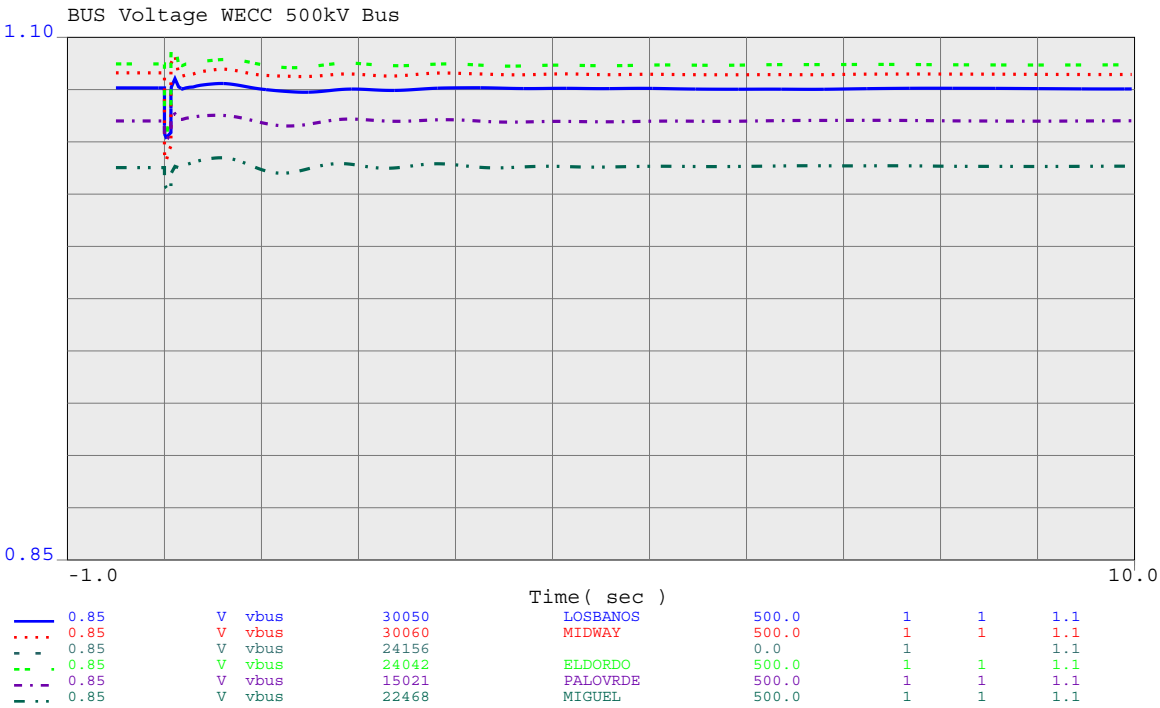
SONGS - Santiago Double Line Outage (fault at SONGS)

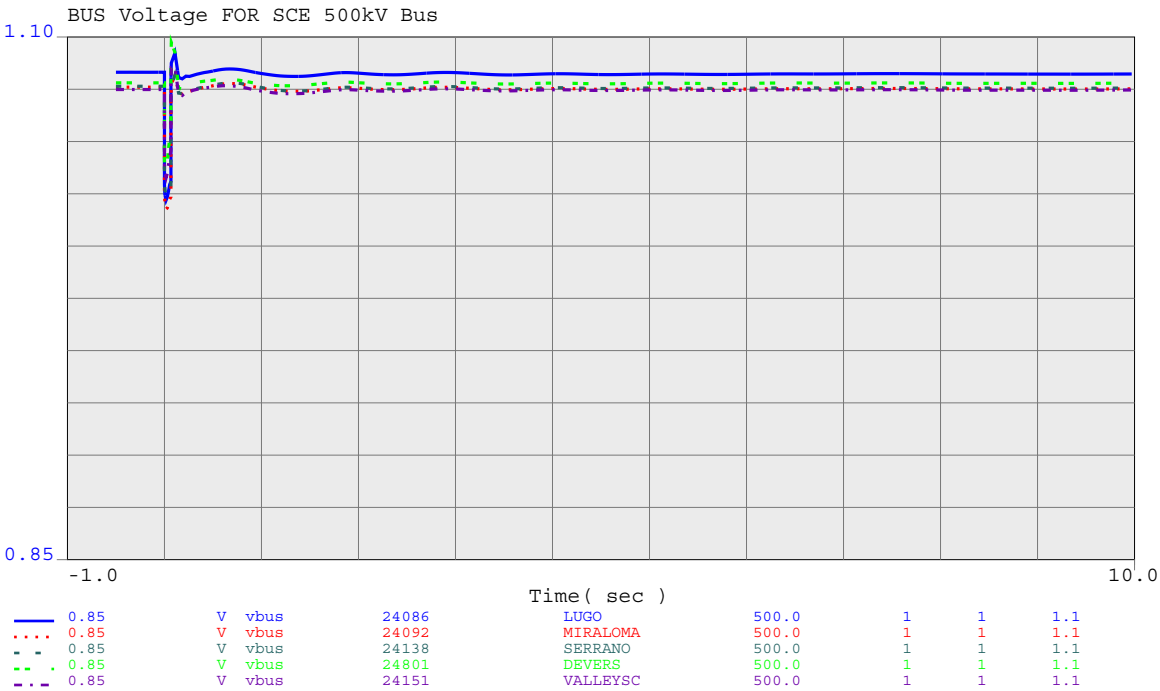
[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

APPENDIX B

Heavy Spring Stability Plots Post - Project

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

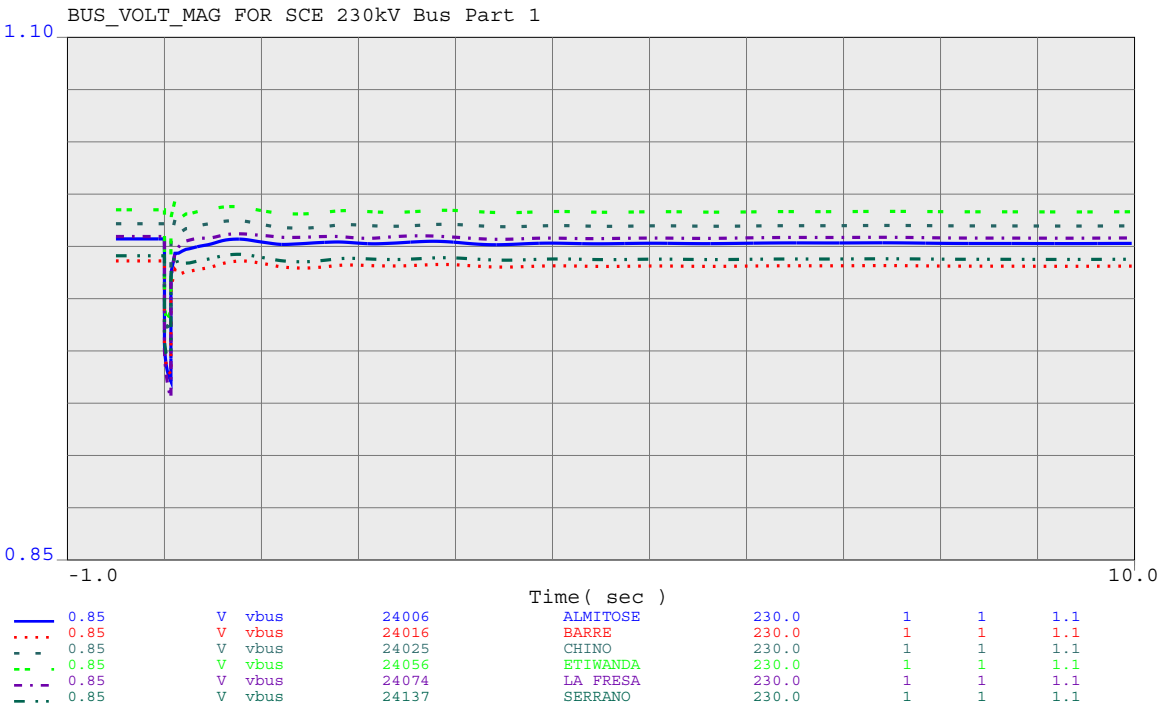
POST PROJECT

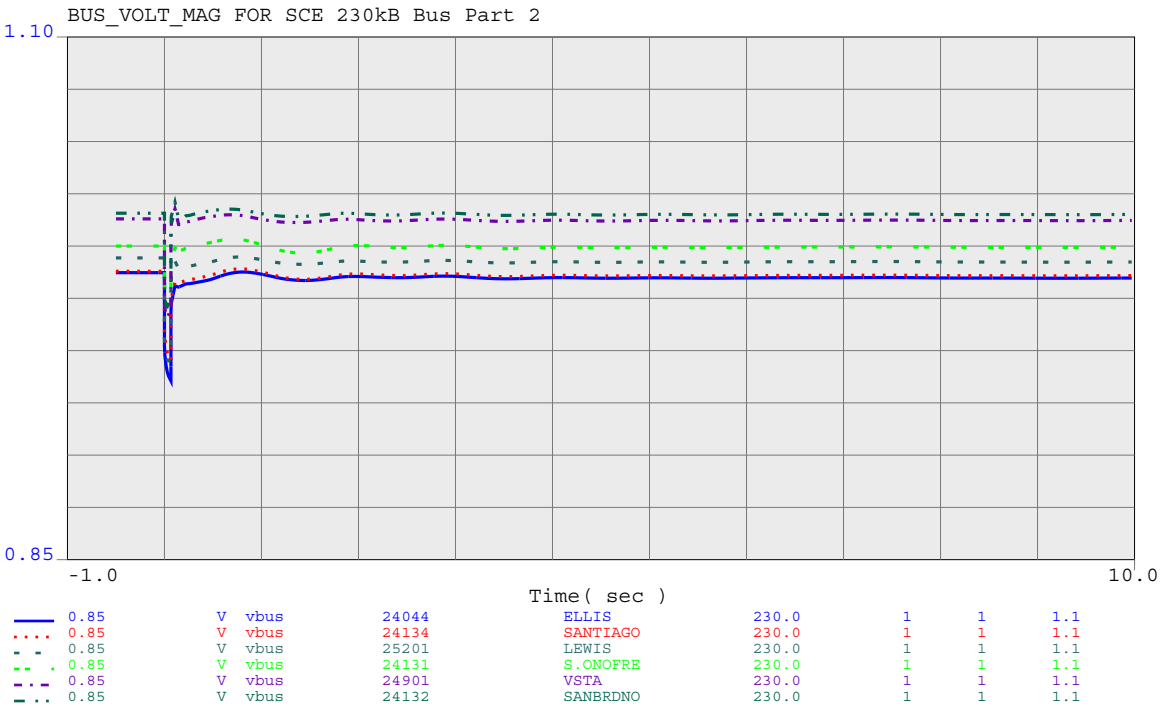
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

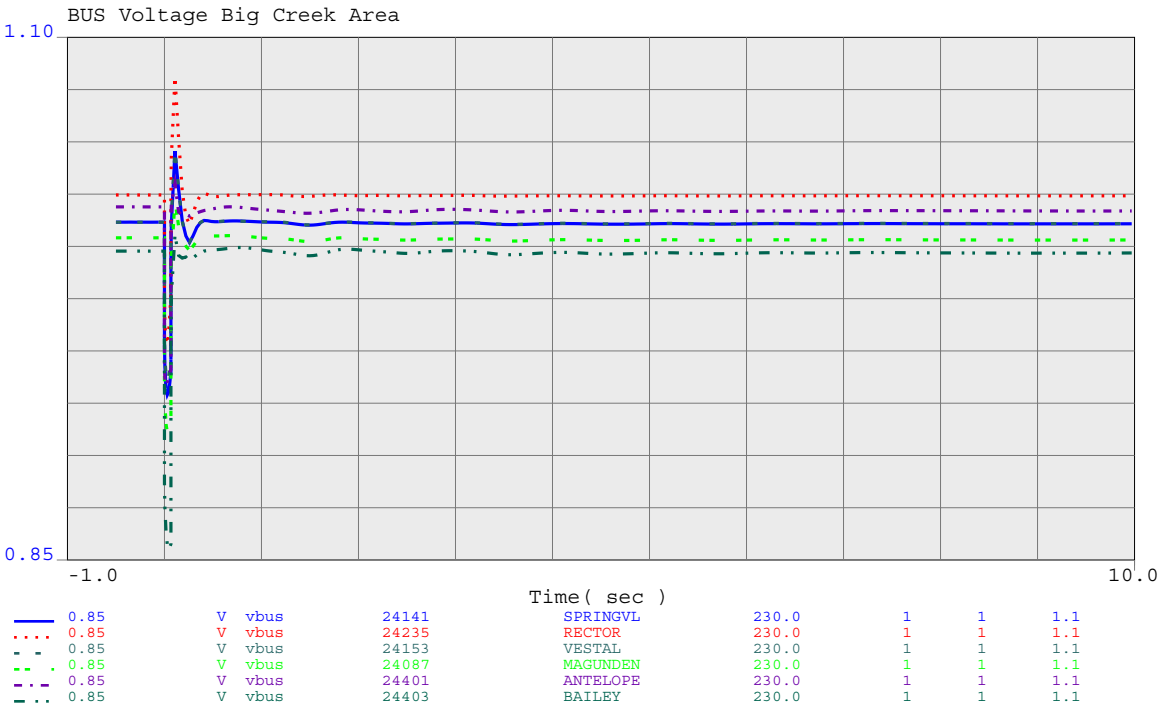
POST PROJECT

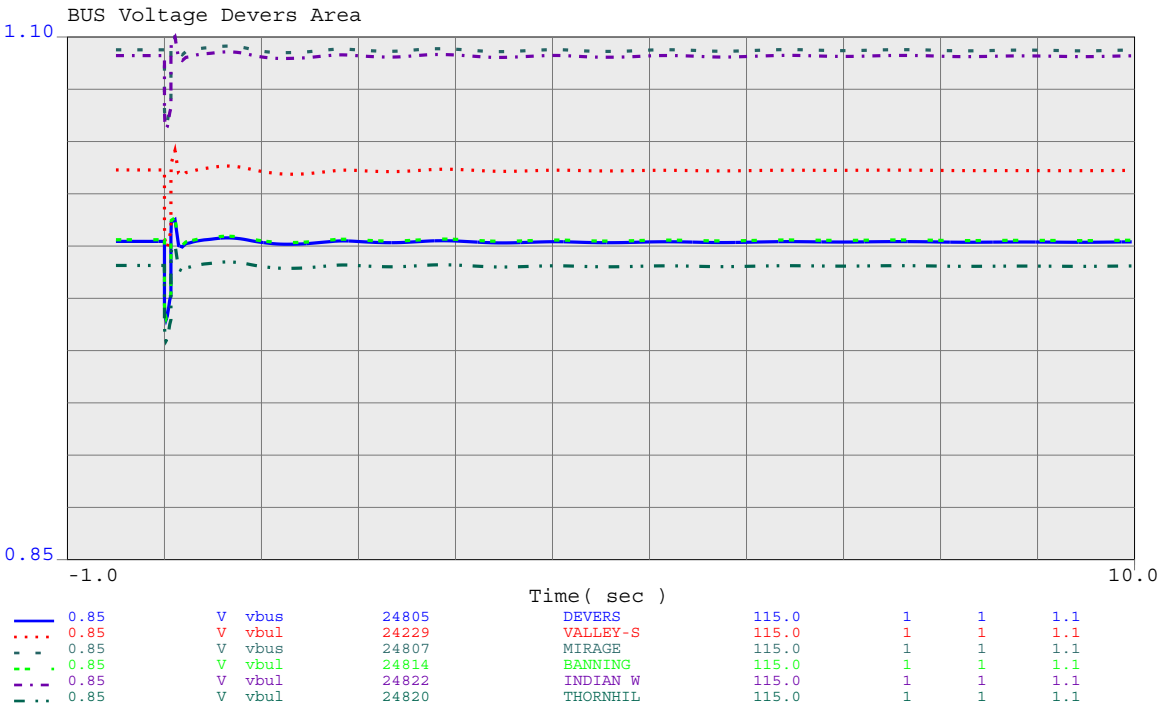
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

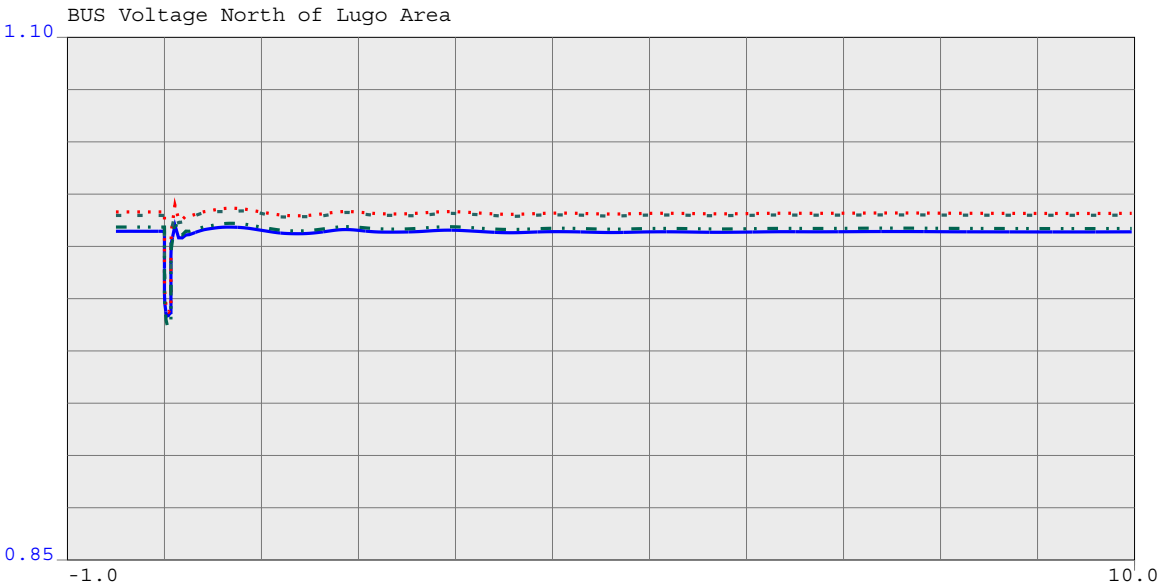
POST PROJECT

2013 Off Peak Case

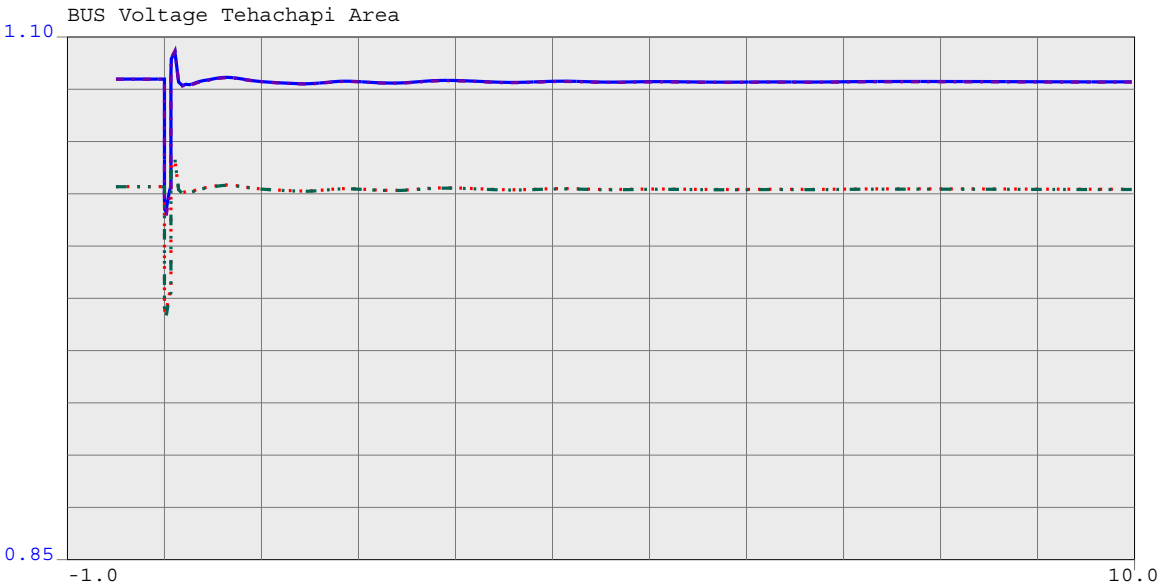
Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

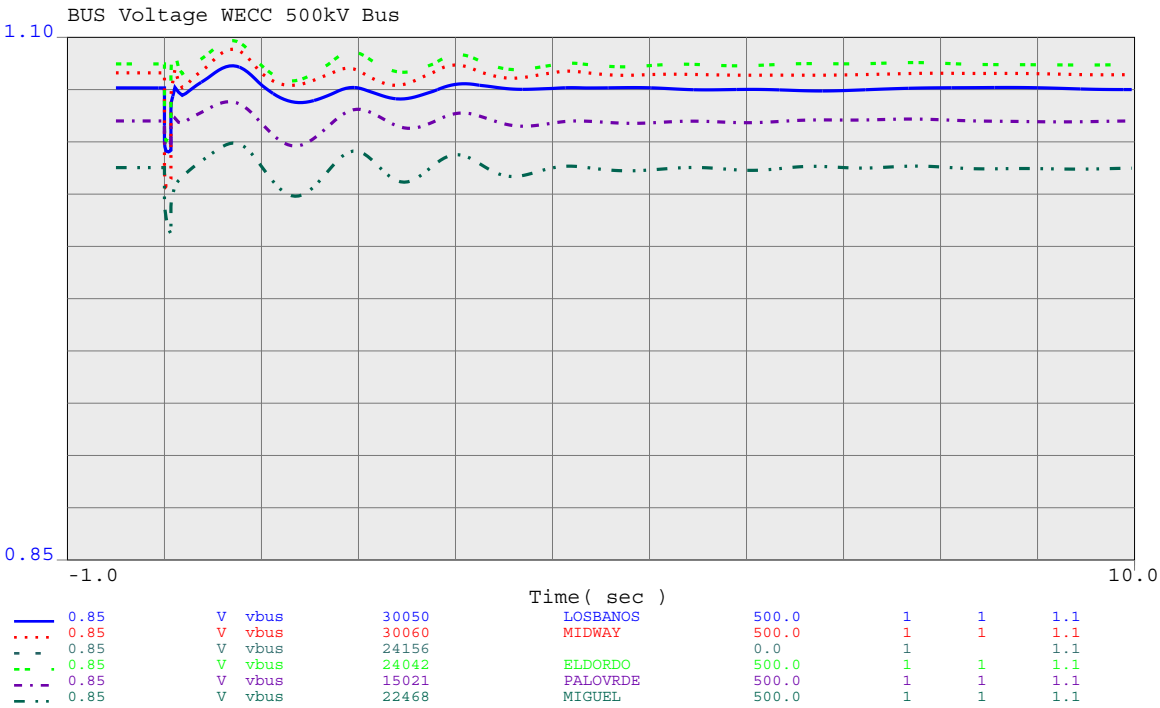
POST PROJECT

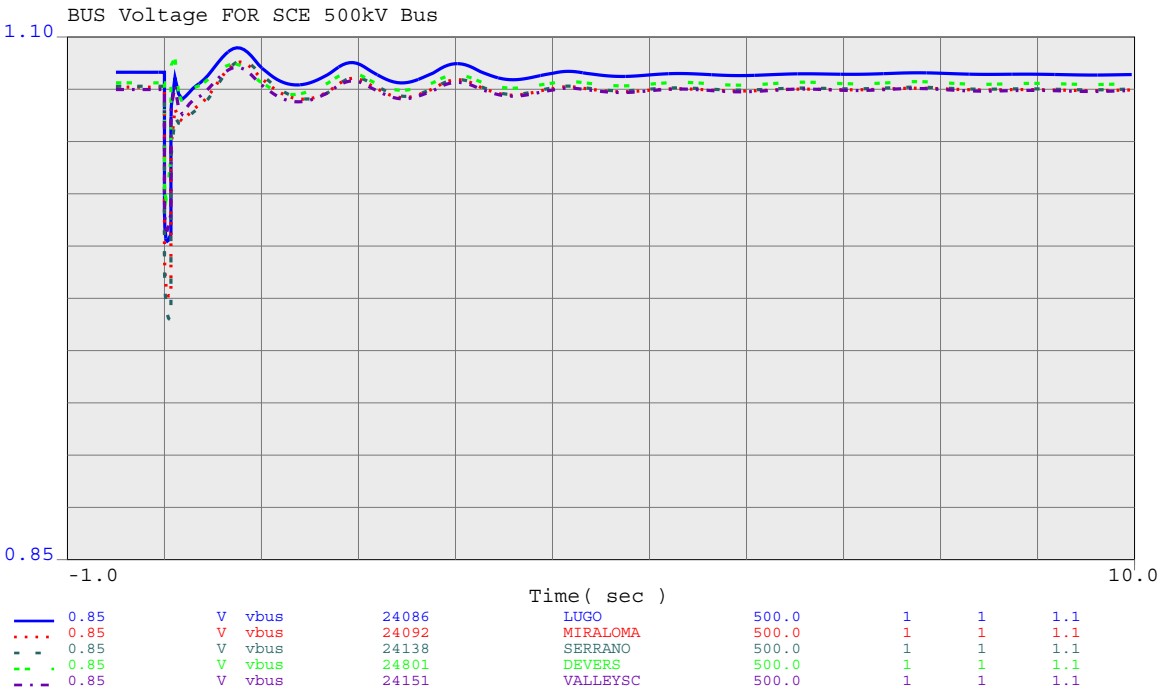
2013 Off Peak Case

Eagle Rock - Mesa 230kV & Goodrich - Laguna Bell 230 kV N-2 outage (fault at Ea

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

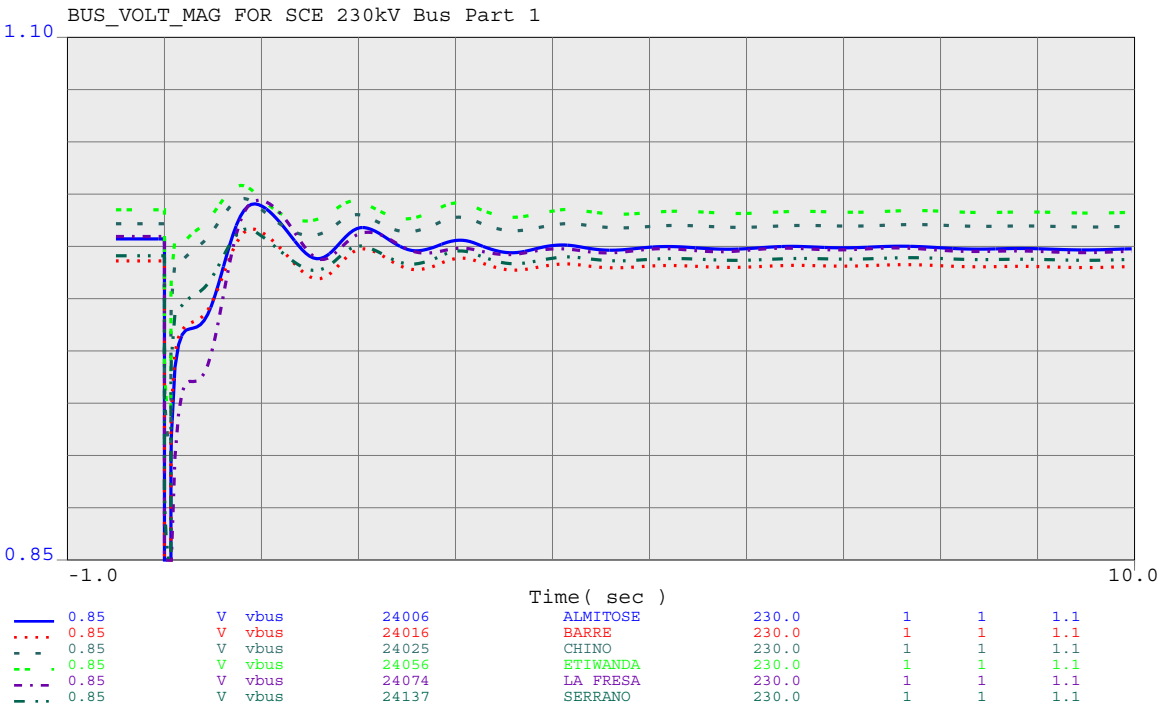
POST PROJECT

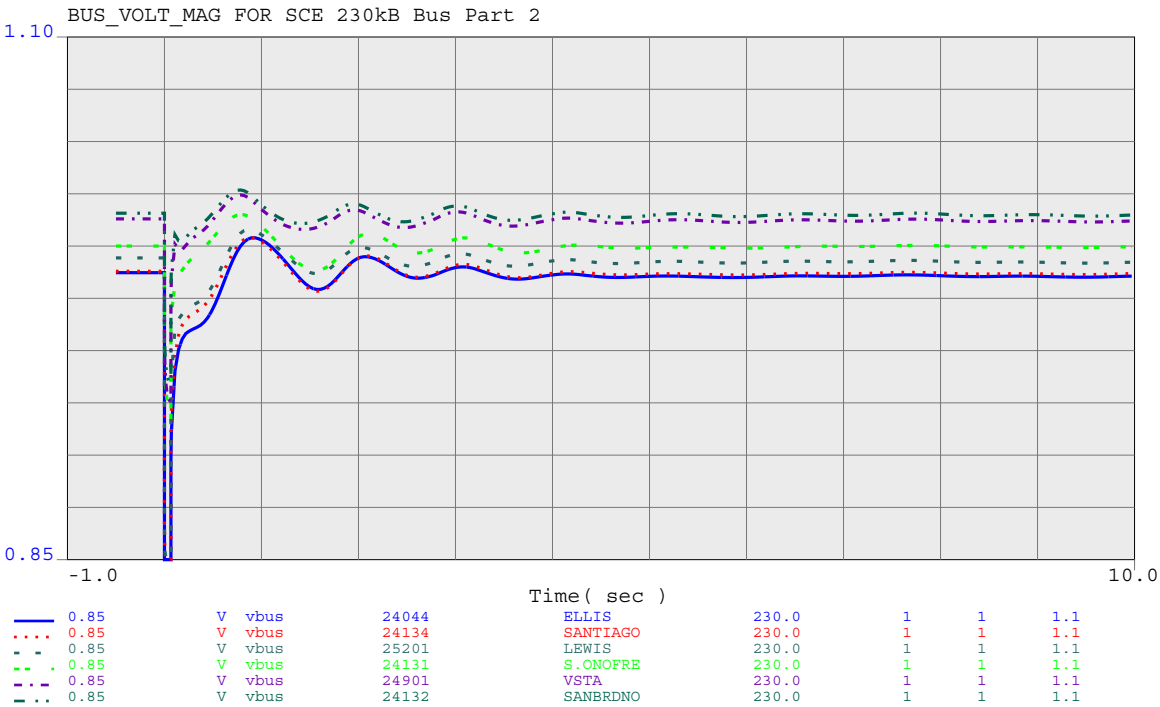
2013 Off Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

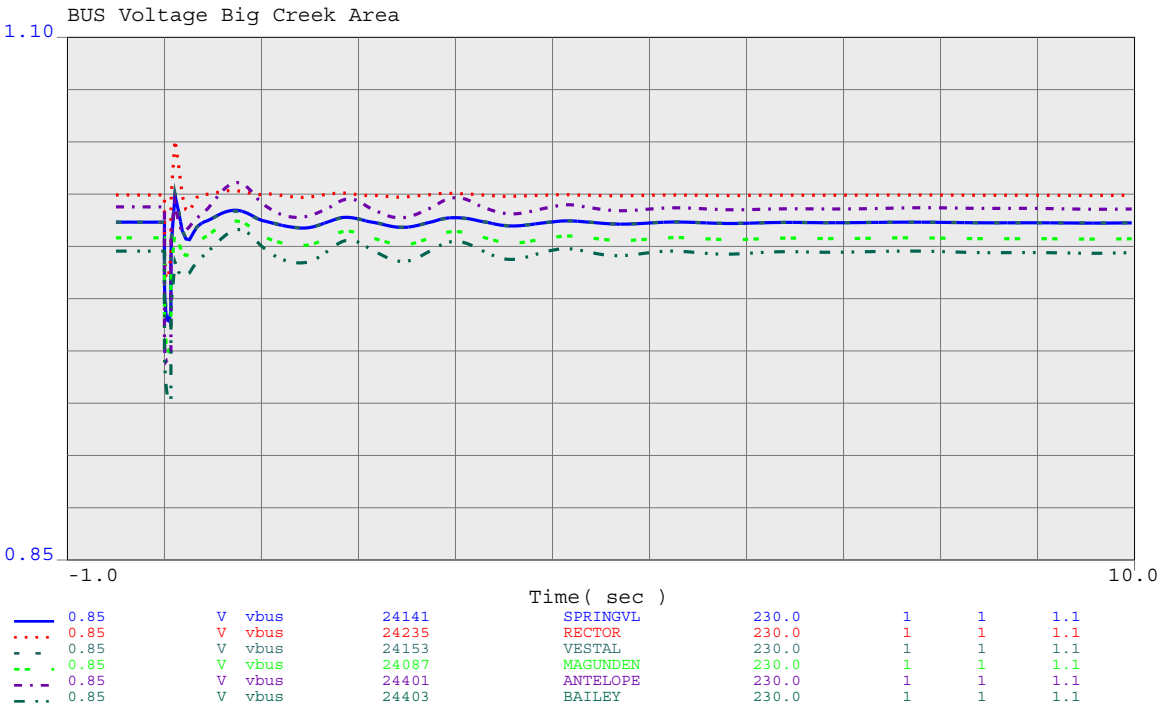
POST PROJECT

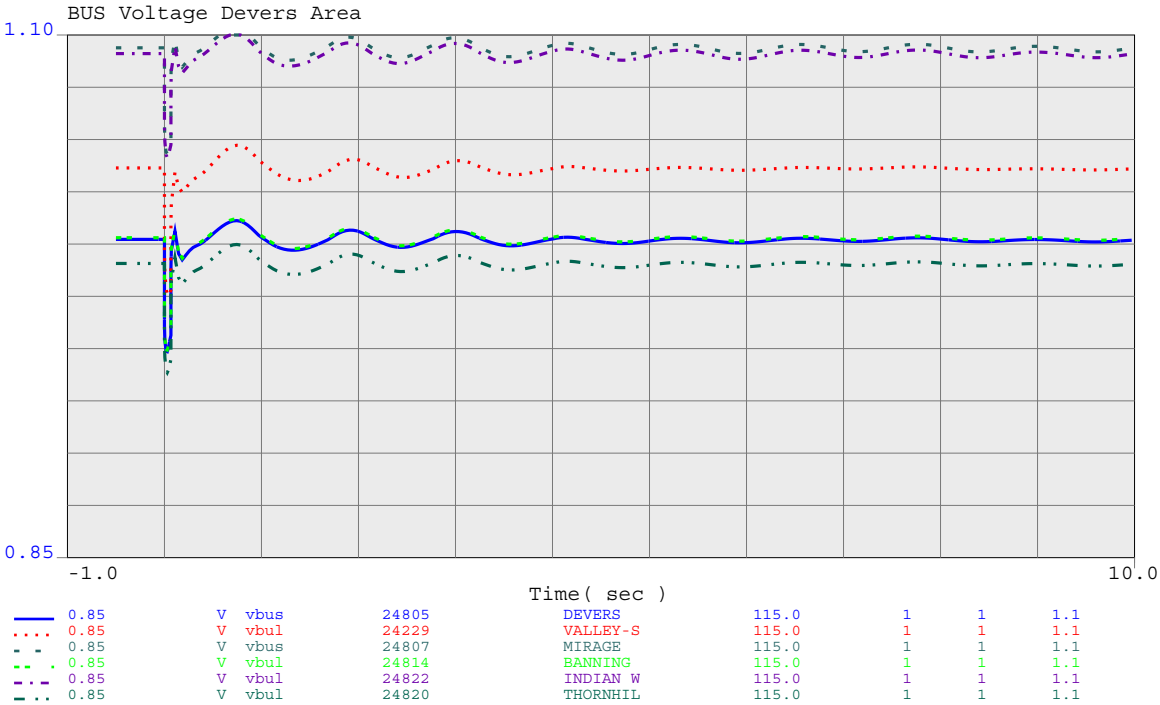
2013 Off Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

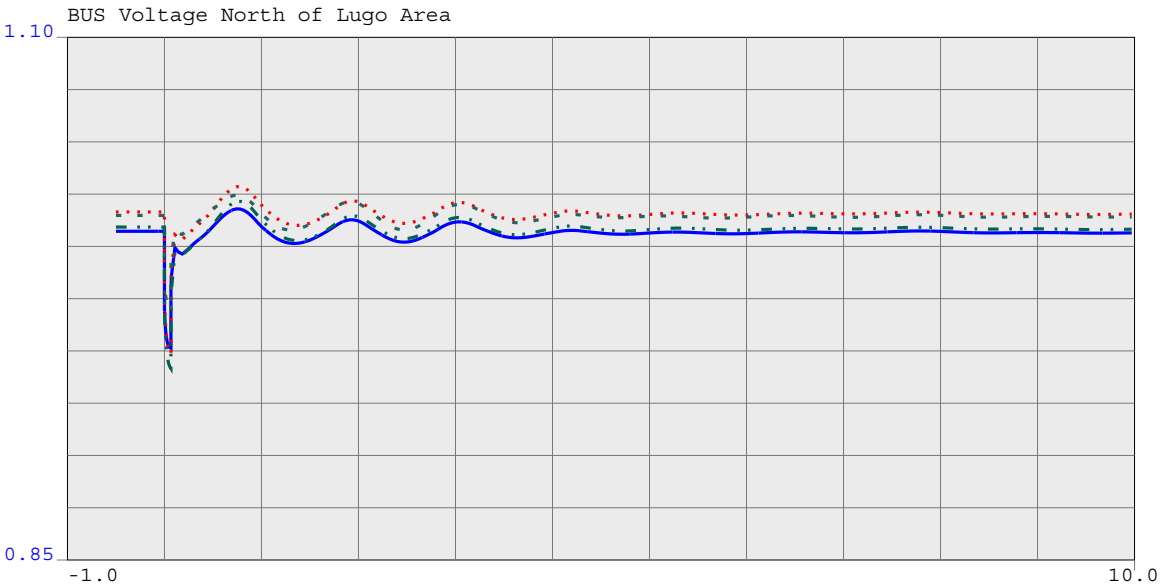
POST PROJECT

2013 Off Peak Case

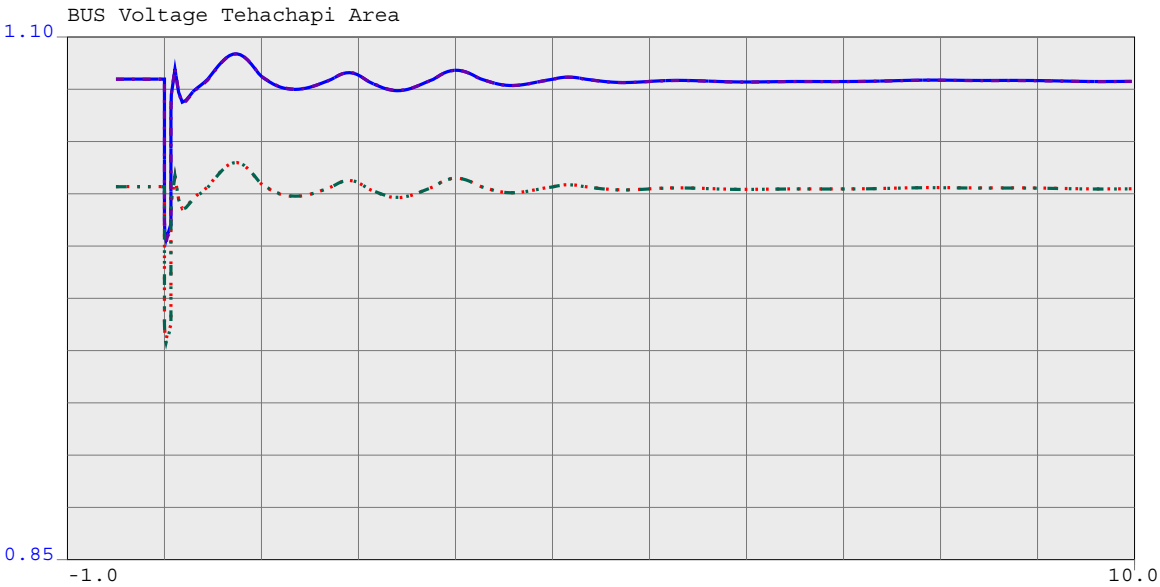
HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

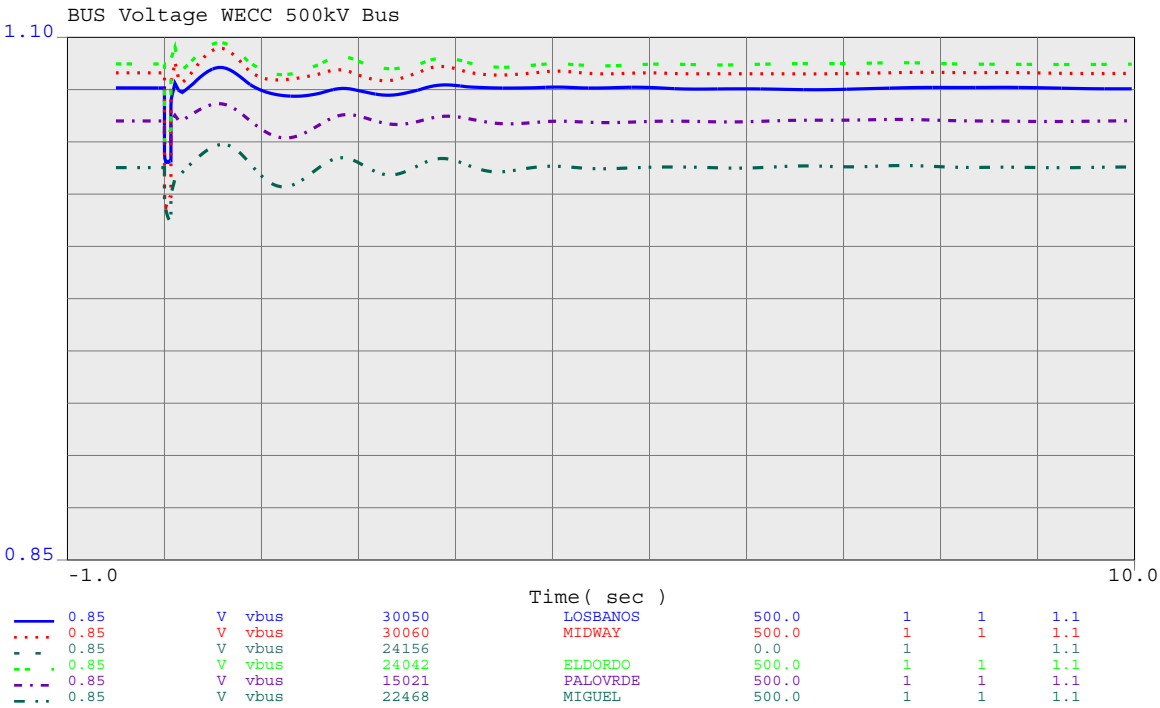
POST PROJECT

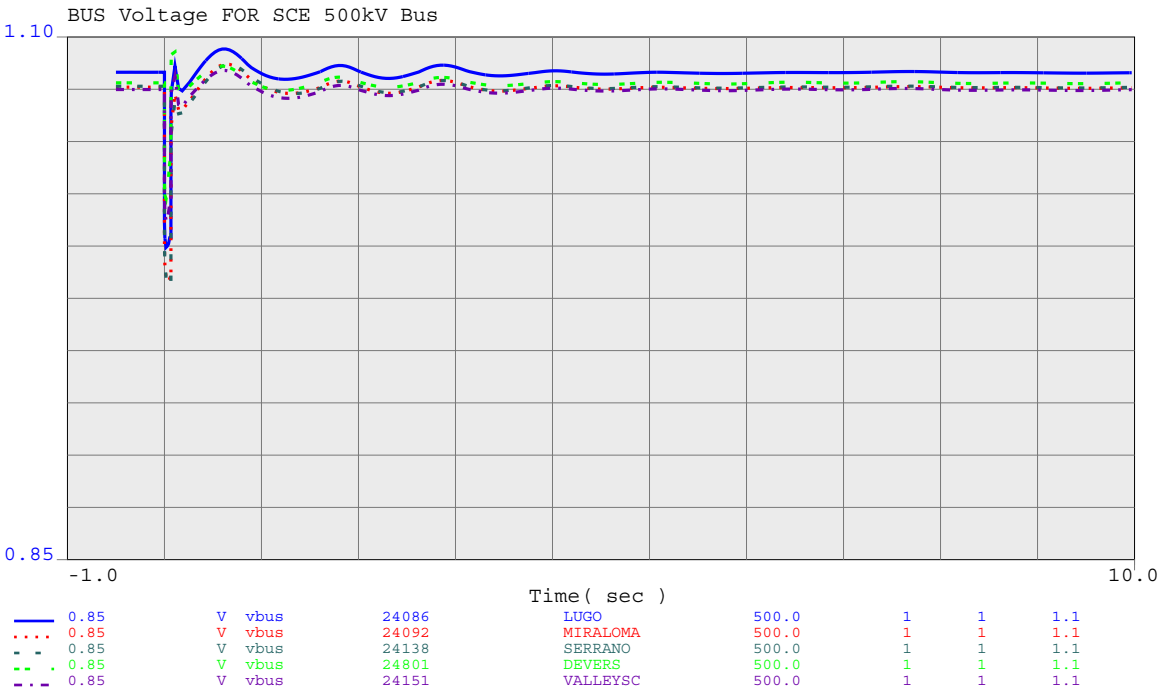
2013 Off Peak Case

HINSON-DEL AMO 230 kV & LIGHTHIPE-HINSON 230kV N-2 outage (fault at Hinson)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

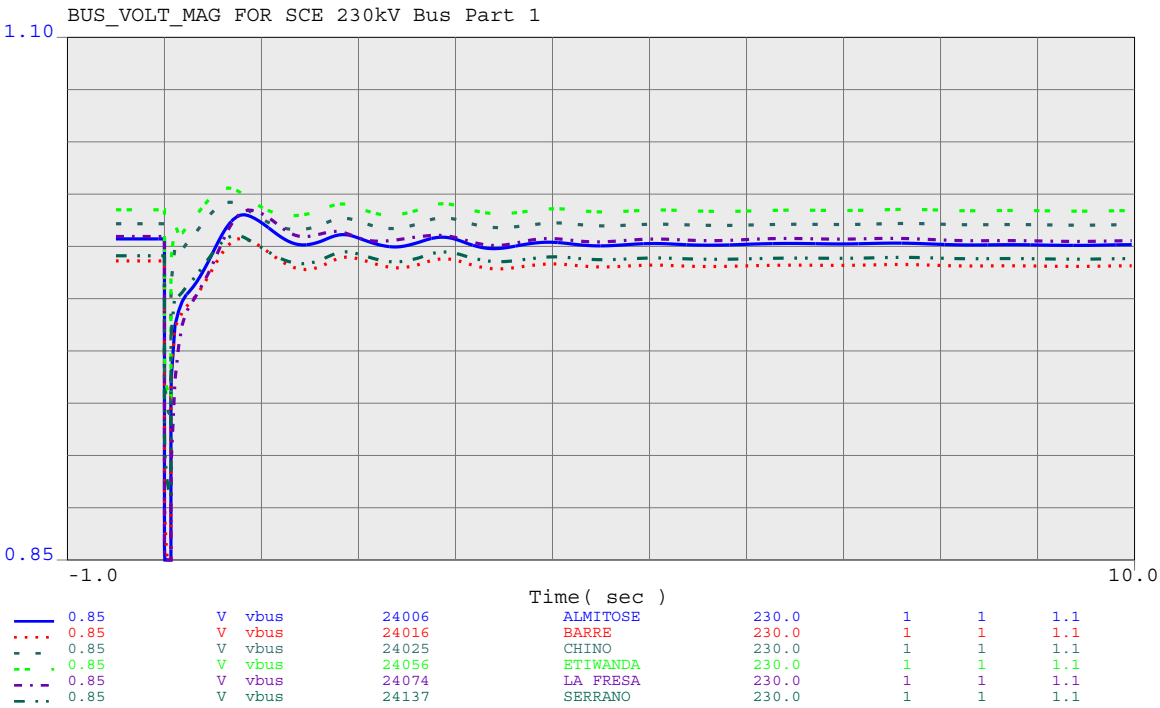
POST PROJECT

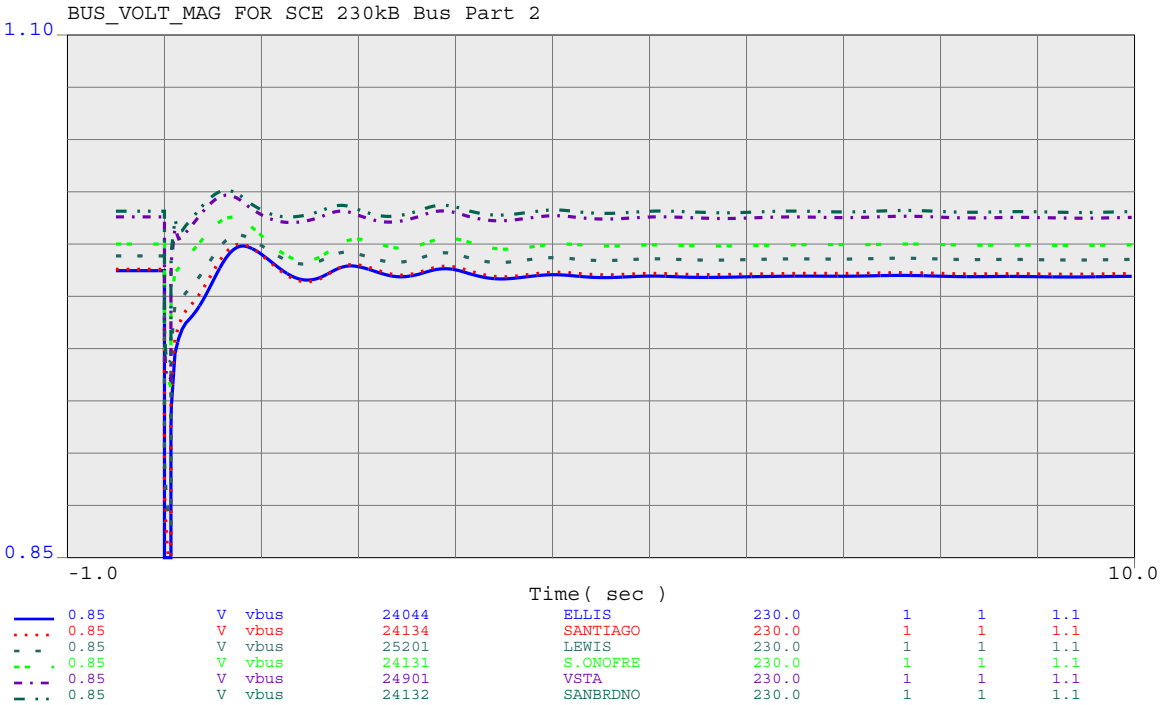
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

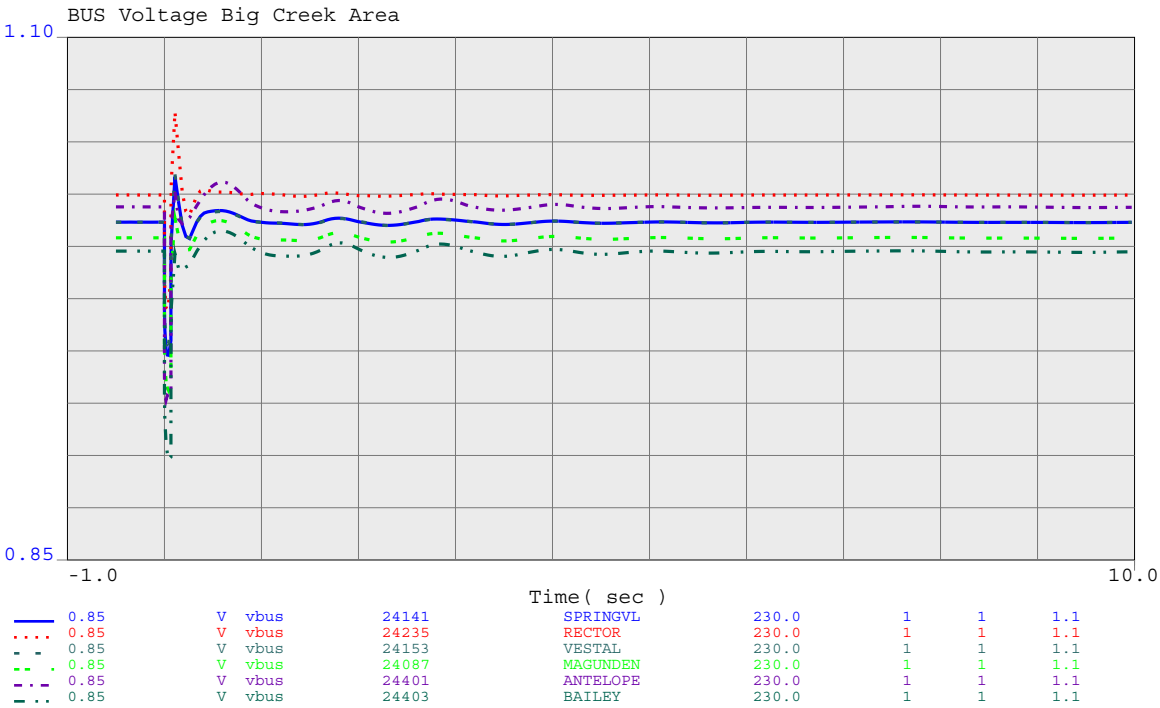
POST PROJECT

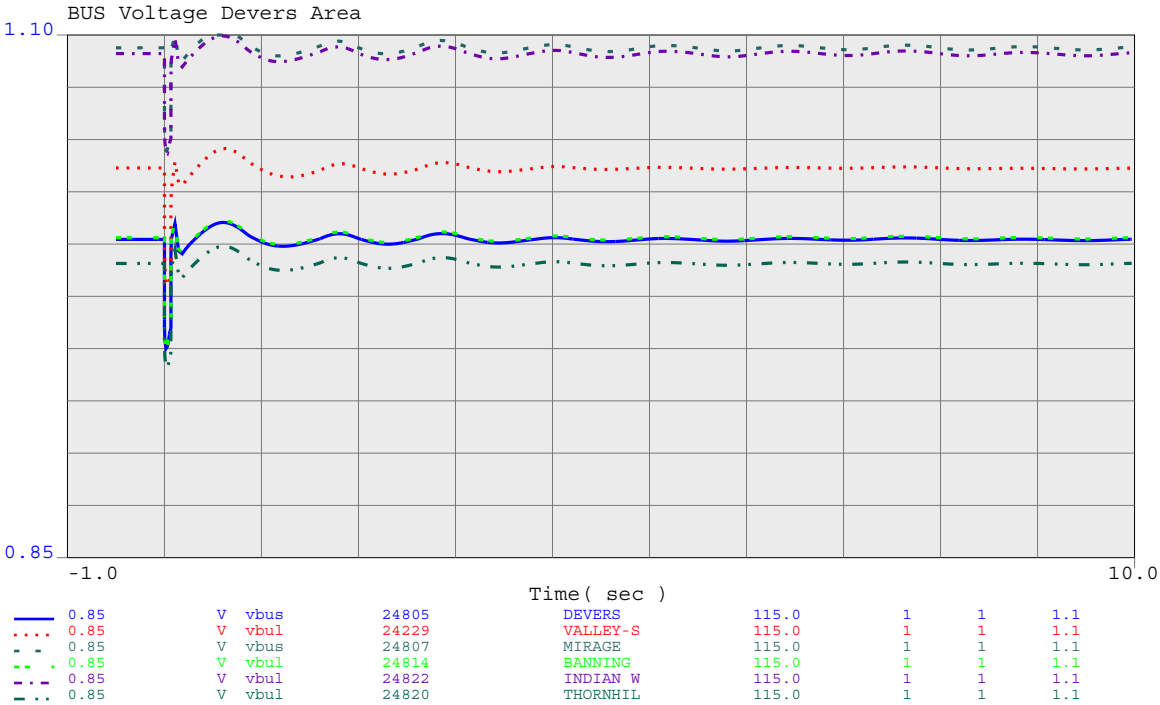
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

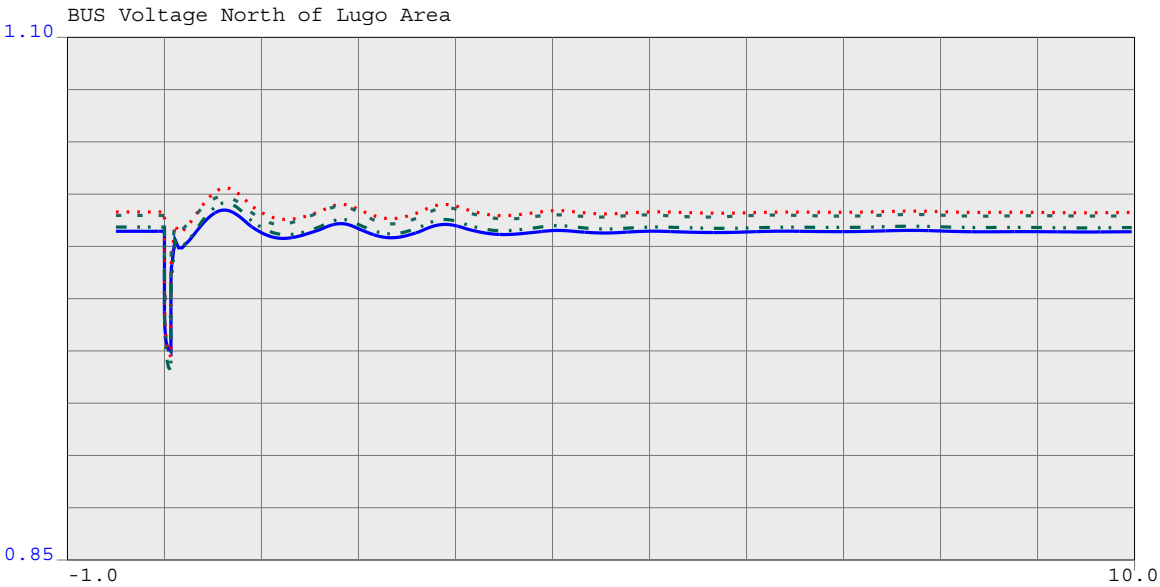
POST PROJECT

2013 Off Peak Case

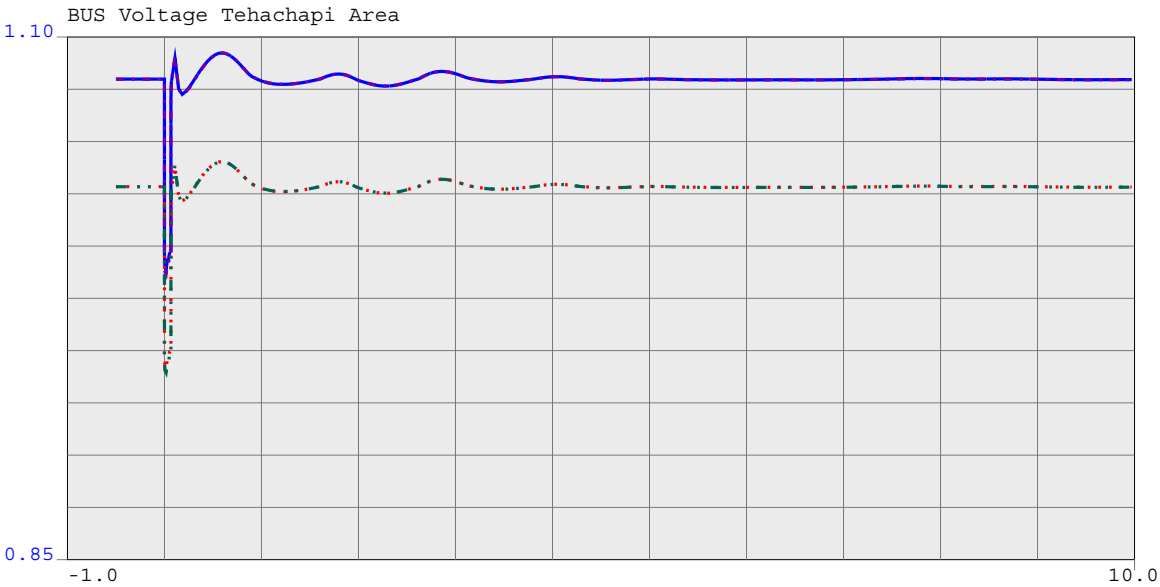
LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

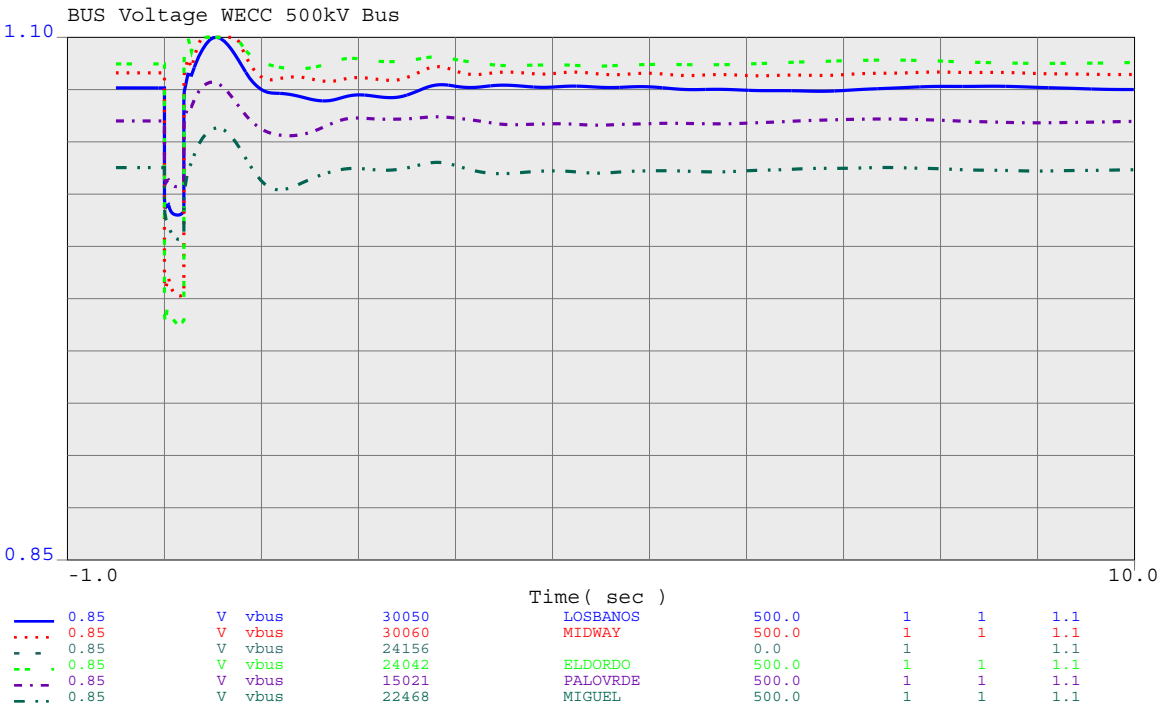
POST PROJECT

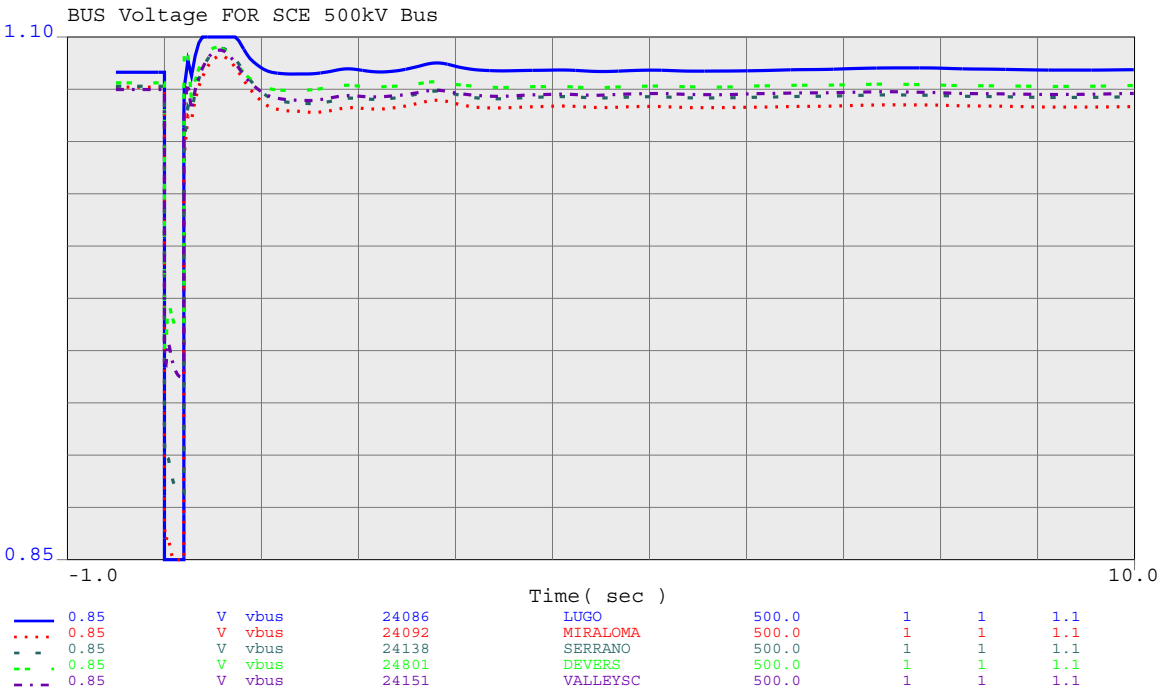
2013 Off Peak Case

LAGUBELL - RIOHONDO 230 kV & MESA CAL - REDONDO 230kV N-2 outage (fault at Lagu

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

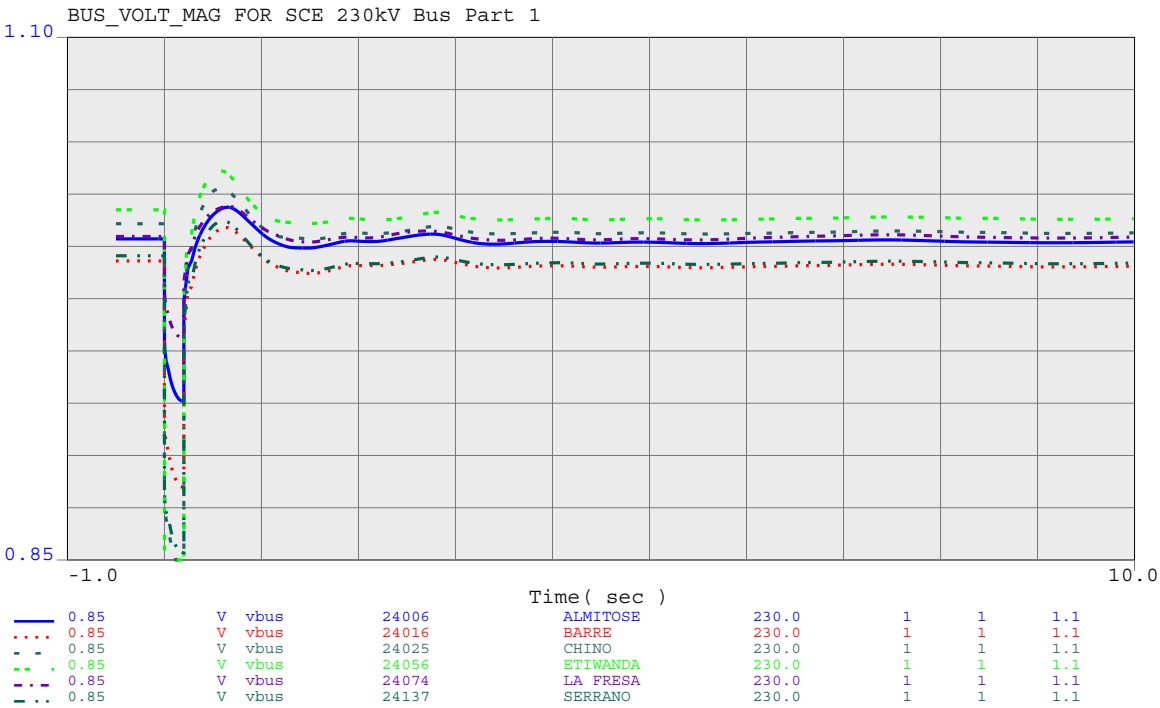
POST PROJECT

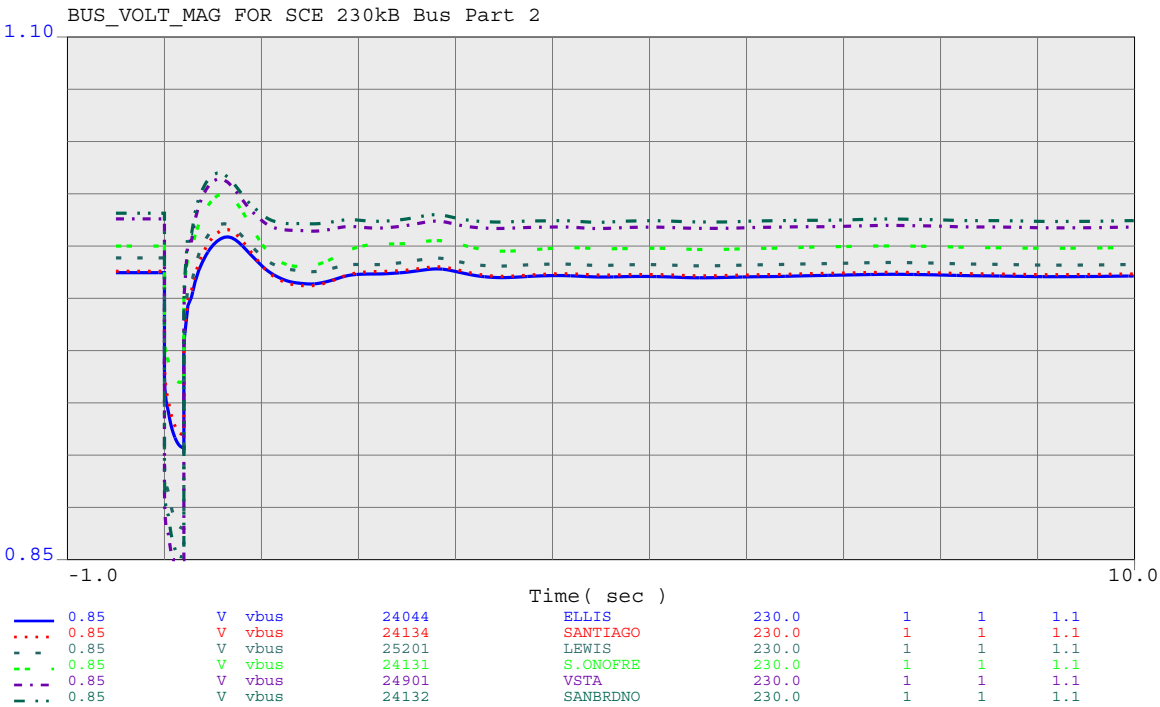
2013 Off Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

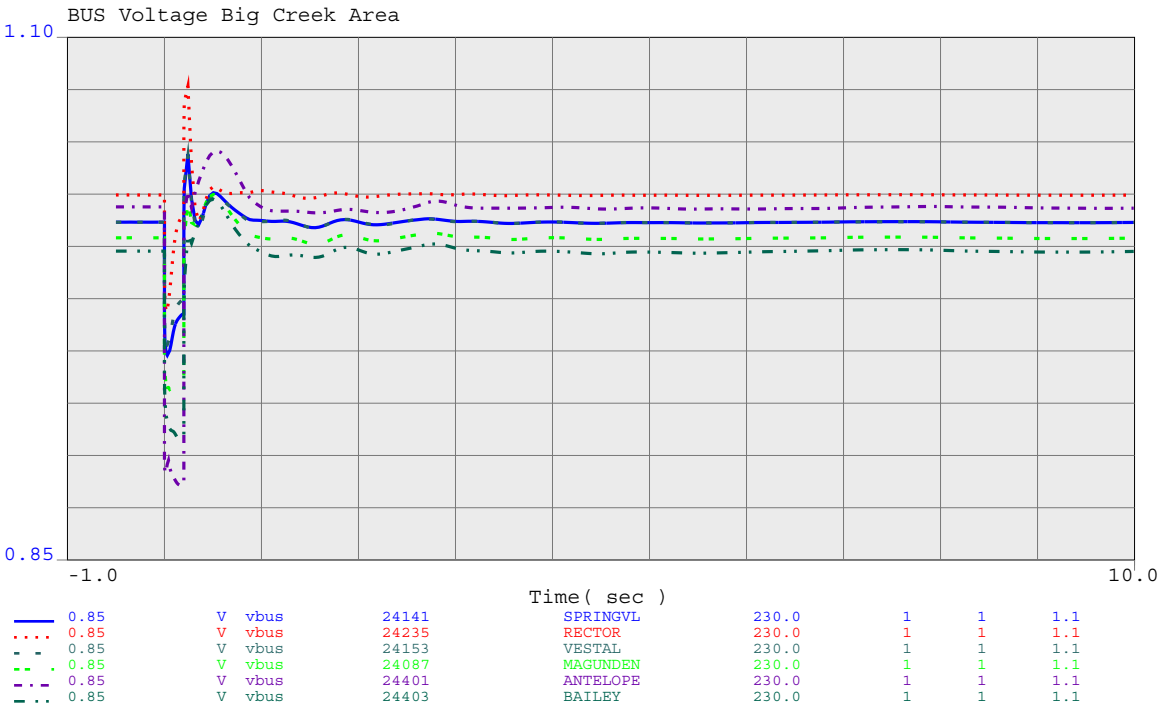
POST PROJECT

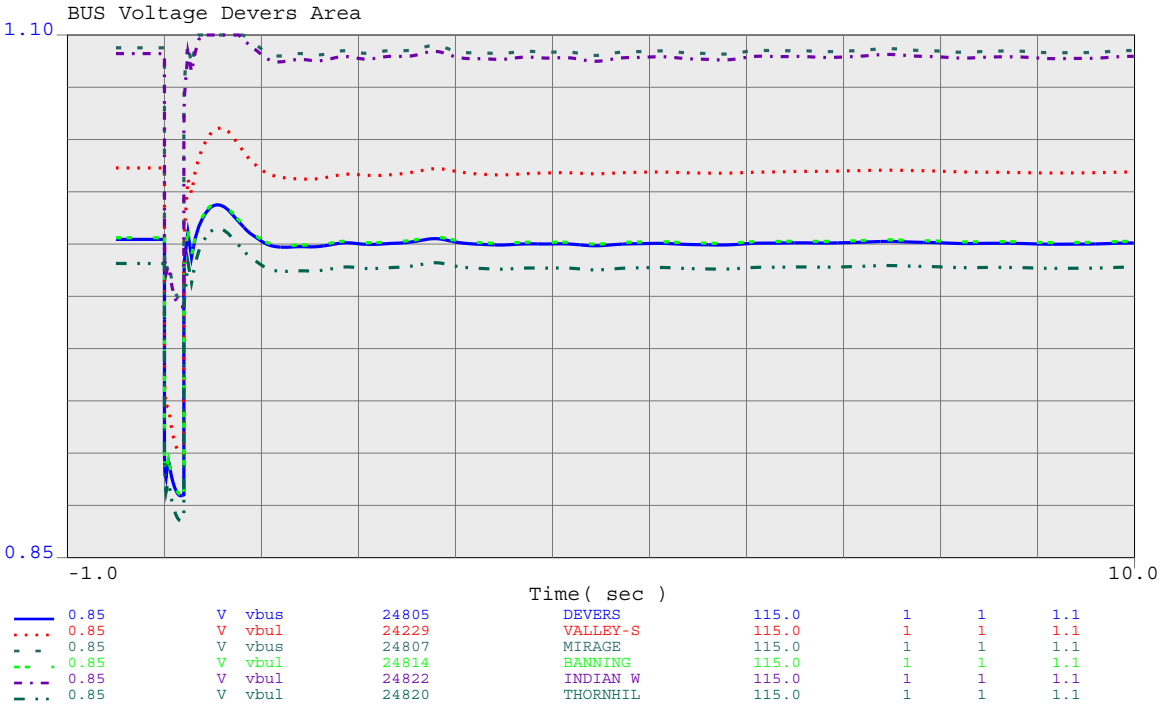
2013 Off Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

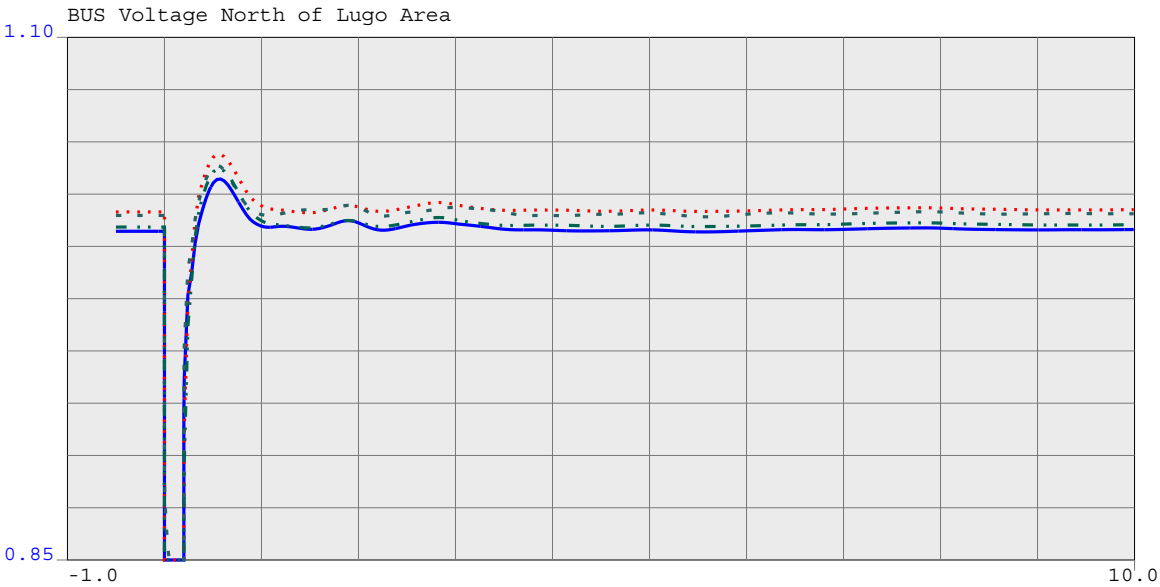
POST PROJECT

2013 Off Peak Case

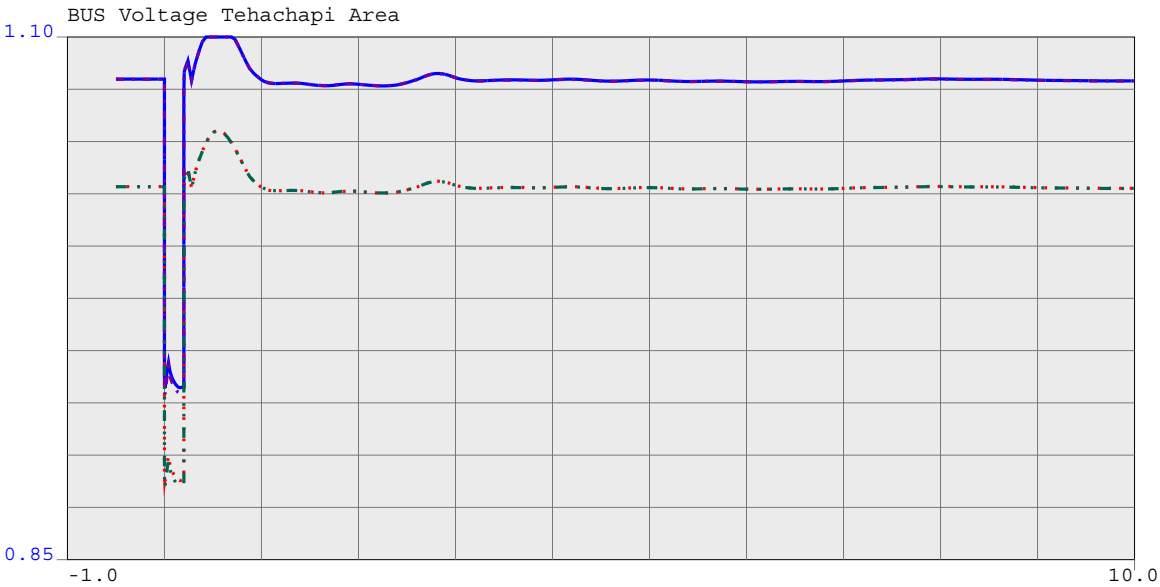
Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area



0.85	V	vbul	24702	KRAMER	115.0	1	1	1.1
0.85	V	vbul	24602	VICTOR	115.0	1	1	1.1
0.85	V	vbul	24731	INYOKERN	115.0	1	1	1.1
0.85	V	vbul	24716		0.0	1		1.1
0.85	V	vbul	24723		0.0	1		1.1
0.85	V	vbul	24608	SAVAGE	115.0	1	1	1.1



0.85	V	vbus	29022	THP-SUB5	500.0	1	1	1.1
0.85	V	vbus	29027	THP-SUB5	230.0	1	1	1.1
0.85	V	vbus	29081		0.0	1		1.1
0.85	V	vbus	29082		0.0	1		1.1
0.85	V	vbus	29003	THP-SUB1	500.0	1	1	1.1
0.85	V	vbus	29004	THP-SUB1	230.0	1	1	1.1

ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

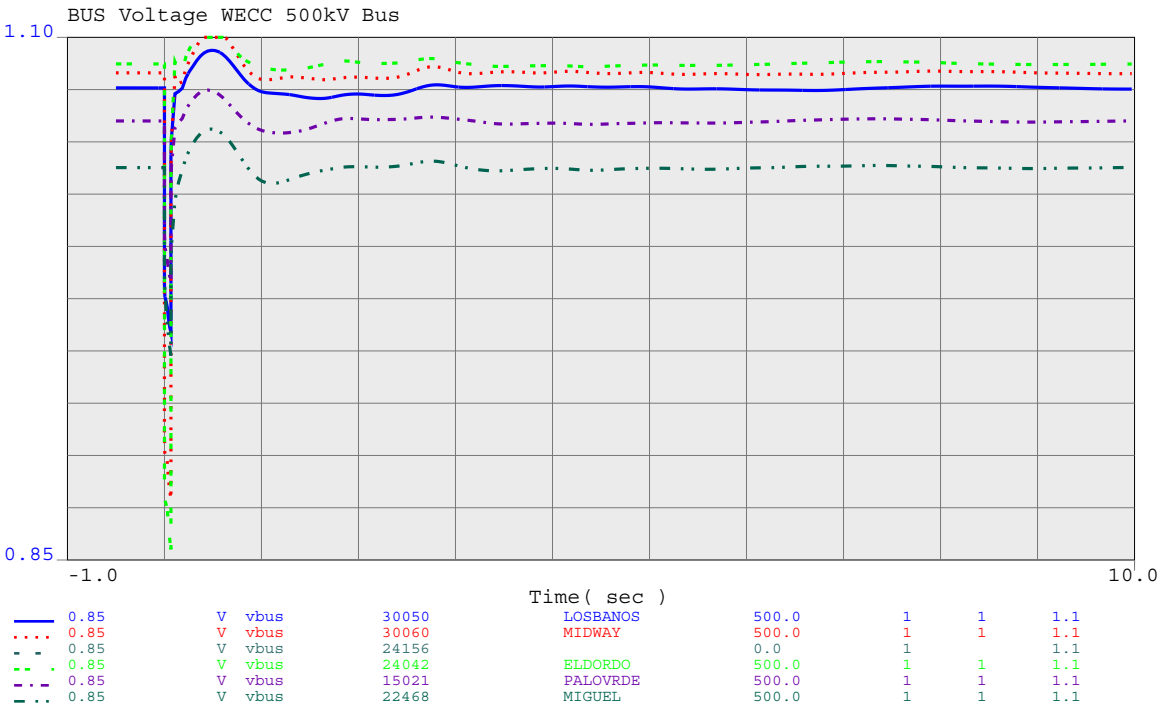
POST PROJECT

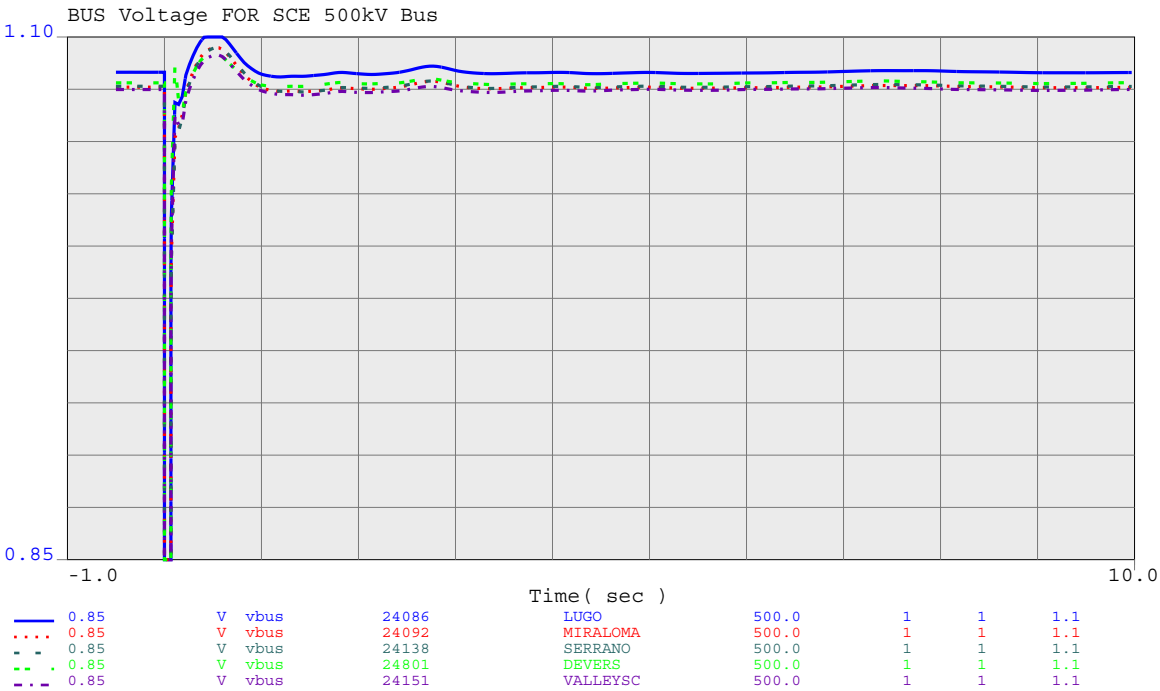
2013 Off Peak Case

Lugo - Mira Loma 500 kV N-2 outage (SLG fault at Lugo)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

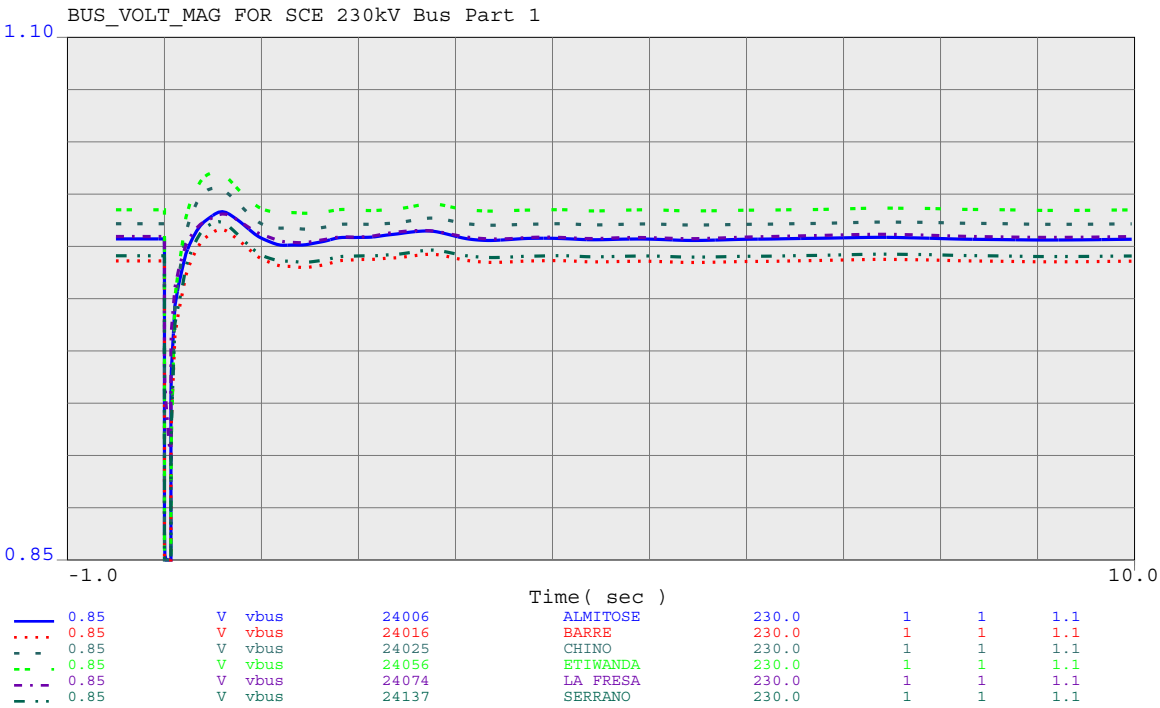
POST PROJECT

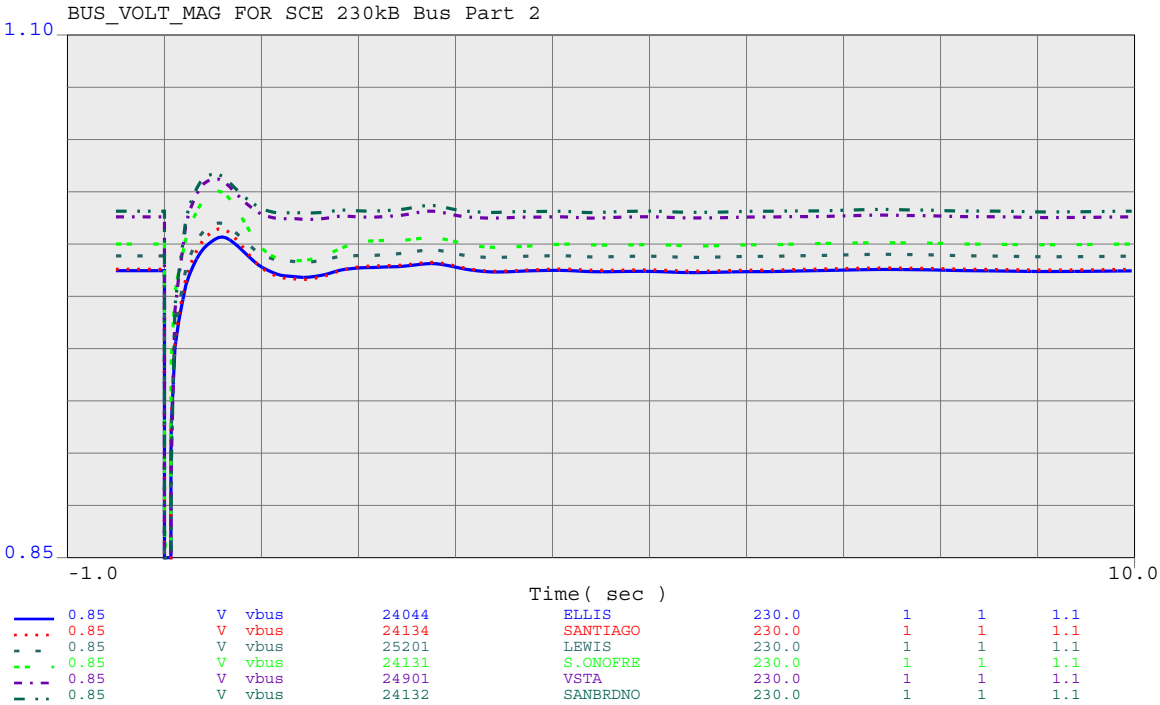
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

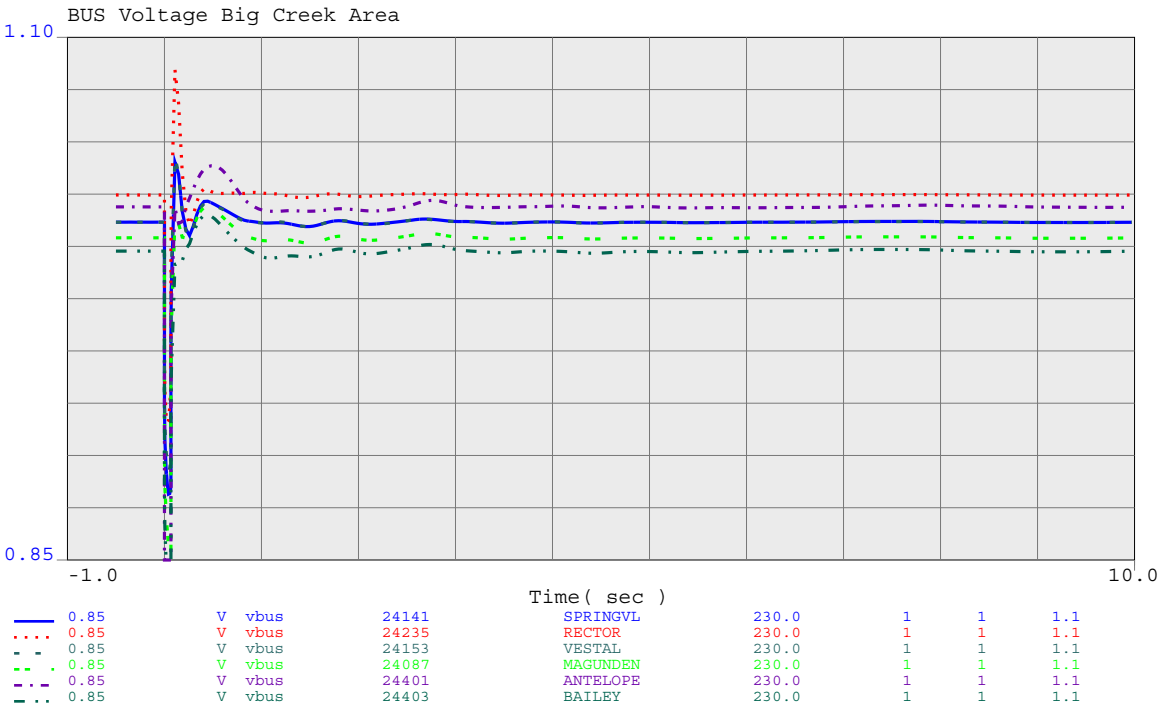
POST PROJECT

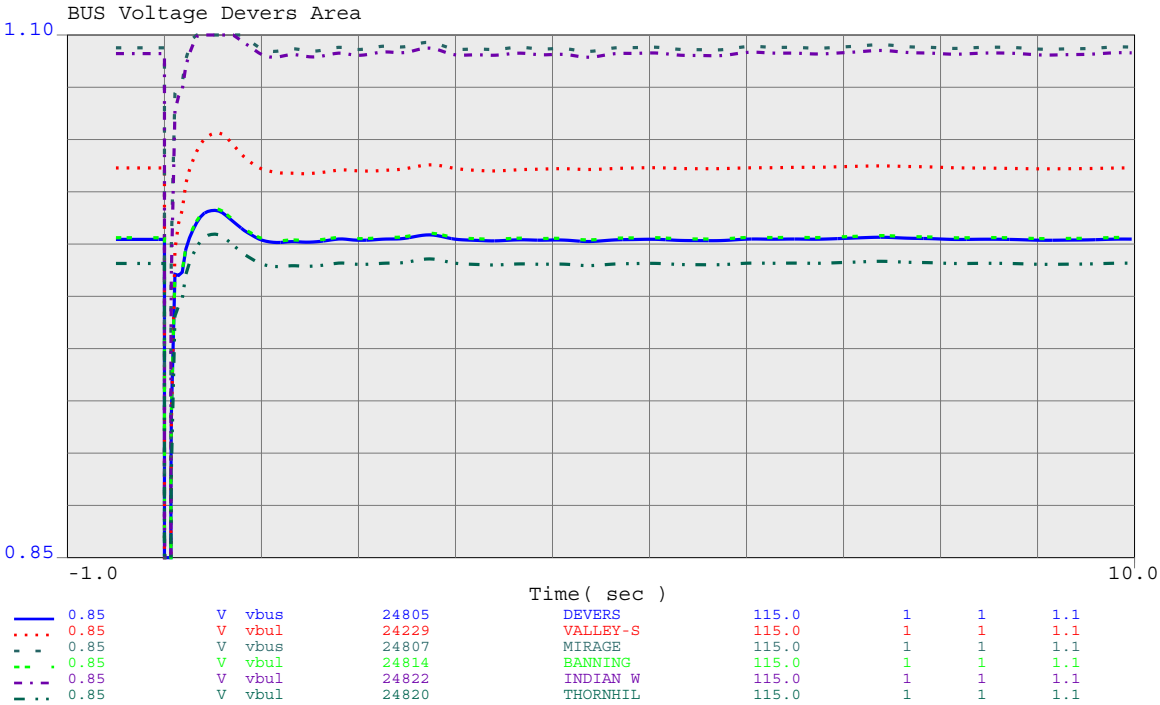
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

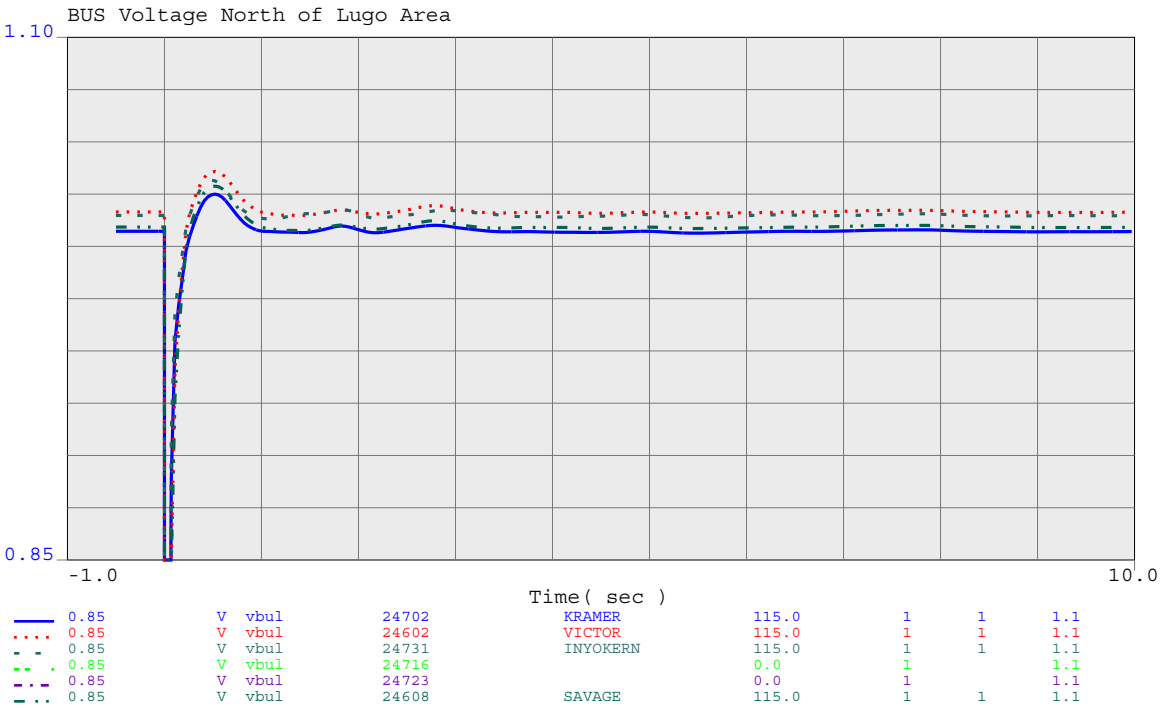
POST PROJECT

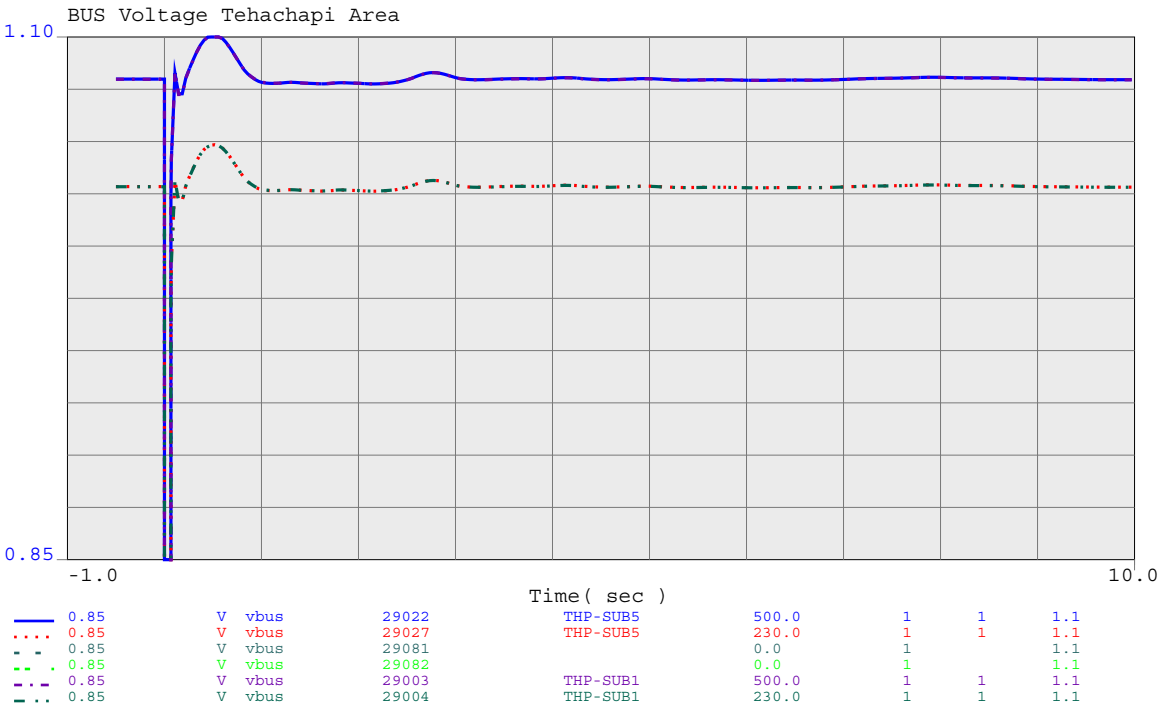
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

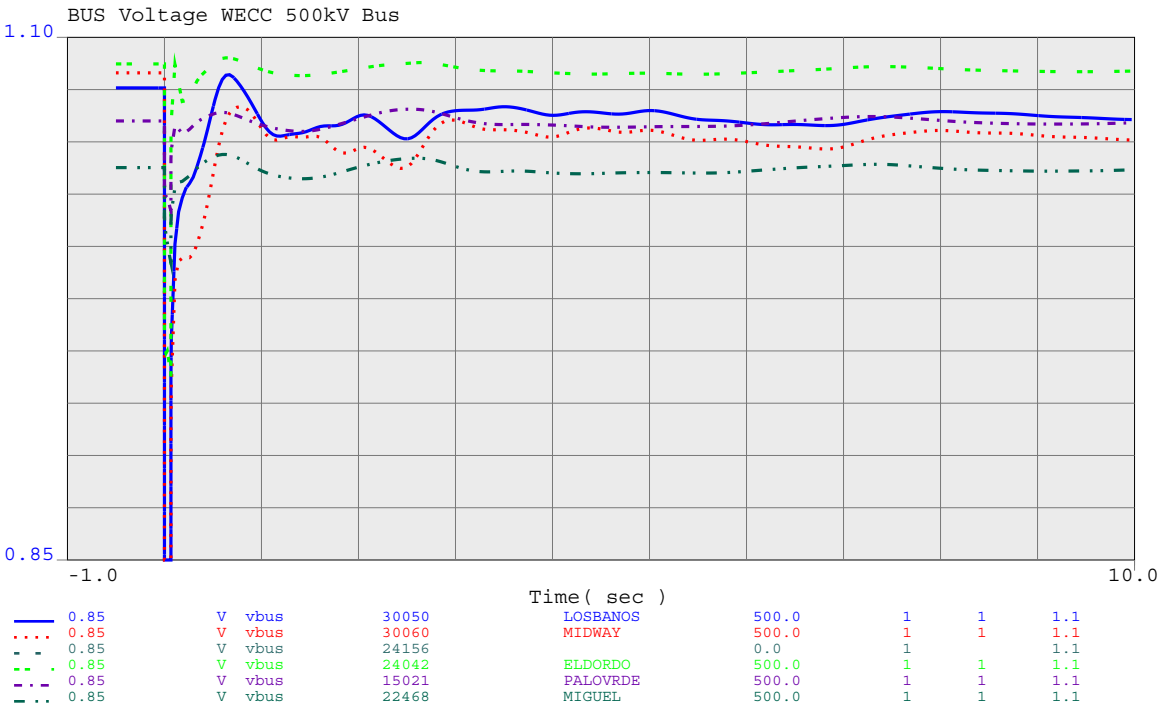
POST PROJECT

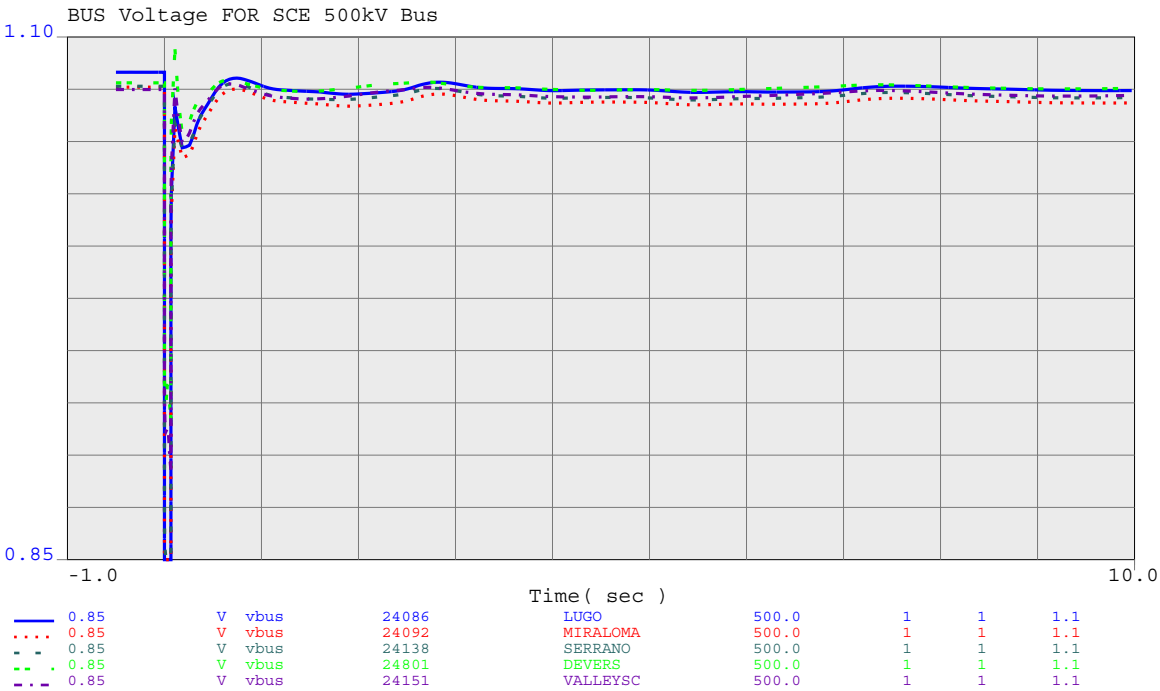
2013 Off Peak Case

LUGO - RANCHO VISTA 500 kV N-1 outage (fault at Rancho Vista)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

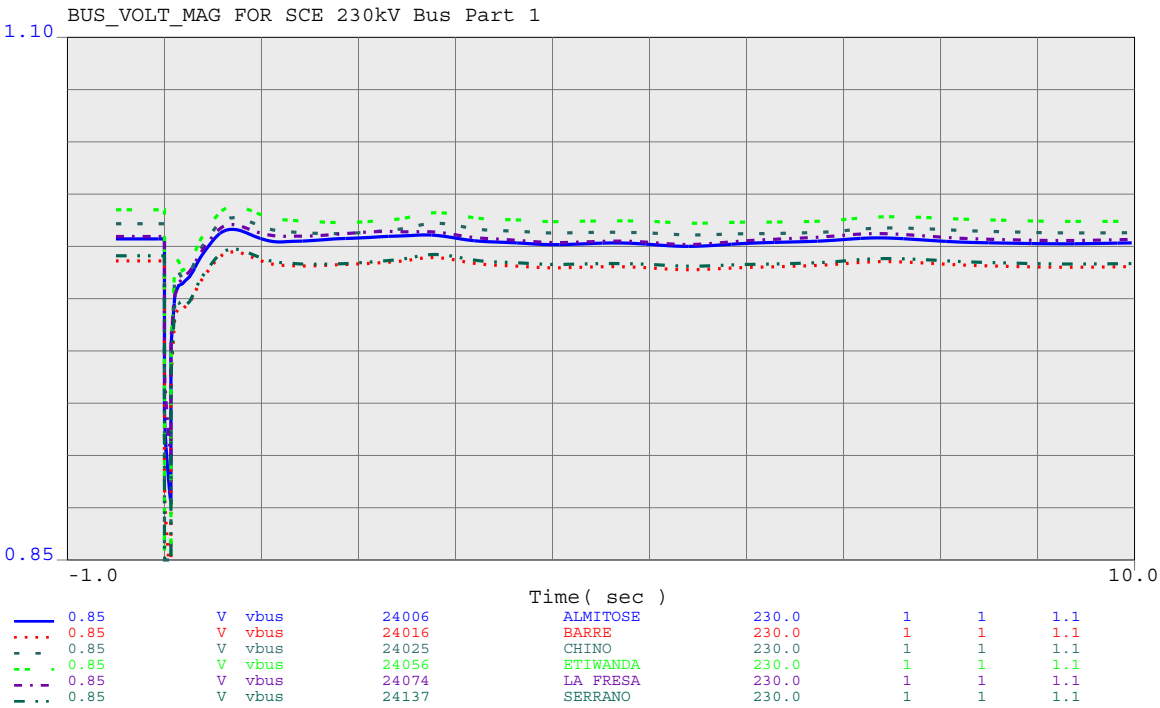
POST PROJECT

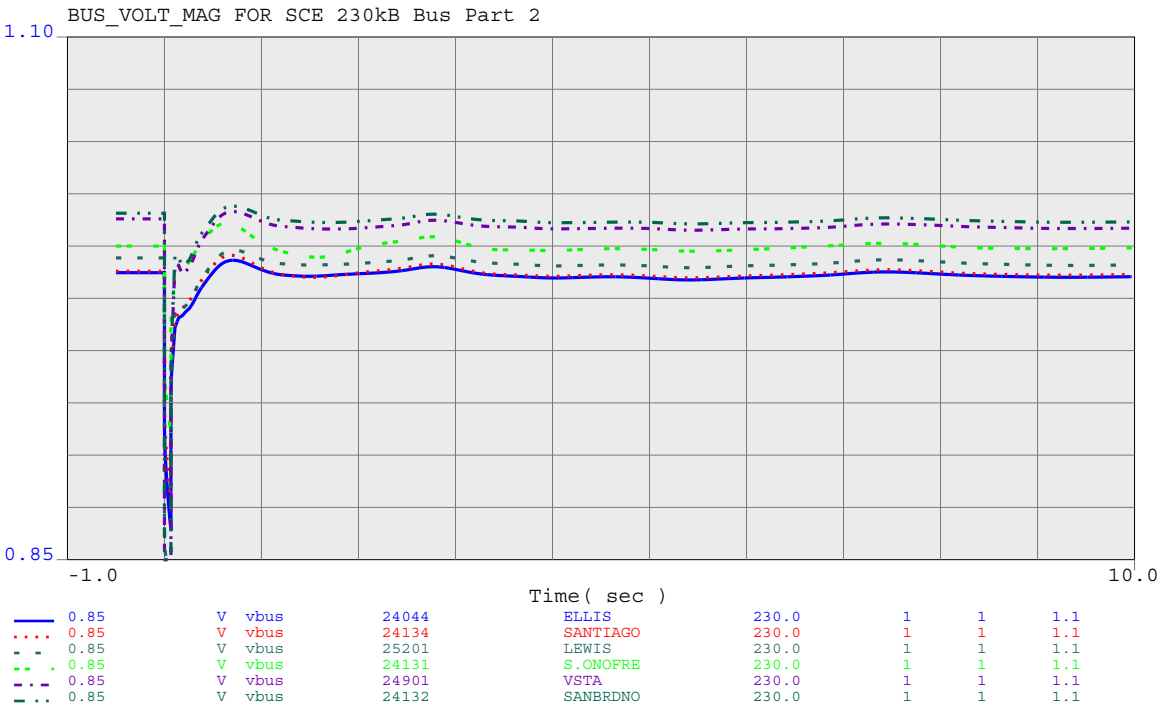
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

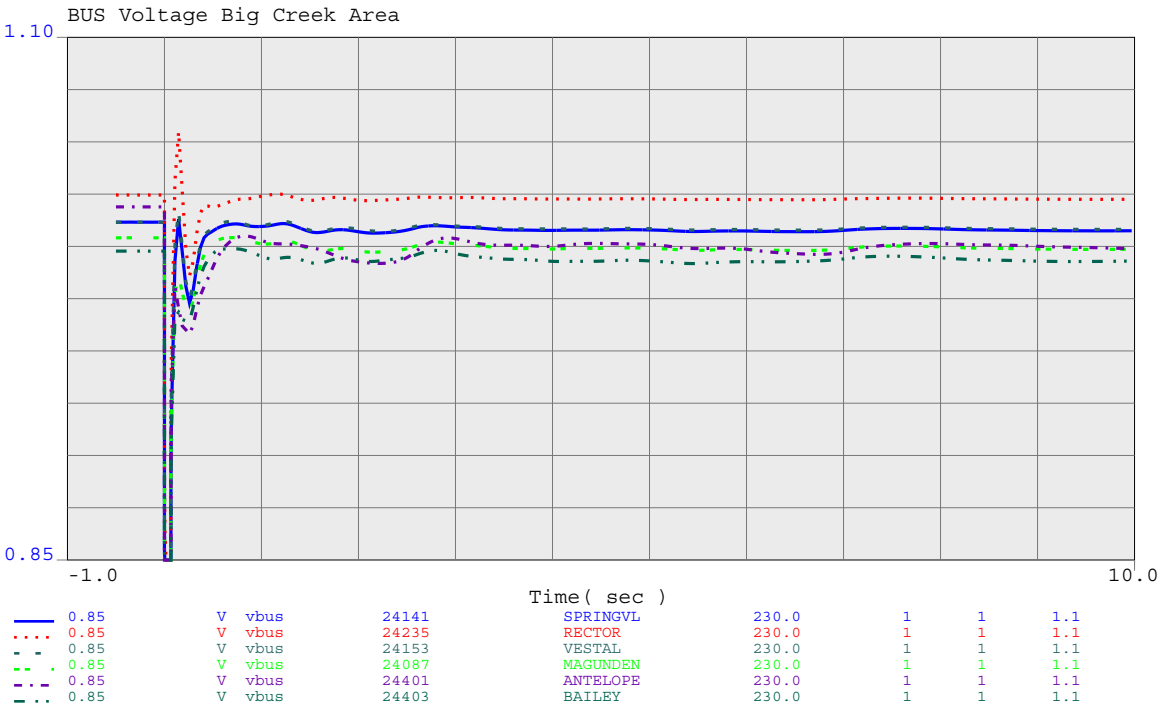
POST PROJECT

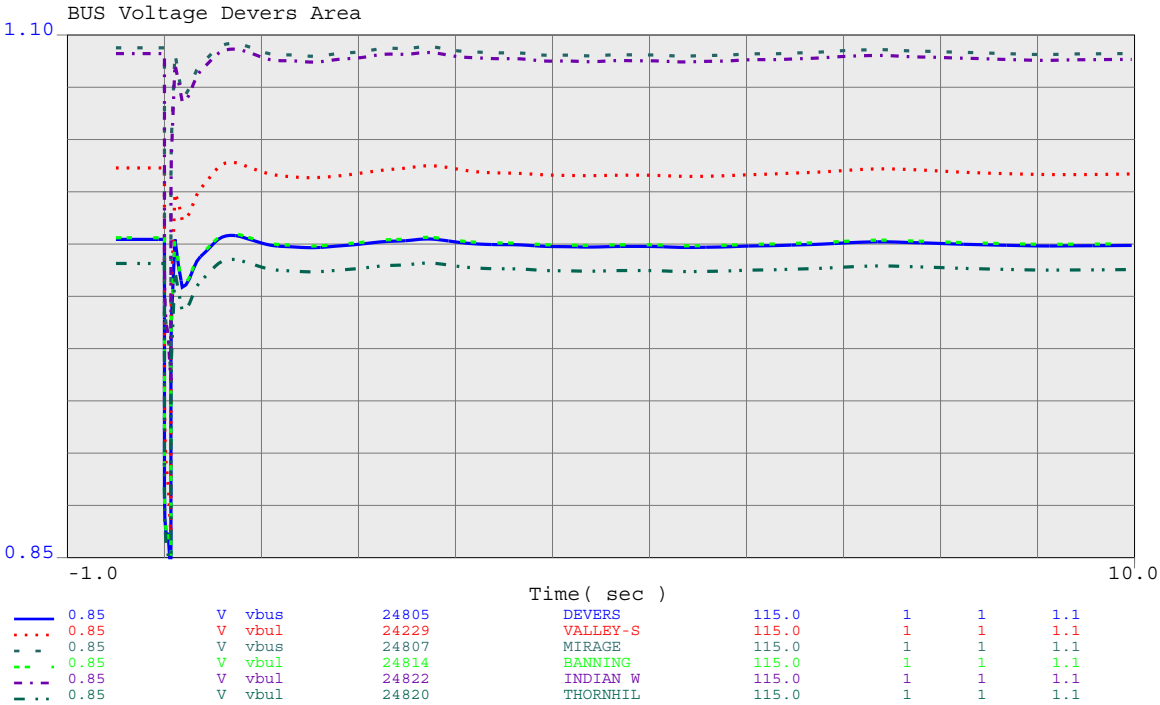
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

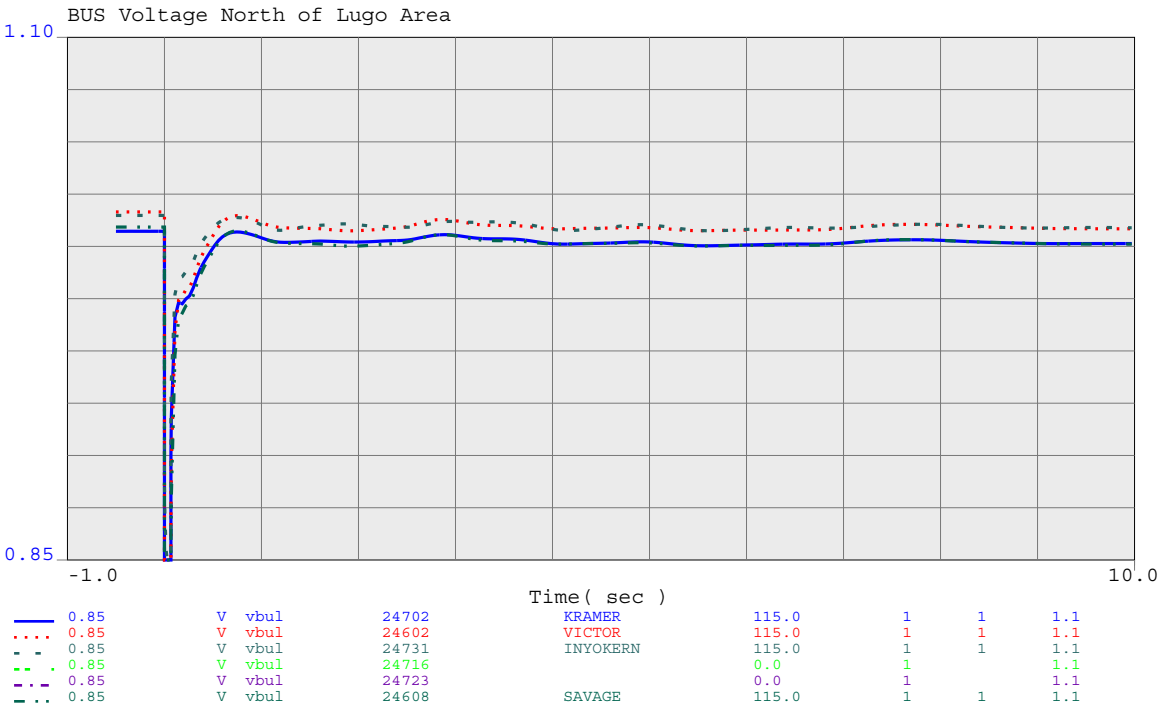
POST PROJECT

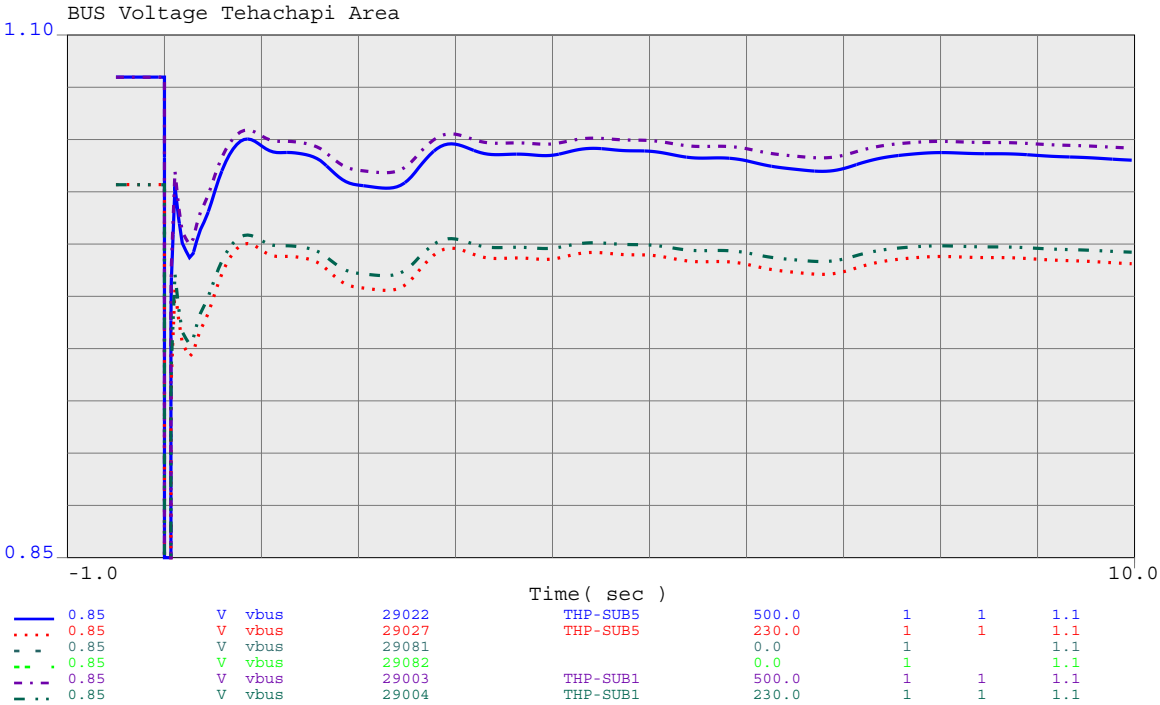
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

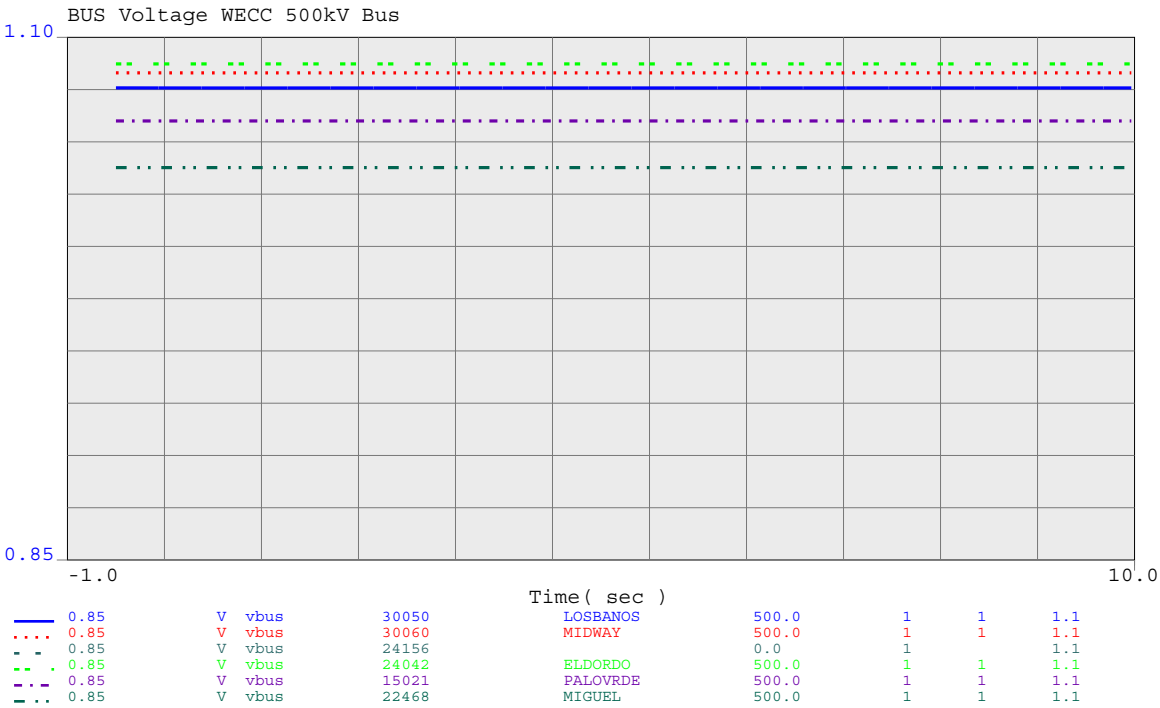
POST PROJECT

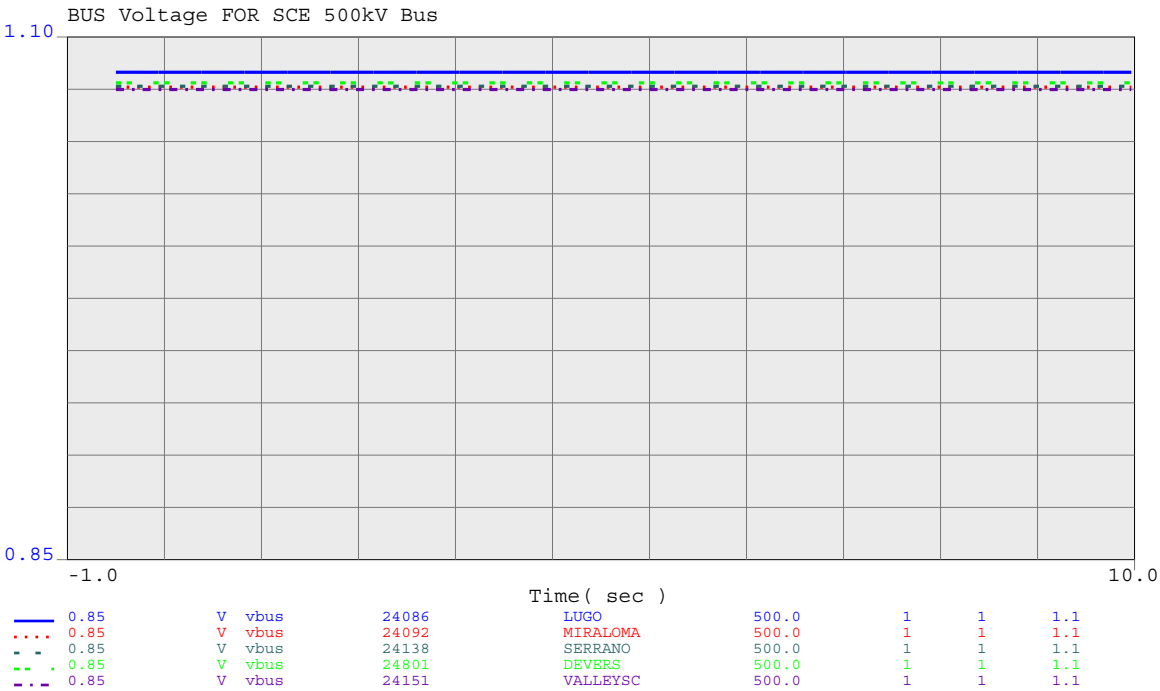
2013 Off Peak Case

Midway - Vincent Double Line Outage (fault at Midway)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

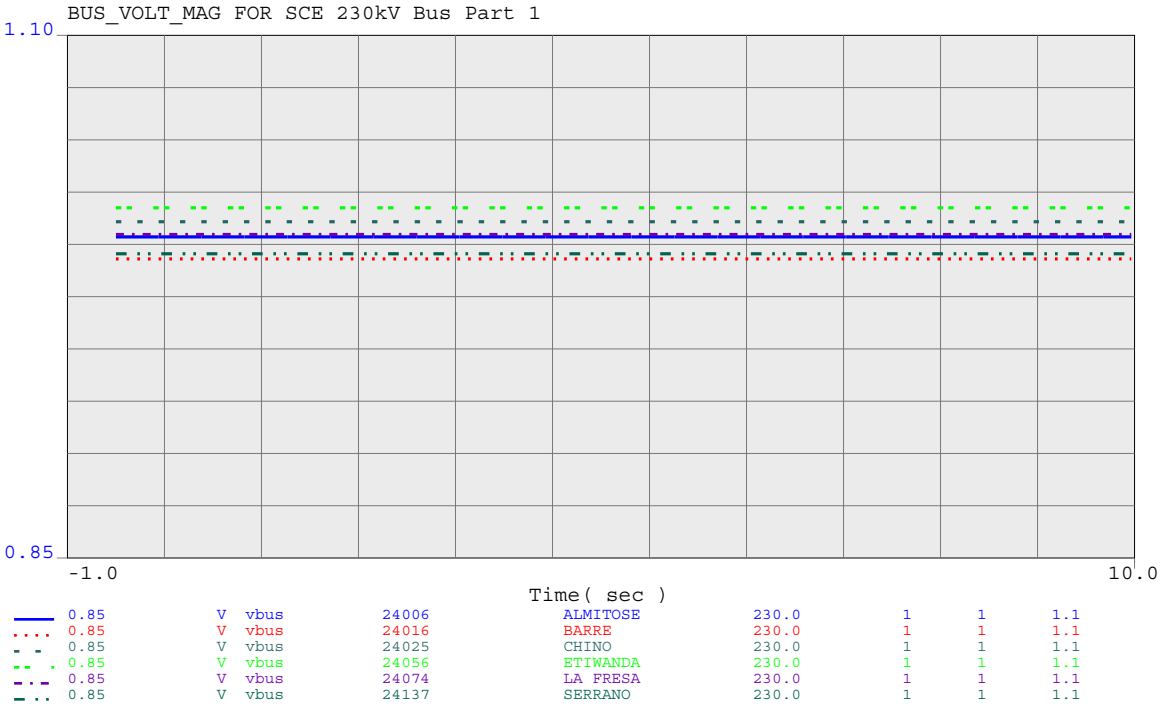
POST PROJECT

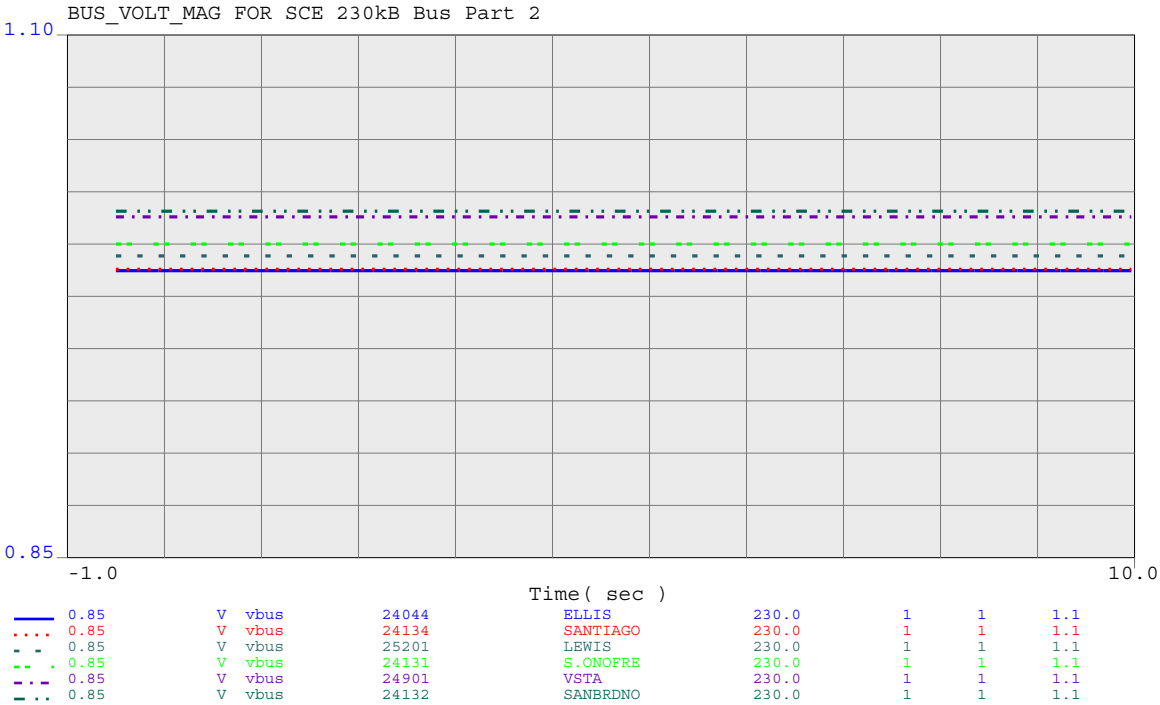
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

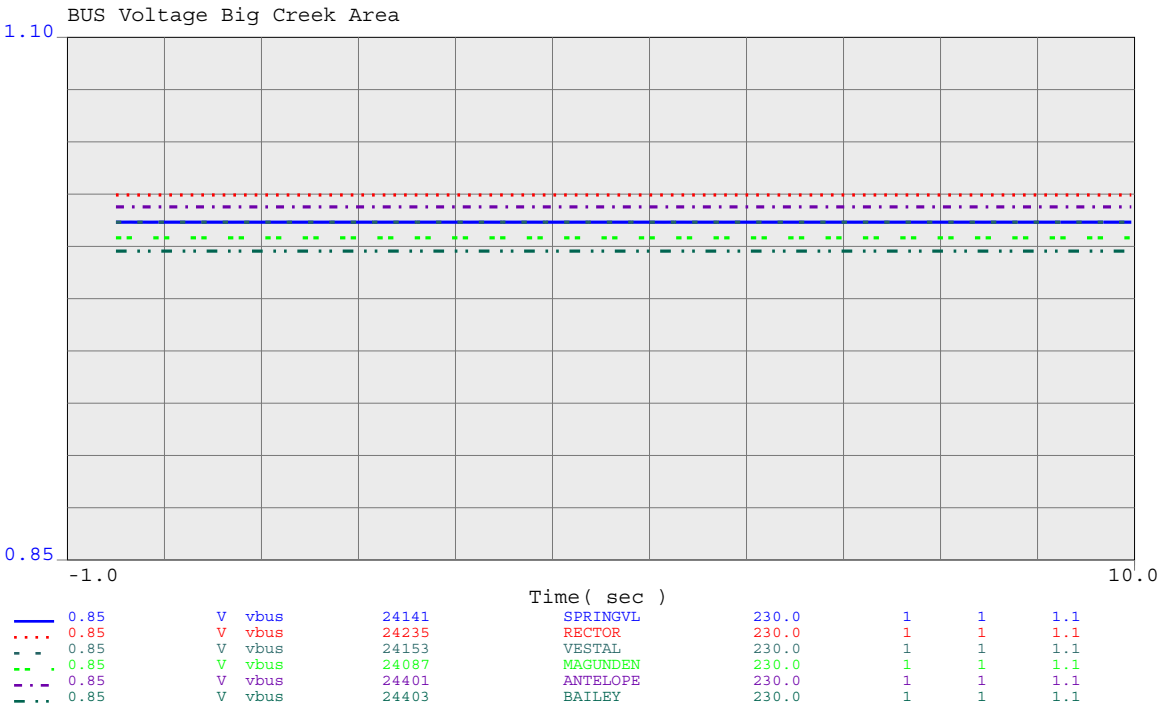
POST PROJECT

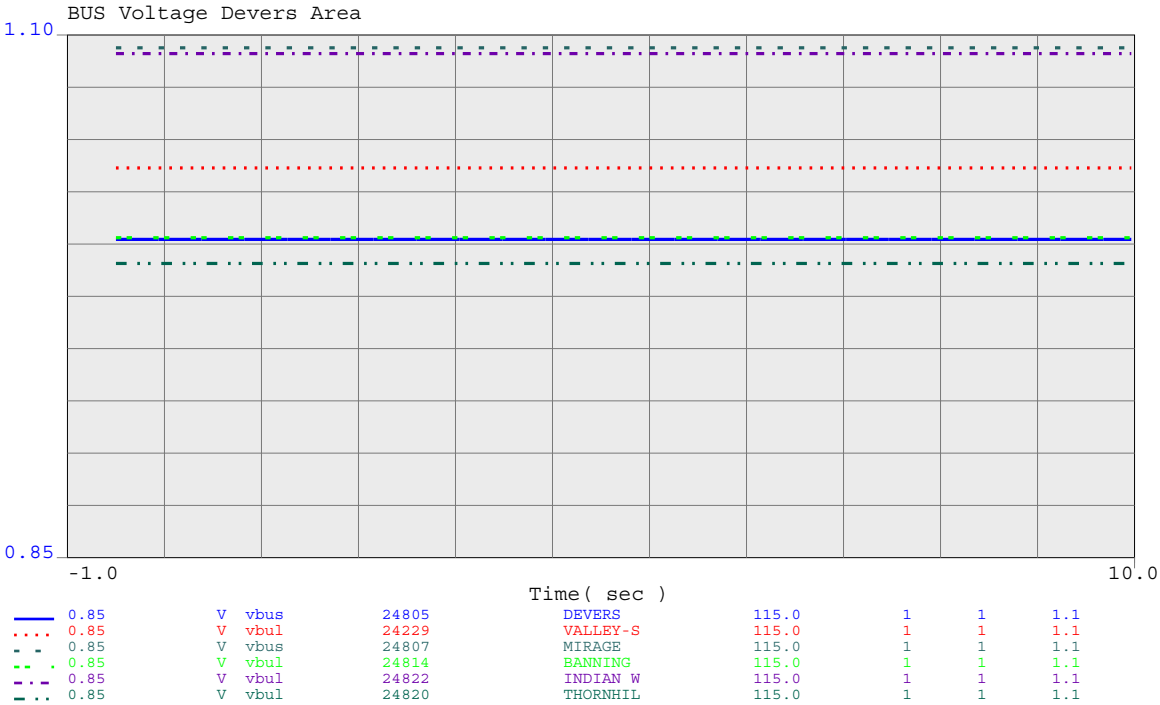
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

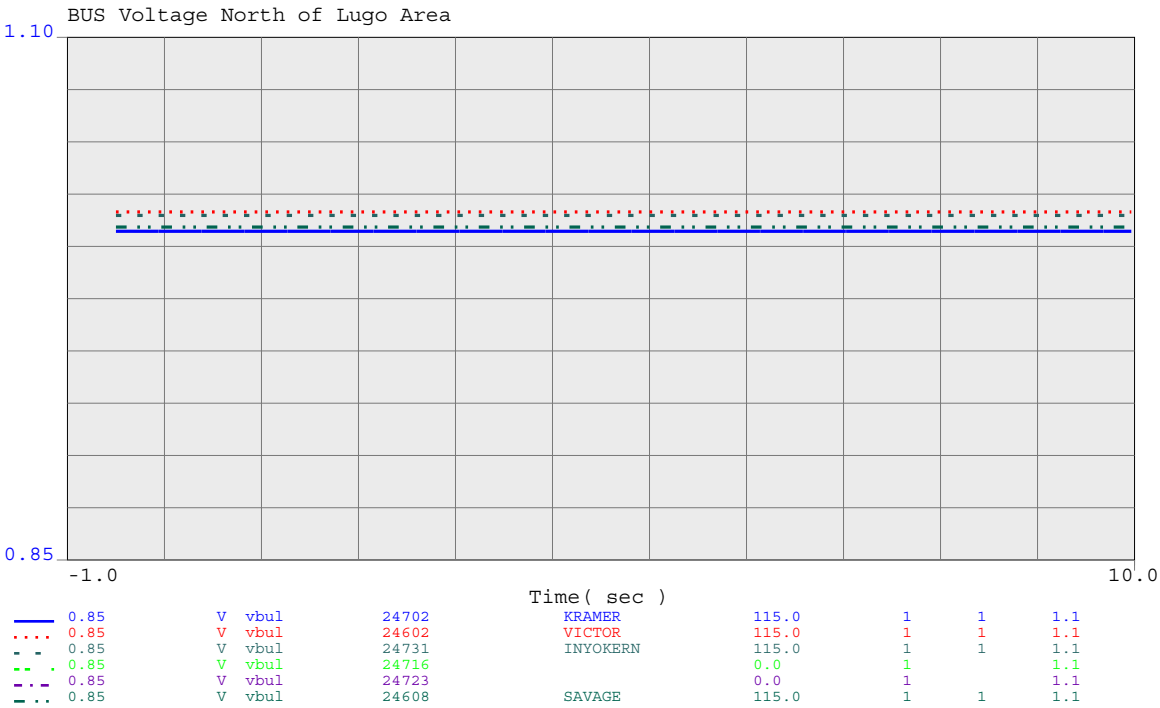
POST PROJECT

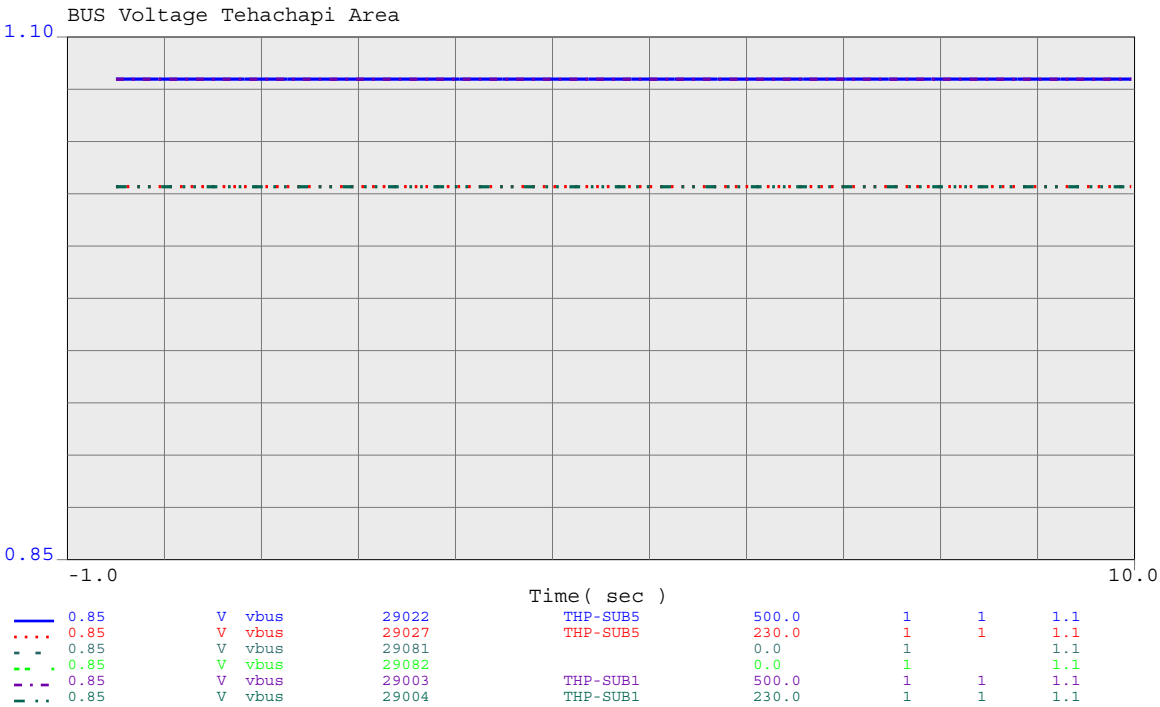
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

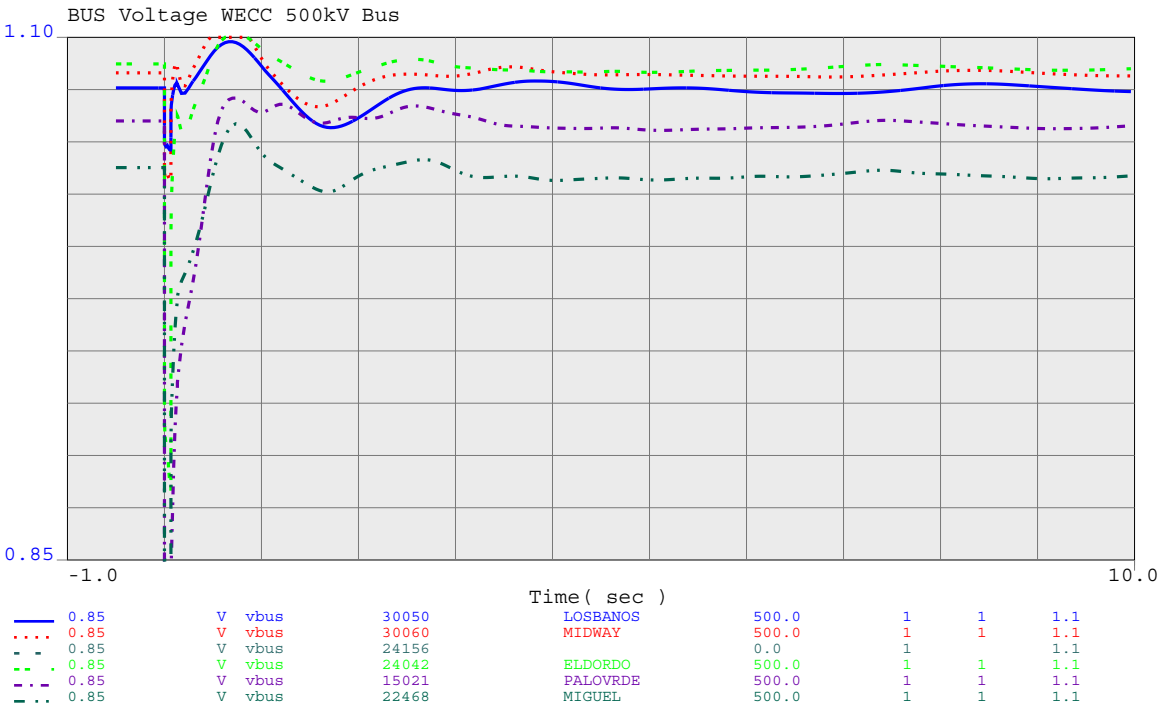
POST PROJECT

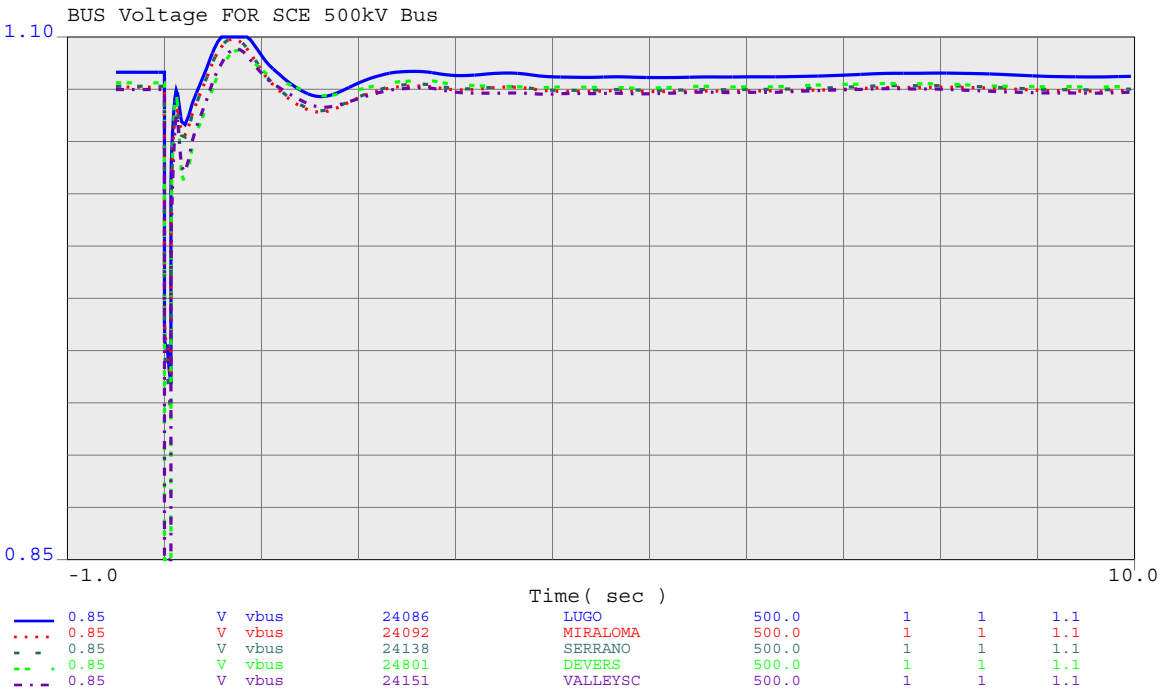
2013 Off Peak Case

No Fault

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

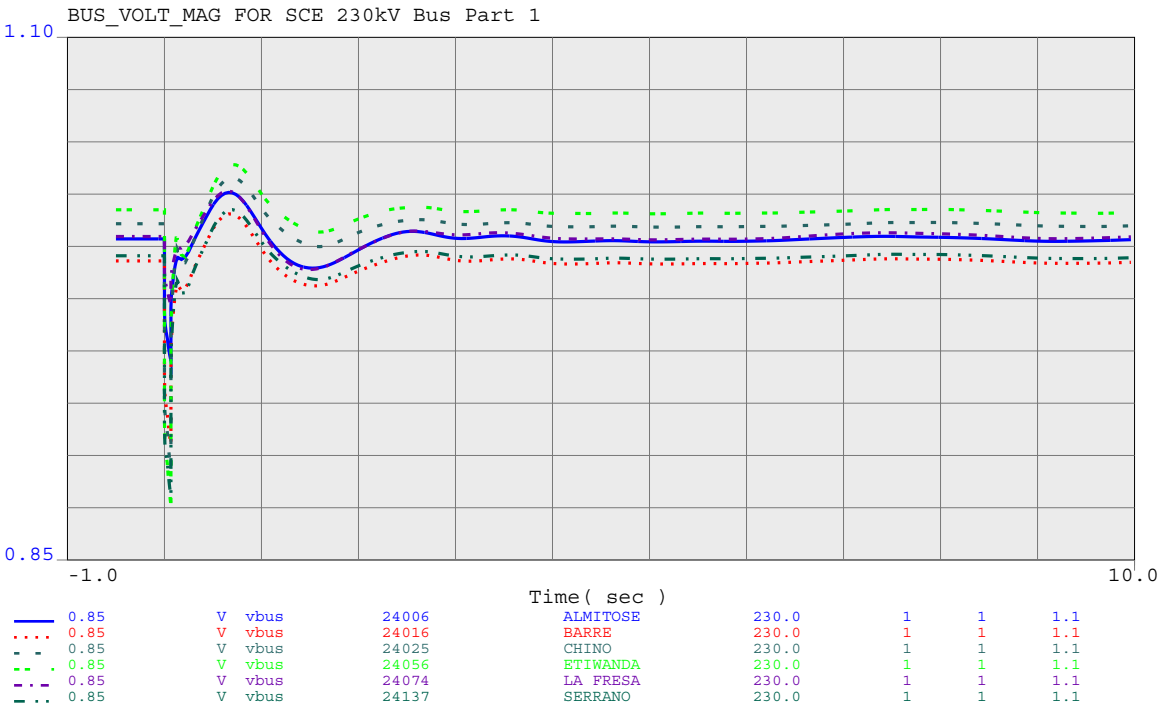
POST PROJECT

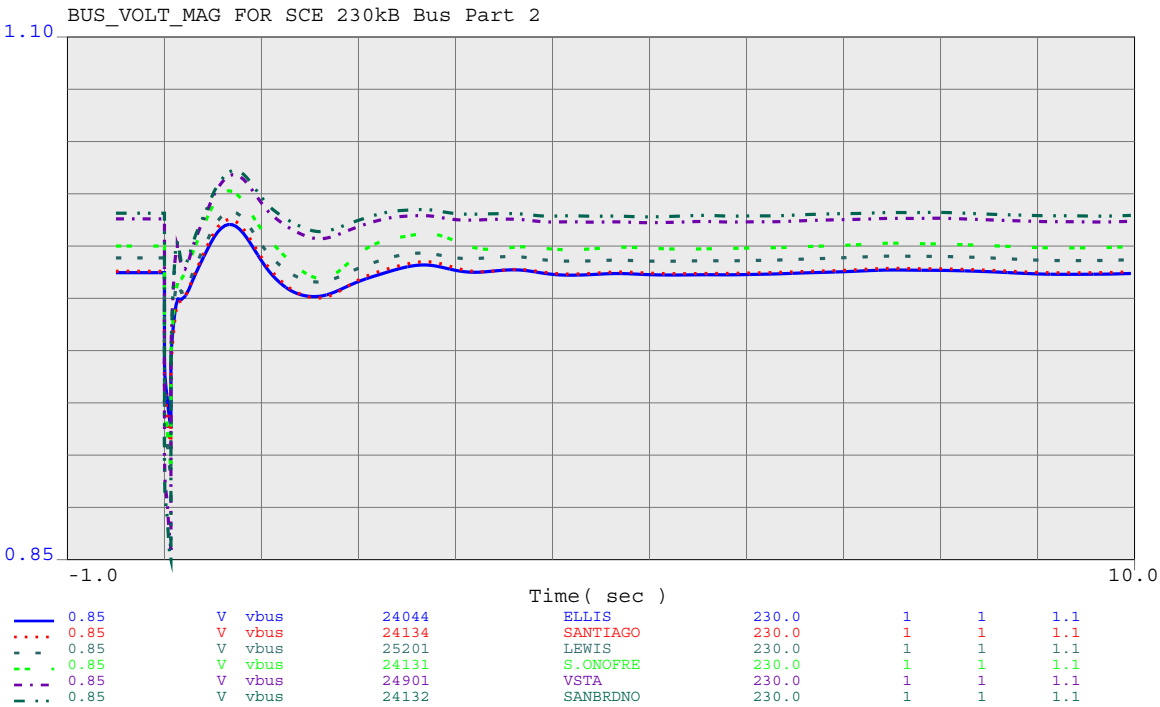
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

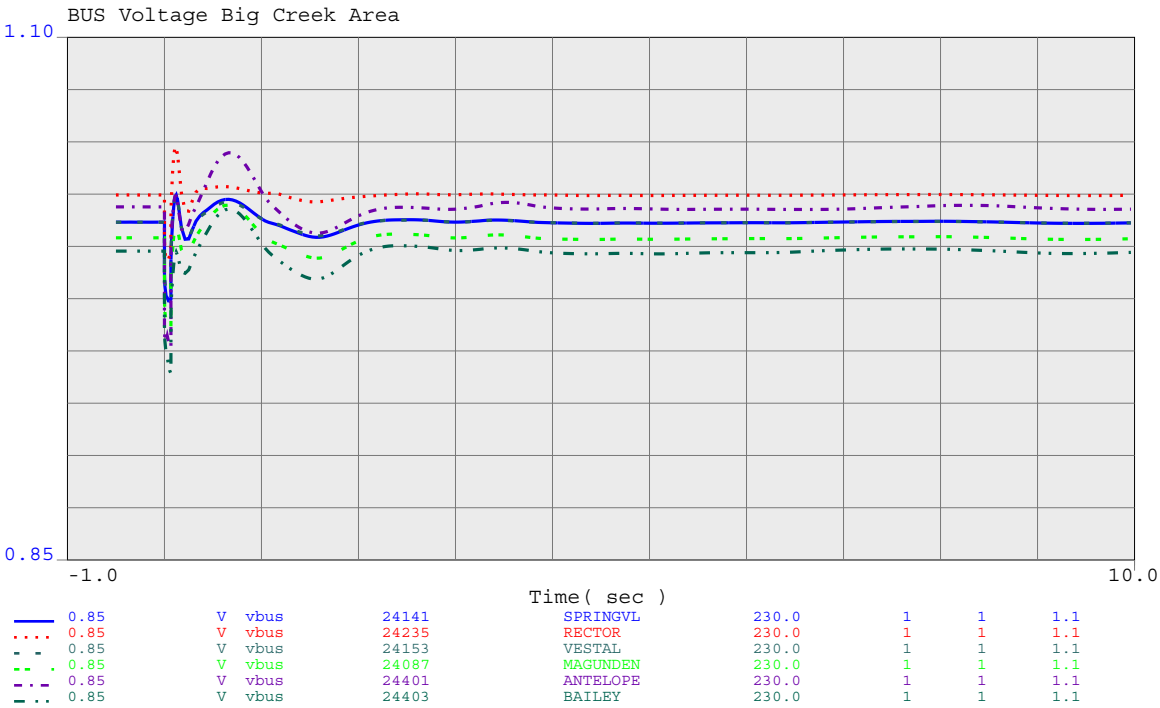
POST PROJECT

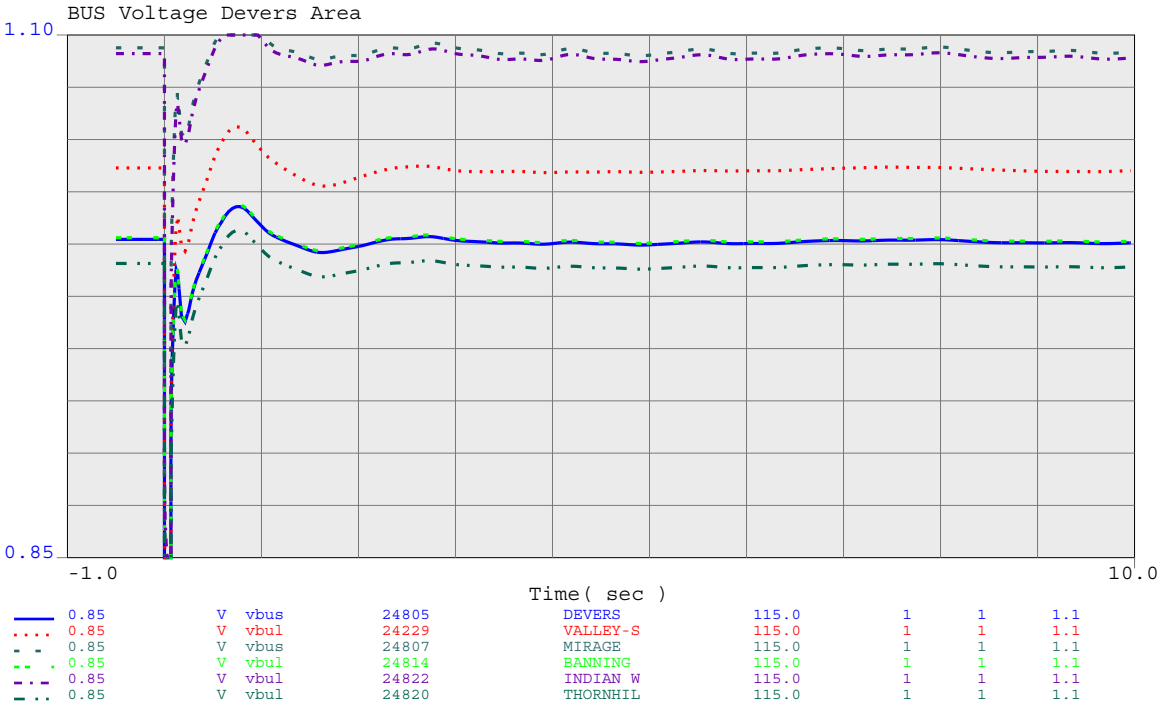
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

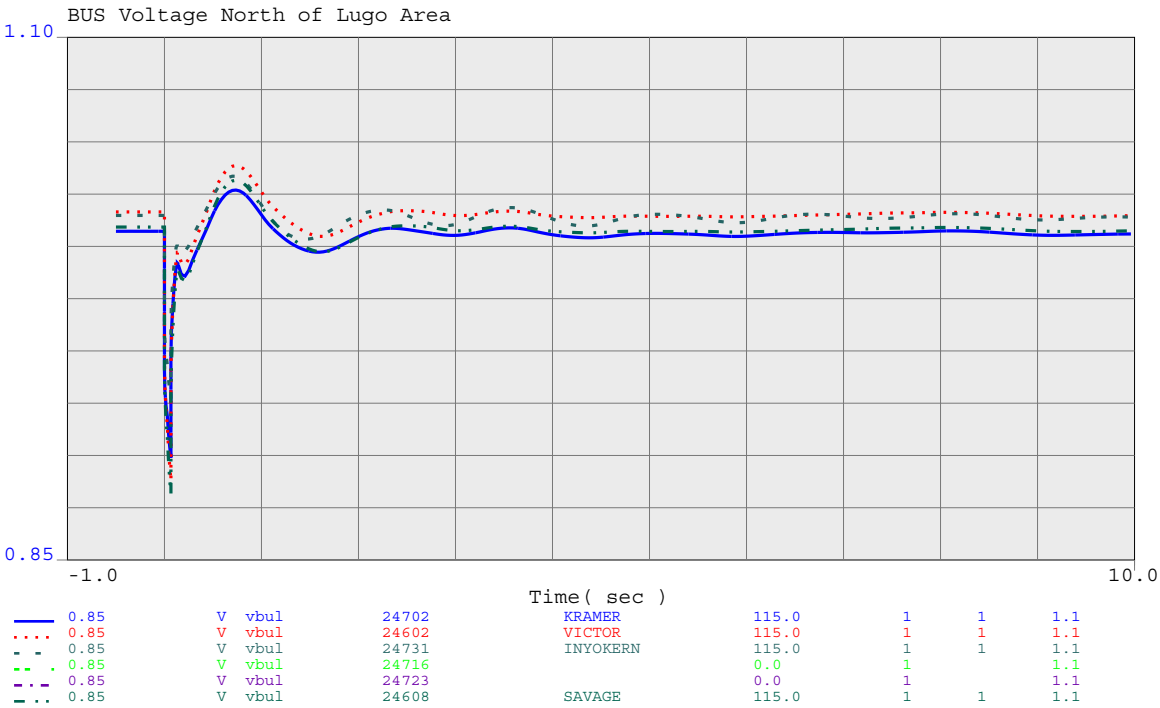
POST PROJECT

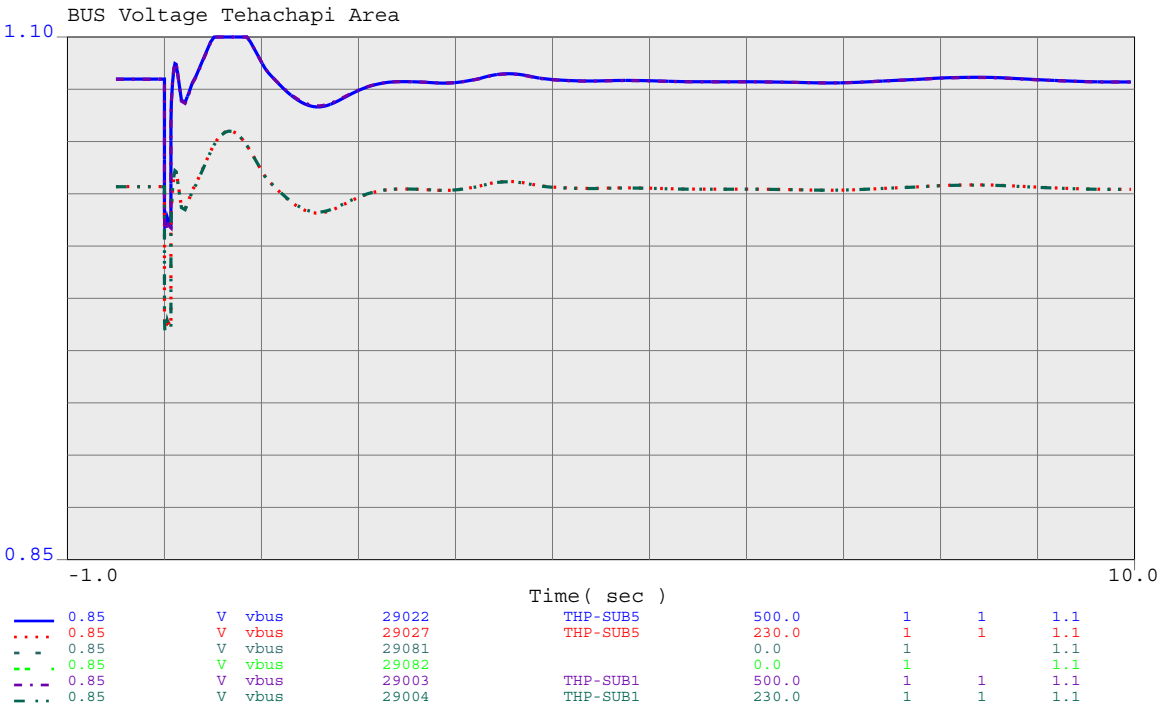
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

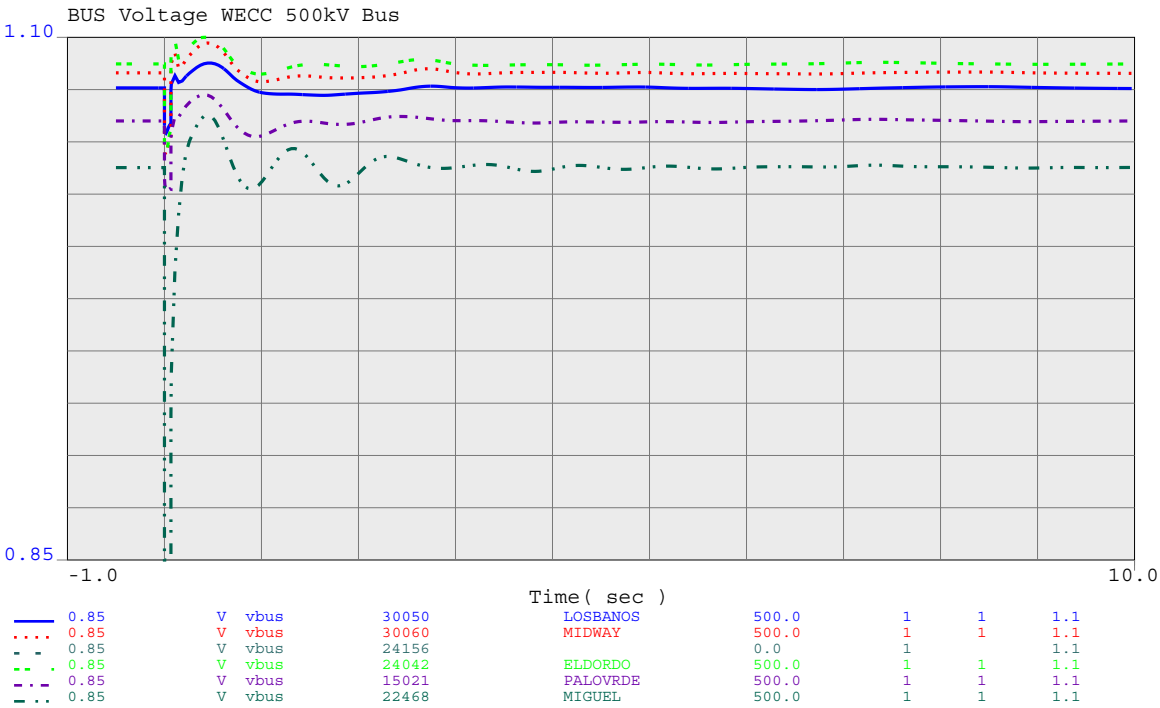
POST PROJECT

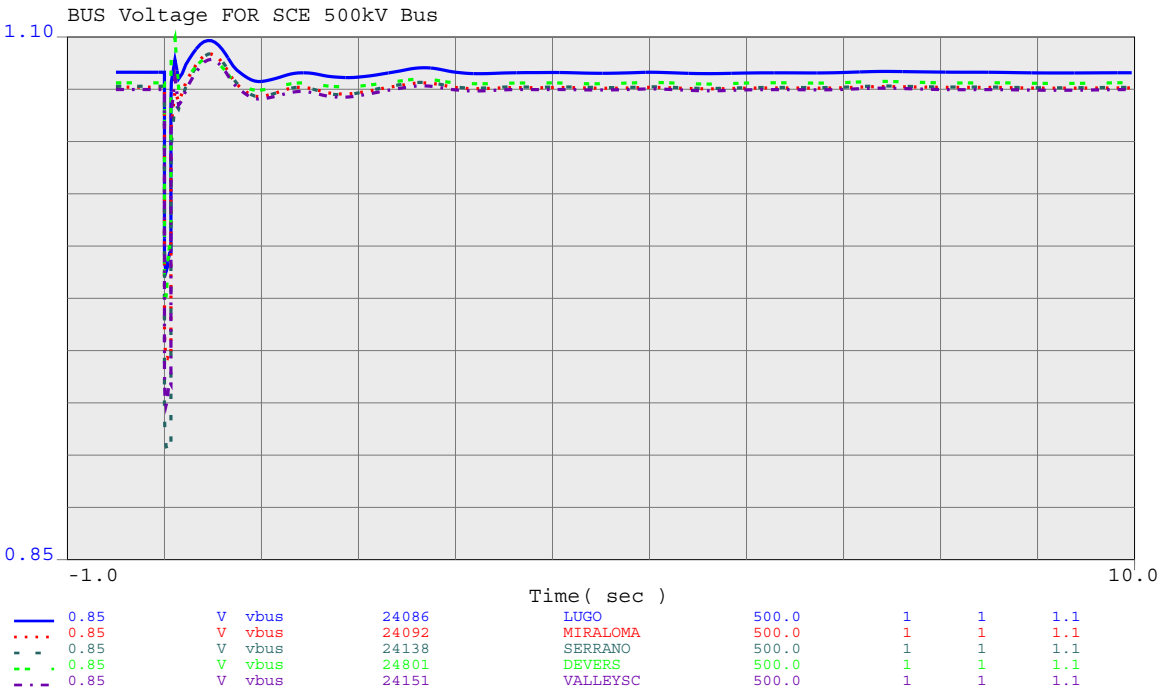
2013 Off Peak Case

Palo Verde - Devers 500kV N-1 outage (fault at Palo Verde)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





ANAHEIM MUNICIPAL POWER STATION (AMPS) PROJECT SIS

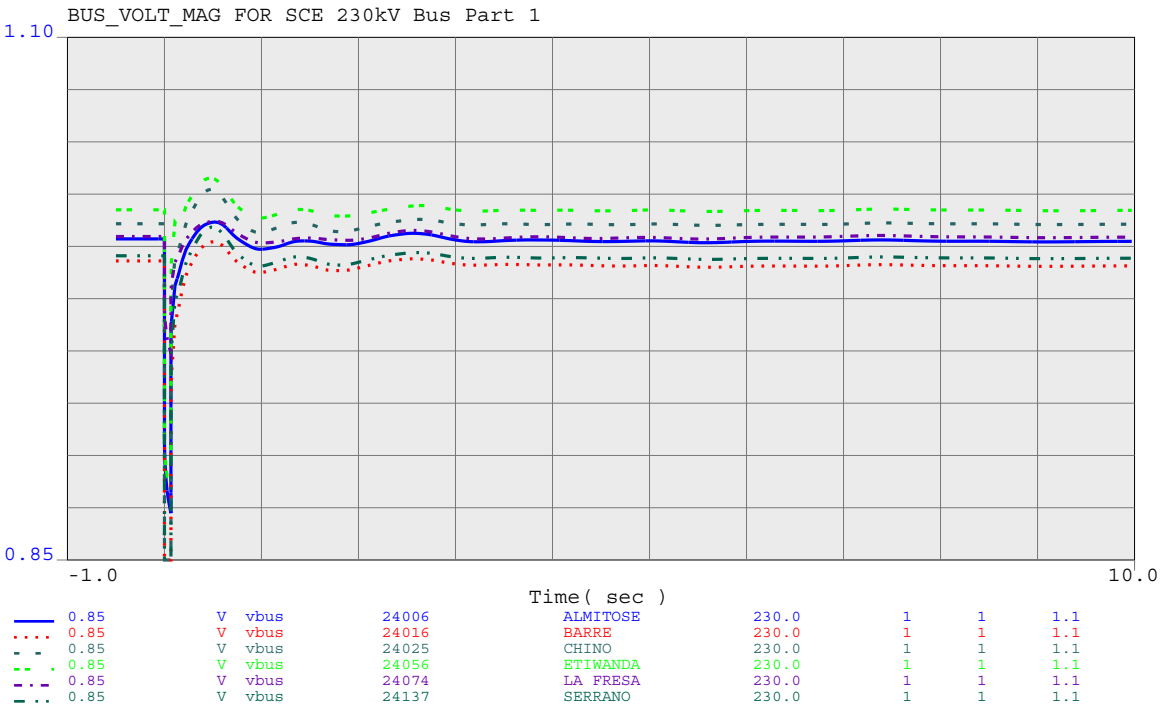
POST PROJECT

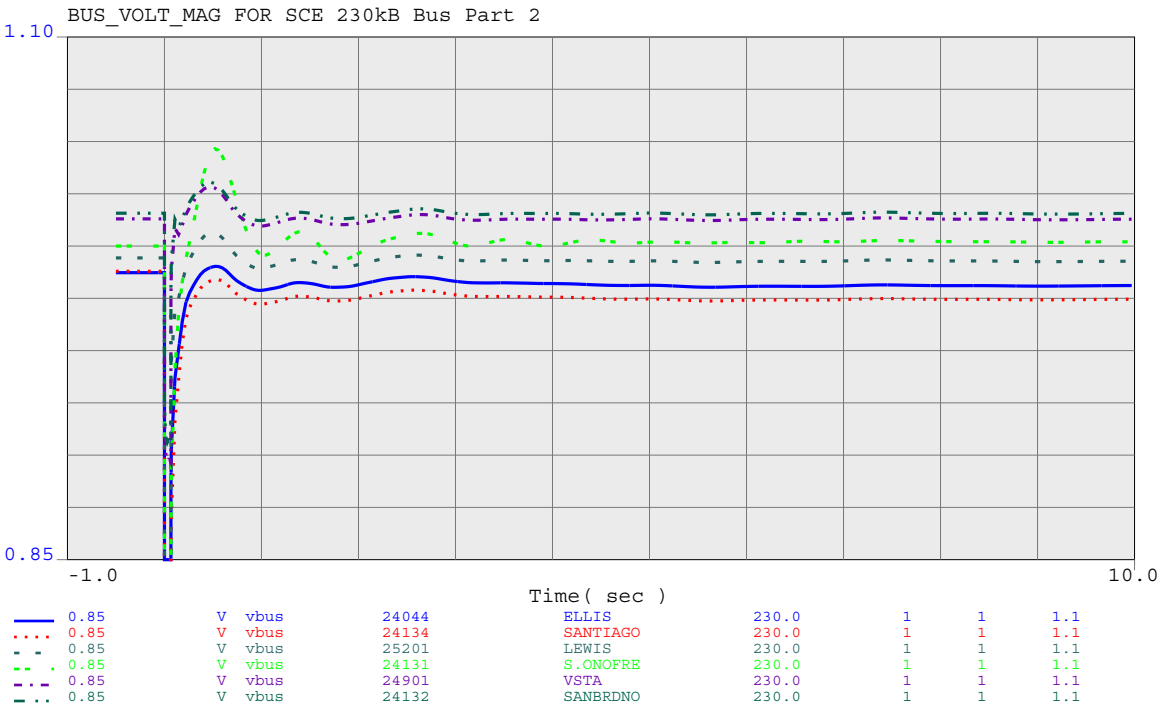
2013 Off Peak Case

SONGS - Santiago Double Line Outage (fault at SONGS)

[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

Stability Plots in SCE Area





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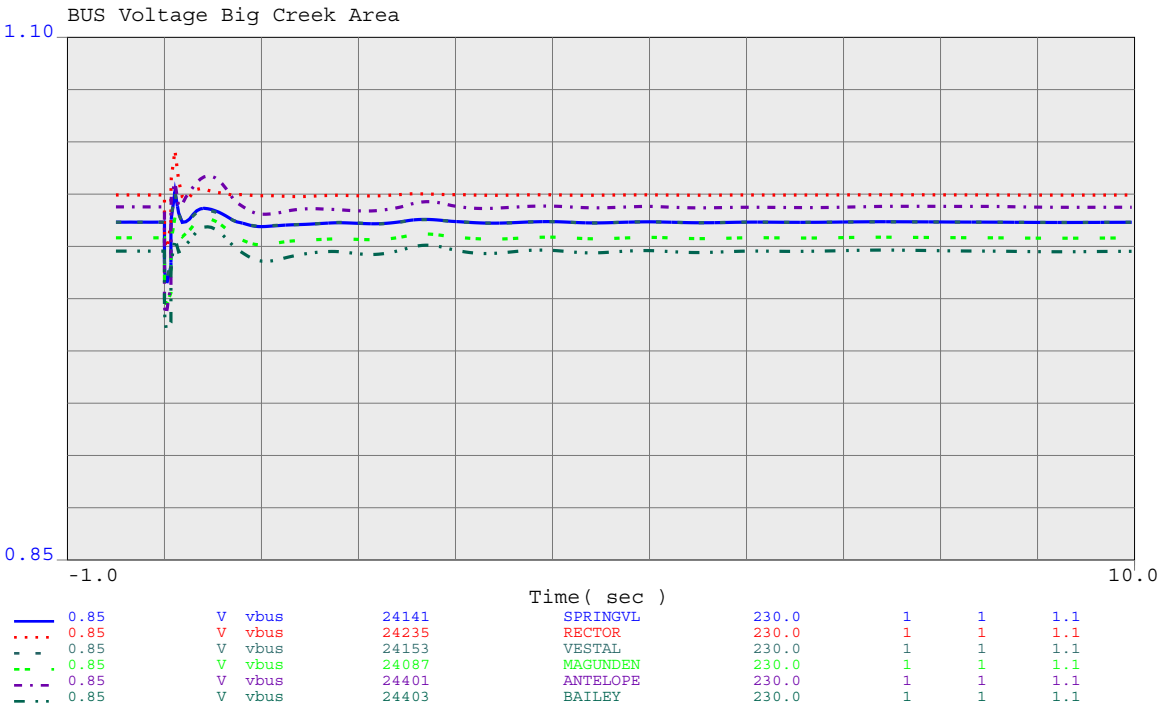

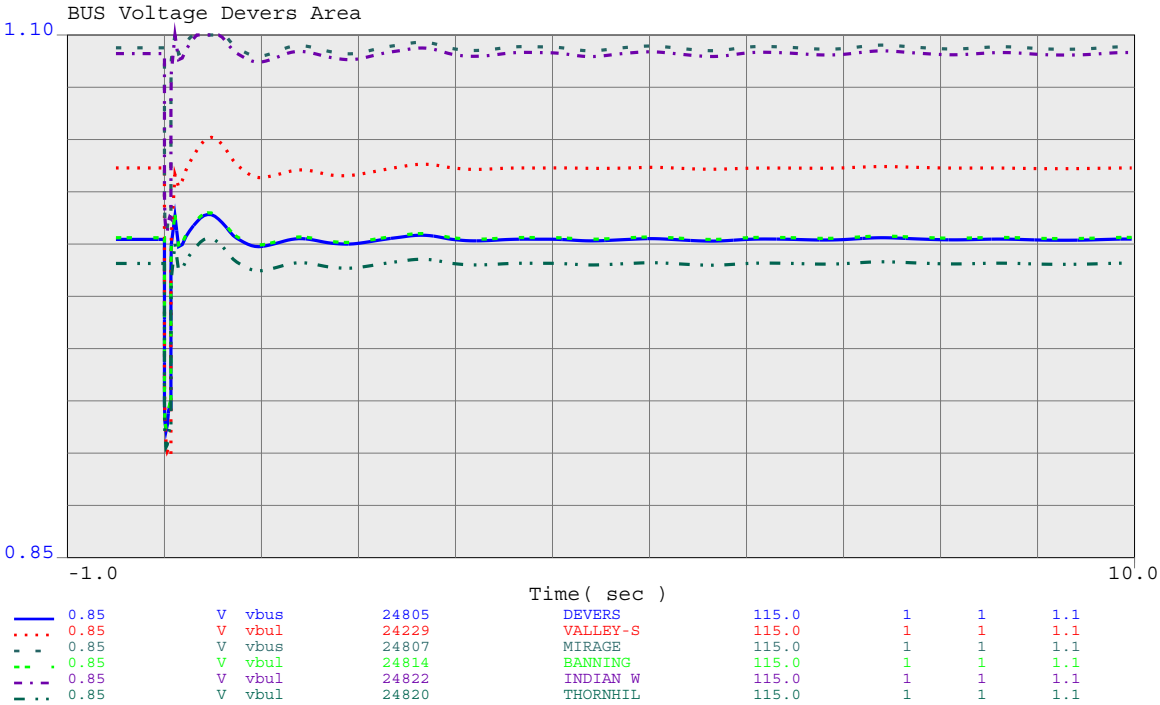

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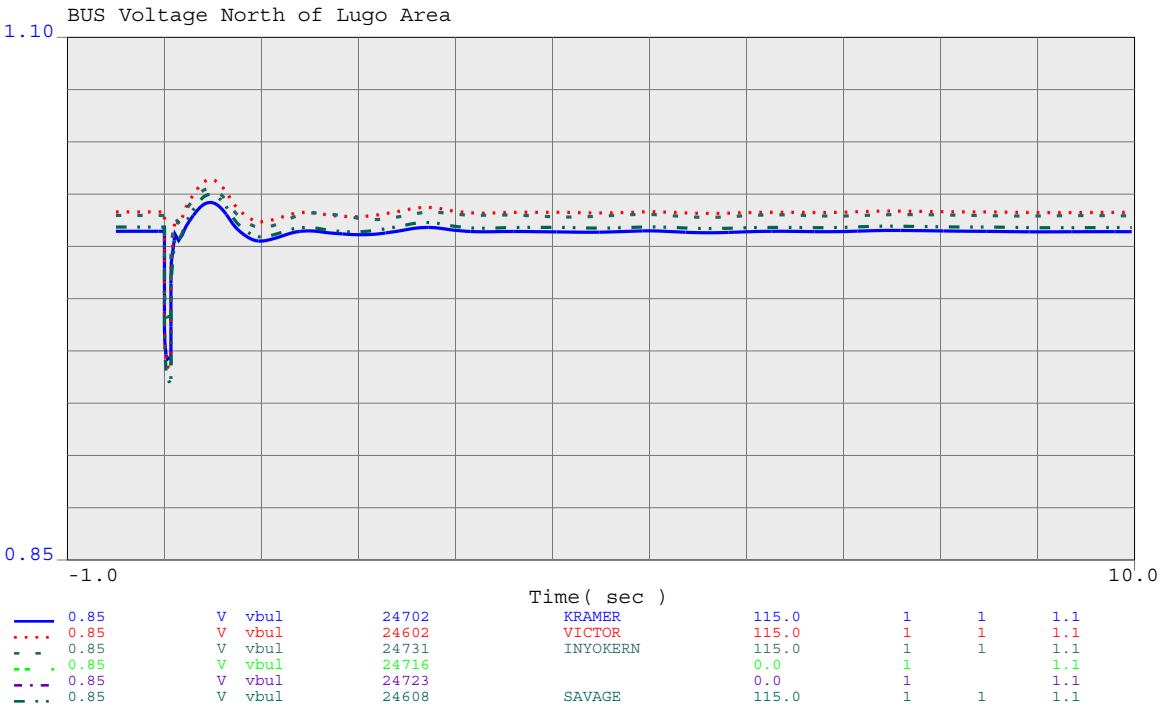

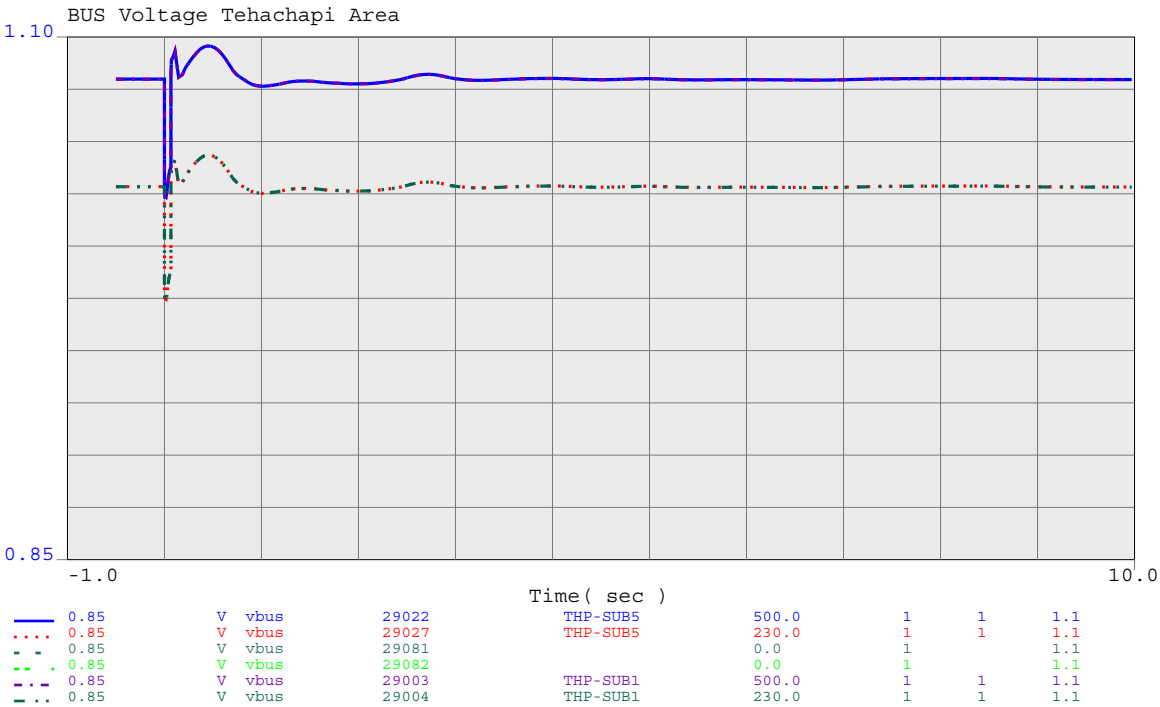

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[SYLMAR -524][VIC-LUGO 872][EL-LUGO 0][MHV-LUGO 268][PV-DV 1691]MW

From: Sudath Arachchige
To: Docket Optical System
Date: 5/30/2008 2:40 PM
Subject: Fwd: Canyon Power Project System Impact Study and Other Requested information
Attachments: SCPPA - AMPS Project SIS Final.pdf; SCPPA-AMPS_APPENDIX A.pdf; SCPPA-AMPS_APPENDIX B.pdf

Please be kind to docket this document.
Sudath Arachchige

>>> "Suzanne Wilson" <SWilson@anaheim.net> 5/21/2008 3:33 PM >>>
Che,

Per your request, I am providing the above attachments to you and Sudath. If you would like this information to be docketed, please let me know.
This file size is large, so I'm sending the attachments in two emails. This email includes 3 of the 9 attachments. Please let me know that you received all 9 attachments.

From: Che McFarlin [mailto:Cmcfarli@energy.state.ca.us]
Sent: Monday, May 19, 2008 5:57 PM
To: Suzanne Wilson
Subject: Fwd: Re: T&D Discussion on the Canyon Power Project

Suzanne,

Can you check and see if this information has been provided or when to expect it. At this time I don't have any record of it's receipt or a expected delivery date for the revised SIS or the other info.

Thanks for your help.

THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL, AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAWS. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution, forwarding, or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender immediately by e-mail or telephone, and delete the original message immediately. Thank you.