

Appendix: Results Tables

7.2 In-State Scenario with CAISO Resource Queue – Northern California Peak with North-to-South Bulk System Flows (A-Q)

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A2_Q (Ca)	Borden - Gregg 230 kV line #1	30	870 Amp	129%		
A2_Q (Ca)	Westley - Los Banos 230 kV line #1	30	1859 Amp	125%		
A2_Q (Ca)	Corcoran 115/70 kV transformer #2	30	23 MVA	121%	Load growth	
A2_Q (Ca)	Tesla - AEC Tap1 115 kV line #1	30	759 Amp	120%		Turn on GWF Tracy
A2_Q (Ca)	Arco 230/70 kV transformer #2	30	154 MVA	115%	Load growth	
A2_Q (Ca)	Arco - Twisselman 70 kV line #1	30	459 Amp	105%	Load growth	
A2_Q (Ca)	Safeway Tap1 - AEC Tap1 115 kV line #1	30	759 Amp	102%		Turn on GWF Tracy
A2_Q (Ca)	Templeton - Morro Bay 230 kV line #1	30	834 Amp	101%		
A2_Q (Ca)	IMPRLVLY 500-CENTRALS 500 ckt #1	22	1000 MW	119.30%	WECC Path Rating for Sunrise is 1000MW, need new transmission to deliver generation out of IV area	Limiting flow on Sunrise to 1000MW (need new transmission to deliver generation out of IV area) or 2) upgrade local system
A2_Q (Ca)	SYCAMORE 230-SYCAMORE 138 ckt #1	22	392 MVA	111.30%		
A2_Q (Ca)	OWENS UP 11.5kV - OWENS UP 230kV #1	26	37.5 MVA	102.40%		Lower gen output

Low Voltages

ID	Substation	Area	Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
Case Name #					

Emergency Conditions (N-1)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loadi ng (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	MossLanding to MetCalf 500 kV line	Westley - Los Banos 230 kV line #1	30	1669.92A mps	132%		
	MossLanding to MetCalf 500 kV line	Borden - Gregg 230 kV line #1	30	793.23A mps	117%		
	OPEN LINE "BARRE 230.00" "VILLA PK 230.00" "1" 1	LEWIS - BARRE 230kV #1	24	3750.27 Amps	103.92		Can be mitigated by turn on local capacity in Western LA Basin
	OPEN LINE "ALBERHL5 500.00" "VALLEYSC 500.00" "1" 1	DEVERS - SANBRDNO 230kV #1	24	795.74 Amps	134.44	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study	
	OPEN LINE "ALBERHL5 500.00" "VALLEYSC 500.00" "1" 1	EL CASCO - DEVERS 230kV #1	24	1149.68 Amps	131.3	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study	
	OPEN LINE "ALBERHL5 500.00" "VALLEYSC 500.00" "1" 1	VSTA - DEVERS 230kV #2	24	1240.05 Amps	104.73	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study	
	OPEN LINE "SERRANO 500.00" "ALBERHL5 500.00" "1" 1	EL CASCO - DEVERS 230kV #1	24	1149.68 Amps	122.57	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study	
	OPEN LINE "KRAMER 500.00" "LLANO 500.00" "1" 1	KRAMER - LUGO 230kV #1	24	1669.3 Amps	106.11		Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
	OPEN LINE "KRAMER 500.00" "LLANO 500.00" "1" 1	KRAMER - LUGO 230kV #2	24	1669.3 Amps	106.11		Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
	ML80 "ML BK 80 230/500 ckt 1 "assoc SPS" "T-1" "B"	MIGUEL 500-MIGUEL 230 ckt #2	22	1344 MVA	102.8		can be mitigated by tripping generation at IV, partial SPS
	ML81 "ML BK 81 230/500 ckt 2 "assoc SPS" "T-1" "B"	MIGUEL 500-MIGUELMP 500 ckt #1	22	1329 MVA	105.33		can be mitigated by tripping

						generation at IV, partial SPS
	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	NATNLCTY 69-MAIN ST 69 ckt #1	22	841.76 Amps	100.02	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
	TL23051 "TL23051 SYCAMORE-PEN ck 1" "N-1" "B"	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	119.85	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
	TL06920 "TL06920 ARTESN-SYCAMORE ck 1" "N-1" "B"	POWAY 69-R.CARMEL 69 ckt #1	22	953.88 Amps	104.9	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-MONTGYTP 69 ckt #1	22	1422.46 Amps	124.15	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-SOUTHBAY 69 ckt #1	22	1196.54 Amps	102.59	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-SWTWTRTP 69 ckt #1	22	1798.99 Amps	113.43	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
	EA60 "EA BK60 230/138 " "T-1" "B"	SYCAMORE 138-CHCARITA 138 ckt #1	22	853.89 Amps	110.79	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
	TL230MMx "TL230MM SY230-OTAYMESA " "N-1"	SYCAMORE 69-SCRIPPS 69 ckt #1	22	1338.78 Amps	115.64	1) need new transmission to

	"B"						deliver generation out of IV area or 2) upgrade local system
	TL230MMx "TL230MM SY230-OTAYMESA " "N-1" "B"	SYCAMORE 230- SYCAMORE 138 ckt #1	22	477 MVA	118.42		1) need new transmission to deliver generation out of IV area or 2) upgrade local system
	MossLanding to MetCalf 500 kV line	Westley - Los Banos 230 kV line #1	30	1669.92A mps	132%		

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	EAGLEMP1 6.9kV	SCE	0.86837		
	OPEN LINE "JHINDMWD 230.00" "EAGLEMTN 230.00" "1" 1	JH LX1 230kV	SCE	0.89446		
	OPEN LINE "JHINDMWD 230.00" "JHINDSCE 230.00" "r1" 1	JHINDSCE 230kV	SCE	0.89651		

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
Case Name #	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	EM LX1 230kV	SCE	-9.88		
	OPEN LINE "JHINDMWD 230.00" "EAGLEMTN 230.00" "1" 1	JH LX1 230kV	SCE	-6.69		
	OPEN LINE "JHINDMWD 230.00" "JHINDSCE 230.00" "r1" 1	JHINDSCE 230kV	SCE	-7.15		

Divergent Cases

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	OPEN LINE "DEVERS 230.00" "MIRAGE 230.00" "1" DEVERS 230.00" "MIRAGE 230.00" "2"		Can be mitigated by reducing import from IID or upgrading the inter-tie capability between IID and

		SCE
	OPEN LINE "DEVERS 500.00" "VALLEYS 500.00" "1" DEVERS 500.00" "VALLEYS 500.00" "2" with SPS	
	OPEN LINE "BARRE 230.00" "ELLIS 230.00" "1" DELAMO 230.00" "ELLIS 230.00" "1"	
	OPEN LINE "LUGO 500.00" "MOHAVE 500.00" "1" MOHAVE 500.00" "ELDORDO 500.00" "1"	
	SONGS G-2	
	OPEN LINE "ANTELOPE 500.00" "WINDHUB 500.00" "1" WINDHUB 500.00" "WIRLWIND 500.00" "1"	
	J. HINDS - MIRAGE 230kV No. 1 with SPS	
	J. HINDS - EAGLE MOUNTAIN 230kV No. 1 with SPS	
	IVANPAH - PRIMM 230Kv No. 1 with SPS	
	OPEN LINE "SYLMAR1 230.00" "SYLMAR S 230.00" "1" 1	
	OPEN LINE "SYLMAR2 230.00" "SYLMARLA 230.00" "1" 1	
	OPEN LINE "NAVAJO 500.00" "CRYSTAL 500.00" "1" CRYSTAL 500.00" "MCCULLGH 500.00" "1"	
	OPEN LINE "ADELANTO 500.00" "TOLUCA 500.00" "1" ADELANTO 500.00" "RINALDI2 500.00" "1"	
	OPEN LINE "MCCULLGH 500.00" "VICTORVL 500.00" "1" MCCULLGH 500.00" "VICTORVL 500.00" "2"	
	OPEN LINE "MCCULLGH 500.00" "VICTORVL 500.00" "2" CRYSTAL 500.00" "MCCULLGH 500.00" "1"	

Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines (no internal RAS)	Gates - Midway 230 kV line #1	30	1376 Amps	146%		
	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines (no internal RAS)	Arco - Midway 230 kV line #1	30	1291 Amps	137%		
	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines (no internal RAS)	Templeton - Morro Bay 230 kV line #1	30	974.97 Amps	130%		
	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines (no internal RAS)	Borden - Gregg 230 kV line #1	30	793.23Amps	119%		
	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Metcalf - Moss Landing 230 kV line #2	30	2168 Amps	125%		Gen readjustment between contingencies
	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Westley - Los Banos 230 kV line #1	30	1669.92 Amps	132%		
	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Metcalf - Moss Landing 230 kV line #1	30	2168 Amps	125%		Gen readjustment between contingencies
	C1 (L-2): Table Mountain - Vaca-Dixon 500 kV Line and Vaca-Dixon 500/230 Bank	CPV Station - Cortina 230 kV line #1	30	1042 Amps	109%	Potential reconductoring or loop in Cortina an additional 230 kV line	Gen readjustment between contingencies

	OPEN LINE "LEWIS 230.00" "SERRANO 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "2"	VILLA PK - LEWIS 230kV #1	SCE	2540.34 Amps	112.5 2	Can be mitigated by turn on local capacity in Western LA Basin
	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "1"	SERRANO - VILLA PK 230kV #2	SCE	4048.98 Amps	110.3 2	Can be mitigated by turn on local capacity in Western LA Basin
	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "2" LEWIS 230.00" "SERRANO 230.00" "1"	SERRANO - VILLA PK 230kV #1	SCE	3810.51 Amps	117.2 3	Can be mitigated by turn on local capacity in Western LA Basin
	OPEN LINE "DEVERS 500.00" "VALLEYSC 500.00" "1" DEVERS 500.00" "VALLEYSC 500.00" "2"	DEVERS - SANBRDNO 230kV #1	SCE	795.74 Amps	155.9 8	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study
	OPEN LINE "DEVERS 500.00" "VALLEYSC 500.00" "1" DEVERS 500.00" "VALLEYSC 500.00" "2"	EL CASCO - DEVERS 230kV #1	SCE	1149.68 Amps	147.5 6	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study
	OPEN LINE "DEVERS 500.00" "VALLEYSC 500.00" "1" DEVERS 500.00" "VALLEYSC 500.00" "2"	VSTA - DEVERS 230kV #2	SCE	1240.05 Amps	120.4	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study
	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" KRAMER 230.00" "LUGO 230.00" "2"	KRAMER - KRAMER 230kV #1	SCE	1230 MVA	117.3 5	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
	OPEN LINE "VINCENT 500.00" "LLANO 500.00" "1" LUGO 500.00" "LLANO 500.00" "1"	KRAMER - LUGO 230kV #1	SCE	1669.3 Amps	105.4 7	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
	OPEN LINE "VINCENT 500.00" "LLANO 500.00" "1" LUGO 500.00" "LLANO	KRAMER - LUGO	SCE	1669.3 Amps	105.4 7	Caused by North of Lugo

500.00" "1"	230kV #2						renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
OPEN LINE "KRAMER 230.00" "INYOKERN 230.00" "1" KRAMER 230.00" "TOT254LP 230.00" "1"	INYOKERN - KRAMER 230kV #2	SCE	1674.32 Amps	121.1 7		Caused by North of Lugo renewable generation, need either SPS of tripping North of Inyokern generation or upgrade north of Inyokern transmission lines	Caused by North of Lugo renewable generation, need either SPS of tripping North of Inyokern generation or upgrade north of Inyokern transmission lines
OPEN LINE "KRAMER 230.00" "INYOKERN 230.00" "2" KRAMER 230.00" "TOT254LP 230.00" "1"	INYOKERN - KRAMER 230kV #1	SCE	1674.32 Amps	121.1 7		Caused by North of Lugo renewable generation, need either SPS of tripping North of Inyokern generation or upgrade north of Inyokern transmission lines	Caused by North of Lugo renewable generation, need either SPS of tripping North of Inyokern generation or upgrade north of Inyokern transmission lines
OPEN LINE "PARDEE 230.00" "MOORPARK 230.00" "1" PARDEE 230.00" "MOORPARK 230.00" "2"	PARDEE - MOORPARK 230kV #3	SCE	2279.28 Amps	102.2 5			Can be mitigated by turn on local capacity in Moorpark LCR sub-area
OPEN LINE "PARDEE 230.00" "MOORPARK 230.00" "1" PARDEE 230.00" "MOORPARK 230.00" "3"	PARDEE - MOORPARK 230kV #2	SCE	2279.28 Amps	102.2 5			Can be mitigated by turn on local capacity in Moorpark LCR sub-area
23051B/230XX "PEN-ES #1+ PEN-ES #2 230KV" "N-2" "C"	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	154.2 2			N-2 overload, can be mitigated by dropping load or upgrading the local system
23051A/6920B "SX-PEN 230KV + AR-SX 69KV" "N-2" "C"	POWAY 69-R.CARMEL 69 ckt #1	22	953.88 Amps	125.6 8			N-2 overload, can be mitigated by dropping load or upgrading the local system
6924/6915 "POM-SX #1+#2 69KV *assoc SPS" "N-2" "C"	R.CARMEL 69-BERNARDO 69 ckt #1	22	568.98 Amps	139.7 8			N-2 overload, can be mitigated by dropping load or upgrading the local system
6906/675 "MR-PQ 69KV + PQ-MRM 69KV" "N-2" "C"	SCRIPPS 69-SYCAMORE 69 ckt #1	22	1338.78 Amps	107.8 4			N-2 overload, can be mitigated by dropping load or upgrading the local system
23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	STUARTTP 69-OCNSDETP 69 ckt #1	22	270.27 Amps	103.7 7			N-2 overload, can be mitigated by dropping load or upgrading the local system

	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 138-CHCARITA 138 ckt #1	22	853.89 Amps	108.9 1	N-2 overload, can be mitigated by dropping load or upgrading the local system
	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 69-SCRIPPS 69 ckt #1	22	1338.78 Amps	118.5 1	N-2 overload, can be mitigated by dropping load or upgrading the local system
	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 230- SYCAMORE 138 ckt #1	22	477 MVA	121.9 7	N-2 overload, can be mitigated by dropping load or upgrading the local system
	23022/23023 "ML-MS 230 kV #1 *assoc SPS" "N-2" "C"	TELECYN 138-GRNT HLL 138 ckt #1	22	1142.15 Amps	109.7 5	N-2 overload, can be mitigated by dropping load or upgrading the local system
	OPEN LINE "SCATERGD 230.00" "OLYMPC 230.00" "2" OLYMPC 230.00" "TARZANA 230.00" "1"	TARZANA - OLYMPCLD 138kV #1	LADWP	1200.72 Amps	120.3 9	
	OPEN LINE "SCATERGD 230.00" "OLYMPC 230.00" "2" OLYMPC 230.00" "TARZANA 230.00" "1"	TARZANA - TARZANA 138kV #1	LADWP	328 MVA	101.6 7	
	OPEN LINE "HOLYWD_E 230.00" "TOLUCA 230.00" "1" HOLYWD_F 230.00" "TOLUCA 230.00" "3"	TOLUCA - TOLUCA 138kV #1	LADWP	325 MVA	105.7 4	
	OPEN LINE "HOLYWD_E 230.00" "TOLUCA 230.00" "1" HOLYWD_F 230.00" "TOLUCA 230.00" "3"	HOLYWDLD - TOLUCA 138kV #2	LADWP	1200.72 Amps	122.5 2	
	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BA3258 161kV to AVE58 161kV ckt #1	IID	591.69 (Amps)	135.2 2	
	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANI161 161kV to BA3258 161kV ckt #1	IID	591.69(Amps)	150.3 3	
	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANI161 161kV to BANIS230 230kV ckt #1	IID	225(MV A)	104.9 5	
	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANIS230 230kV to ELCENTRO 230kV ckt #1	IID	1641.68(Amps)	103.1 1	
	OPEN LINE "COACHELV 230.00" "RAMON 230.00" "2" COACHELV 230.00" "MIRAGE 230.00" "2"	COACHELV 92kV to COACHELV 230kV ckt #1	IID	150(MV A)	136.3 9	
	OPEN LINE "COACHELV 230.00" "RAMON 230.00" "2" COACHELV 230.00" "MIRAGE 230.00" "2"	COACHELV 92kV to COACHELV 230kV ckt #2	IID	150(MV A)	136.3 9	
	OPEN LINE "IIDIVSUB 230.00" "ELCENTRO 230.00" "1" IIDIVSUB 230.00" "DIXIE230 230.00" "1"	ELCENTSW 161kV to ELSTEAMP 92kV ckt #1	IID	125(MV A)	114.7 6	
	OPEN LINE "IMPRLVLY 230.00" "IIDIVSUB 230.00" "1" IMPRLVLY 230.00" "IIDIVSUB 230.00" "2"	ELSTEAMP 92kV to ELCENTSW 161kV ckt #1	IID	125(MV A)	115.2 7	
	OPEN LINE "IMPRLVLY 230.00" "IIDIVSUB 230.00" "1" IMPRLVLY 230.00" "IIDIVSUB 230.00" "2"	PILOTKNB 161kV to PILOTKNB 92kV ckt #1	IID	75(MVA)	115.6 4	

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230kV	22	0.87888		due to load growth
	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	TALEGA 230kV	22	0.89138		due to load growth

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	C3 (L-2): Los Banos - Tesla and Los Banos - Tracy 500 kV lines	Gualala 60 kV	30	-12%		Under investigation, possible case divergence
	C3 (L-2): Los Banos - Tesla and Los Banos - Tracy 500 kV lines	Annapols 60 kV	30	-11%		Under investigation, possible case divergence
	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Gualala 60 kV	30	-12%		Under investigation, possible case divergence
	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Annapols 60 kV	30	-11%		Under investigation, possible case divergence
	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Mosher 60 kV	30	-10%	Load growth	Under investigation, possible case divergence
	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Gualala 60 kV	30	-11%		Under investigation, possible case divergence
	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230kV	22	-11.62		due to load growth
	OPEN LINE "ELSTEAMP 92.00" "HOLTIVILL 92.00" "1" ELSTEAMP 92.00" "HOLTIVILL 92.00" "2"	HOLTIVILL	IID	-11.64		

7.3 In-State Scenario with CAISO Resource Queue – Northern California Peak with South-to-North Bulk System Flows (Asn-Q)

Normal Conditions (N-0):

Thermal Overloads

ID (Case Name)	Overloaded Facility	Area	Rating (Amps)	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A2sn_Q.sav	SY230 – MLMS3TAP #1 230KV LINE	22	2289A	101.20%		
A2sn_Q.sav	SYCAMORE 230/138KV TRANSFORMER BANK	22	392MVA	114.70%	Build a new Sycamore – Penasquitos 230kV line	
A2sn_Q.sav	VINCENT – LLANO 500KV LINE	24	3000A	112.10%	Build Midway – Kramer 500kV line	
A2sn_Q.sav	JHINDSCE – MIRAGE #1 230KV LINE	24	600A	115.10%	Re-dispatch Blythe generation	
A2sn_Q.sav	HSKLLCYN – SYLMARLA #1 230KV LINE	26	1855A	106.50%	Reconductor	
A2sn_Q.sav	BELLOTA – COTTLE B #1 230KV LINE	30	675A	102.20%	Reconductor	Under Study
A2sn_Q.sav	WESTLEY – LOSBANOS #1 230KV LINE	30	1484A	119.00%	Reconductor	Under Study
A2sn_Q.sav	STOREY 1 – GREGG #1 230KV LINE	30	675A	114.20%	Reconductor	Under Study
A2sn_Q.sav	BORDEN – GREGG #1 230KV LINE	30	675A	156.90%	Reconductor	Under Study
A2sn_Q.sav	TEMPLETN – MORROBAY #1 230KV LINE	30	825A	102.60%	Reconductor	Under Study
A2sn_Q.sav	COTTLE B – WARNERVL #1 230KV LINE	30	675A	111.10%	Reconductor	Under Study

Low Voltages

ID (Case Name)	Substation	Area	Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A2sn_Q.sav	EL CASCO 230KV	24	0.9344	Build Devers-Mira Loma 500kV or Devers-Rancho Vista 500kV line	Reactive support in WOD region
A2sn_Q.sav	SANBRDNO 230KV	24	0.9394	Build Devers-Mira Loma 500kV or Devers-Rancho Vista 500kV line	Reactive support in WOD region
A2sn_Q.sav	WILDLIFE 230KV	24	0.9418	Build Devers-Mira Loma 500kV or Devers-Rancho Vista 500kV line	Reactive support in WOD region
A2sn_Q.sav	VSTA 230KV	24	0.9428	Build Devers-Mira Loma 500kV or Devers-Rancho Vista 500kV line	Reactive support in WOD region

Emergency Conditions (N-1)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
Case Name #	MIGUEL 500/230 TRAN BANK-2	MIGUEL 500/230 TRAN BANK-1	22	1329 MVA	115.1%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230 or OtayMesa-TJI 230kV line)	
	IMPRLVLY 500/230 TRAN BANK-1	IMPRLVLY 500/230 TRAN BANK-2	22	732 MVA	168.3%	Install 3 rd 500/230kV Transformer Bank at IV	
	OTAYMESA - MLMS3TAP #1 230KV LINE	SYCAMORE 230/138KV TRAN BK-1	22	477 MVA	123.7%	Build a new Sycamore – Penasquitos 230kV line	
	SILVERGT - OLD TOWN #1 230KV LINE	OLD TOWN – OLDTWNTP 230KV LINE	22	1145 A	120.2%	Reconductor	
	IMPRLVLY - CENTRALX #1 500KV LINE	IMPRLVLY – ROA-230 #1 230KV LINE	22	2134 A	118.4%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230kV line)	SPS (Transfer trip of IV Gen)--Under Study
	MIGUEL 500/230 TRAN BANK-1	MIGUEL 500/230 TRAN BANK-2	22	1344 MVA	112.5%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230 or OtayMesa-TJI 230kV line)	
	IMPRLVLY - CENTRALX #1 500KV LINE	OTAYMESA – TJI-230 #1 230KV LINE	22	2071A	101.0%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230kV line)	
	LUGO 500.00 - VICTORVL 500.00 line	ELDORDO – PISGAH #1 500KV LINE	24	1600 A	121.6%	Upgrade Series Capacitors	
	LUGO 500.00 - VINCENT 500.00 line	VINCENT – LLANO #1 500KV LINE	24	3300 A	117.1%	New Kramer - Whirlwind or Midway 500kV	
	WIRLWIND 500/230 TRAN BANK-1	WIRLWIND 500/230 TRAN BANK-2	24	1230 MVA	115.9%	Energize 3rd deliverability transformer	
	MNTVIEW - SANBRDNO #2 230KV LINE	MNTVIEW - SANBRDNO #1 230KV LINE	24	2289 A	154.9%	Add Voltage Support in area	Dispatch down generation
	MNTVIEW - SANBRDNO #1 230KV LINE	MNTVIEW - SANBRDNO #2 230KV LINE	24	2289 A	154.2%	Add Voltage Support in area	Dispatch down generation
	DEVERS - EL CASCO #1 230KV LINE	SANBRDNO – DEVERS #1 230KV LINE	24	796 A	105.3%	Reconductor	
	Gregg - Storey - Wilson 230kV Line, trip Helms #3	BORDEN – GREGG #1 230KV LINE	30	793 A	170.3%	Reconductor	Under Study
	line Borden - Gregg 230kV Line (Ck 1), trip Helms #3	STOREY 1 – GREGG #1 230KV LINE	30	793 A	152.2%	Reconductor	Under Study
	Pittsburg - Delta Energy Center #1 230kV Line	PITSBG D – DEC PTSB #2 230KV LINE	30	1669 A	132.4%	Re-dispatch DEC generation	Under Study
	Pittsburg - Delta Energy Center #2 230kV Line	PITSBG D – DEC PTSB #1 230KV LINE	30	1669 A	132.4%	Re-dispatch DEC generation	Under Study
	Metcalf - Moss Landing #1 500kV Line, DEC 4 Gen offline (L-1/G-1)	WESTLEY – LOSBANOS #1 230KV LINE	30	1700 A	132.0%	Reconductor	Under Study
	Borden - Gregg #1 230kV Line,	STOREY 1 – WILSON #1 230KV	30	851 A	130.6%	Reconductor	Under Study

Low Voltages

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
Case Name_#	Borden - Gregg 230kV Line (Ck 1)	BORDEN 230KV	30	-7.1%	Install Voltage Supports	Under Study
	Borden - Gregg 230kV Line (Ck 1)	STOREY 2 230KV	30	-6.6%	Install Voltage Supports	Under Study
	Gregg - Henrieta - Gates 230kV Line	HENRIETA 230KV	30	-11.5%	Install Voltage Supports	Under Study
	Gregg - Henrieta - Gates 230kV Line	HENRETTA 115KV	30	-9.5%	Install Voltage Supports	Under Study
	Gregg - Henrieta - Gates 230kV Line	LEPRNOFD 115KV	30	-8.0%	Install Voltage Supports	Under Study
	Gregg - Henrieta - Gates 230kV Line	GWF_HEP 115KV	30	-6.1%	Install Voltage Supports	Under Study
	Gregg - Henrieta - Gates 230kV Line	CONTADNA 115KV	30	-5.9%	Install Voltage Supports	Under Study
	Table Mt. - Caribou 230kV Line	BELDENTP 230KV	30	-5.1%	Install Voltage Supports	Under Study
	Rock Creek - Poe 230kV Line	ROCKCK 1 230KV	30	-6.6%	Install Voltage Supports	Under Study
	Rock Creek - Poe 230kV Line	RK C JT1 230KV	30	-6.5%	Install Voltage Supports	Under Study
	Bucks Creek - Cresta 230kV Line	RK C JT2 230KV	30	-5.2%	Install Voltage Supports	Under Study
	Cresta - Rio Oso 230kV Line (ck 1)	RK C JT2 230KV	30	-5.2%	Install Voltage Supports	Under Study
	Poe - Rio Oso 230kV Line (ck 1)	ROCKCK 1 230KV	30	-6.6%	Install Voltage Supports	Under Study
	Poe - Rio Oso 230kV Line (ck 1)	RK C JT1 230KV	30	-6.5%	Install Voltage Supports	Under Study
	Templeton - Morro Bay 230kV Line	TEMPLETN 230KV	30	-8.1%	Install Voltage Supports	Under Study
	Metcalf - Moss Landing 500kV Line, DEC 4 Gen offline	SARATOGA 230KV	30	-5.1%	Install Voltage Supports	Under Study
	Metcalf - Moss Landing 500kV Line, DEC 4 Gen offline	VASONA 230KV	30	-5.1%	Install Voltage Supports	Under Study
	Metcalf - Moss Landing 500kV Line, DEC 4 Gen offline	MONTAVIS 230KV	30	-5.1%	Install Voltage Supports	Under Study
	Metcalf - Moss Landing 500kV Line, DEC 4 Gen offline	HICKS 230KV	30	-5.1%	Install Voltage Supports	Under Study

Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	TALEGA - S.ONOFRE #1&2 230KV LINES	ESCNDIDO – TALEGA #1 230KV LINE	22	114 5A	100 .6%	SPS (controlled load drop)	
	DEVERS - MIRAGE #1&2 230KV LINES	IMPRVLVLY 500/230KV TRAN BANK-1	22	119 4M VA	103 .7%	Install 3rd 500/230 KV trans bank at IV	
	CENTRALS - SYCAMORE #1&2 230KV LINES	IMPRVLVLY – ROA-230 #1 230KV LINE	22	213 4A	117 .9%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230kV lines)	
	CENTRALS - SYCAMORE #1&2 230KV LINES	OTAYMESA – TJI-230 #1 230KV LINE	22	207 1A	101 .4%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230kV lines)	
	MIGUEL - MISSION #1&2 230KV LINES	SYCAMORE 230/138KV TRAN BANK-1	22	477 MV A	105 .1%	Build a new Sycamore-Penasquitos 230KV line	
	S.ONOFRE - SANTIAGO 1&2 230KV LINES	BARRE – ELLIS #1 230KV LINE	24	334 6 A	128 .7%	Possibly Reconductor	LA Basin Units dispatched
	MNTVIEW - SANBRDNO 1&2 230KV LINES	DEVERS – EL CASCO #1 230KV LINE	24	115 0 A	117 .8%	Reconductor	
	MCCULLGH - VICTORVL 1&2 500KV LINES	ELDORDO – PISGAH #1 500KV LINE	24	160 0 A	127 .8%	Upgrade Series Capacitors	
	PARDEE - SAUG TAP 1&2 230KV LINES	PARDEE – SAUG TAP #3 230KV LINE	24	142 6 A	156 .8%	Fourth 230 kV Line or Reconductor	Possibly Loop-In Moorpark-Pardee or Sylmar-Pardee
	PARDEE - SAUG TAP 1&2 230KV LINES	PARDEE – SAUG TAP #2 230KV LINE	24	142 6 A	156 .8%	Fourth 230 kV Line or Reconductor	Possibly Loop-In Moorpark-Pardee or Sylmar-Pardee
	PARDEE - SAUG TAP 1&2 230KV LINES	PARDEE – SAUG TAP #1 230KV LINE	24	142 6 A	156 .8%	Fourth 230 kV Line or Reconductor	Possibly Loop-In Moorpark-Pardee or Sylmar-Pardee
	MNTVIEW - SANBRDNO 1&2 230KV LINES	SANBRDNO – DEVERS #1 230KV LINE	24	796 A	121 .7%	Reconductor	
	VINCENT - LUGO 1&2 500KV LINES	VINCENT – LLANO #1 500KV LINE	24	330 0 A	117 .1%	Build a new Midway - Kramer 500kV line	
	NRTHRDGE - TARZANA 1&3 230KV LINES	HSKLLCYN – SYLMARLA 230KV LINE	26	200 1	111 .4%	Reconductor	
	Bellota-Tesla and Weber-Tesla 230kV lines	BELLOTA - COTTLE B #1 230KV Line	30	793	123 .9%	Re-conductor	Under Study
	Gates – Midway & Los Banos - Midway 500kV lines (w/ RAS)	BORDEN - GREGG #1 230KV Line	30	793	147 .8%	Re-conductor	
	Bellota-Tesla and Weber-Tesla 230kV lines	COTTLE B - WARNERVL #1 230KV Line	30	793	131 .5%	Re-conductor	Under Study
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	EIGHT MI - STAGG #1 230KV Line	30	977	117 .5%	Load growth	Under Study
	Gregg-Herndon #1&2 230kV lines, trip Helms #3	FGRDN T1 - ASHLAN #1 230KV Line	30	851	160 .8%	UVLS to drop loads at Figarden and Ashlan	Under Study
	Gregg-Herndon #1&2 230kV lines, trip Helms #3	FGRDN T2 - ASHLAN #1 230KV Line	30	850	227 .3%	UVLS to drop loads at Figarden and Ashlan	Under Study
	Gregg-Herndon #1&2 230kV lines, trip Helms #3	GREGG - FGRDN T2 #1 230KV Line	30	850	245 .3%	UVLS to drop loads at Figarden and Ashlan	Under Study
	Helm-McCall and Gates-McCall 230kV lines	HENRIETA 230/115KV TranBank-3	30	168	102 .0%	Re-dispatch GWF generation	Under Study
	Gregg-Herndon #1&2 230kV lines, trip Helms #3	HERNDON-FGRDN T1 #1 230KV Line	30	851	135 .6%	UVLS to drop loads at Figarden and Ashlan	Under Study

	Metcalfe - Monta Vista #3 230 kV and Cal MEC - Monta Vista #4 230 kV lines	METCALF-HICKS #1 230KV Line	30	160 0	116 .7%	Load growth	Under Study
	Metcalfe - Moss Landing & Tesla - Metcalfe 500kV lines	METCALF-MOSSLND1 #1 230KV Line	30	174 2	127 .2%	Re-dispatch Moss Landing generation	Under Study
	Metcalfe - Moss Landing & Tesla - Metcalfe 500kV lines	METCALF - MOSSLND2 #1 230KV Line	30	174 2	127 .2%	Re-dispatch Moss Landing generation	Under Study
	Midway - Vincent # 1 & # 2 500kV lines	MIDWAY - WIRLWIND #3 500KV Line	30	350 0	154 .9%	Build a new Midway - Kramer 500kV line	Under Study
	Metcalfe - Monta Vista #3 230 kV and Cal MEC - Monta Vista #4 230 kV lines	MONTAVIS - HICKS #1 230KV Line	30	125 3	114 .1%	Load growth	Under Study
	Metcalfe - Monta Vista #3 230 kV and Cal MEC - Monta Vista #4 230 kV lines	MONTAVIS - SARATOGA #1 230KV Line	30	105 5	110 .8%	Load growth	Under Study
	Colgate - Rio Oso 230kV & Table Mountain - Rio Oso 230kV lines	PALERMO 230/115KV TRAN BANK-2	30	239	125 .1%	Load growth	Under Study
	Bellota-Rancho Seco PP #1 and #2 230kV lines	PROCTER - HEDGE #1 230KV Line	30	925	105 .3%	Load growth	Under Study
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	RIO OSO - ATLANTC #1 230KV Line	30	107 7	105 .8%	Load growth	Under Study
	Metcalfe - Monta Vista #3 230 kV and Cal MEC - Monta Vista #4 230 kV lines	SARATOGA - VASONA #1 230KV Line	30	125 3	121 .0%	Load growth	Under Study
	Gates - Midway & Los Banos - Midway 500kV lines (w/ RAS)	STOREY 1 - GREGG #1 230KV Line	30	793	111 .2%	Re-conductor	Under Study
	Gates - Midway & Los Banos - Midway 500kV lines (w/ RAS)	TEMPLETN - MORROBAY #1 230KV Line	30	975	107 .1%	Re-dispatch Morro Bay generation	Under Study
	Bellota-Rancho Seco PP #1 and #2 230kV lines	TRCY PMP - HURLEY S #2 230KV Line	30	108 0	119 .9%	Load growth	Under Study
	Bellota-Rancho Seco PP #1 and #2 230kV lines	TRCY PMP - HURLEY S #1 230KV Line	30	108 0	117 .1%	Load growth	Under Study
	Cresta - Rio Oso 230kV & Poe - Rio Oso 230kV lines	VSC_PTSB 230/180KV Tran BANK-1	30	450	103 .0%	Re-dispatch Trans Bay Cable	Under Study
	Tesla - Los Banos & Tracy - Los Banos 500kV lines (w/ RAS)	WESTLEY - LOSBANOS #1 230KV Line	30	170 0	156 .7%	Re-conductor	Under Study

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	STAGG-E 230	30	-17.1	Install voltage supports	
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	STAGG-D 230	30	-16.92	Install voltage supports	
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	STAGG-F 230	30	-16.71	Install voltage supports	
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	STAGG-H 230	30	-16.46	Install voltage supports	
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	STAGG 230	30	-16.2	Install voltage supports	
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	EIGHT MI 230	30	-14.89	Install voltage supports	
	Tesla-Stagg and Tesla-Eight Mile 230kV lines	LODI 230	30	-14.57	Install voltage	

					supports	
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7.4 In-State Scenario with CAISO Resource Queue – Southern California Peak with North-to-South Bulk System Flows (B-Q)

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_1	Corcoran 115/70 kV transformer #2	30	21 MVA	111%	Load growth	
B2 Q_2	Borden - Gregg 230 kV line #1	30	717 Amp	106%	Reconductor	
B2 Q_3	Tesla - AEC Tap1 115 kV line #1	30	665 Amp	106%	Load growth	Turn on GWF Tracy
B2 Q_4	Arco 230/70 kV transformer #2	30	139 MVA	104%	Load growth	
B2 Q_5	IMPRVLVLY 500-CENTRALS 500 ckt #1	22	1000 MW	130.7	WECC Path Rating for Sunrise is 1000MW, need new transmission to deliver generation out of IV area	
B2 Q_6	GRANITE 69-GRANITTP 69 ckt #1	22	815.82 Amps	102.46		Can be mitigated by dispatching peaker units in the area (13 MW)
B2 Q_7	MLMS3TAP 230-SY230 230 ckt #1	22	2289.32 Amps	104.85		Can be mitigated by dispatching peaker units (40 MW)
B2 Q_8	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	104.47		Can be mitigated by dispatching peaker units in the area (91 MW)
B2 Q_9	POWAY 69-R.CARMEL 69 ckt #1	22	811.64 Amps	104.73		Can be mitigated by dispatching peaker units in the area (91 MW)
B2 Q_10	SYCAMORE 69-SCRIPPS 69 ckt #1	22	1338.78 Amps	101.68		Can be mitigated by dispatching peaker units in the area (78 MW)
B2 Q_11	SYCAMORE 230-SYCAMORE 138 ckt #1	22	392 MVA	120.56	1) can be mitigated by limiting flow on Sunrise to 1000MW (need new transmission to deliver generation out of IV area) or 2) upgrade local system	

Emergency Conditions (N-1)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_12	(N-2)Lonetree - Cayetano 230 kV and Cayetano - North Dublin 230 kV lines	30720 SARATOGA 230kV to 30733 VASONA 230kV ckt #1	30	1253.1	103.76		
B2 Q_13	(N-2)Lonetree - Cayetano 230 kV and Cayetano - North Dublin 230 kV lines	30730 HICKS 230kV to 30735 METCALF 230kV ckt #1	30	1600.01	100.6		
B2 Q_14	(L-1)BORDEN - GREGG 230.00 kV line with SPS to Drop Helms #3	30796 STOREY 1 230kV to 30810 GREGG 230kV ckt #1	30	793.23	100.65	Reconductor	
B2 Q_15	(L-1)WILSON - GREGG 230.00 kV line with SPS to Drop Helms #3	30805 BORDEN 230kV to 30810 GREGG 230kV ckt #1	30	793.23	115.83	Reconductor	
B2 Q_16	(L-1,G-1)WILSON - GREGG 230.00 kV line & Drop Helms #3 & Trip MELONE1	30805 BORDEN 230kV to 30810 GREGG 230kV ckt #1	30	793.23	121.98	Reconductor	
B2 Q_17	(N-2)Dixon Landing - McKee 115 kV and Milpitas - Swift 115 kV	30915 MORROBAY 230kV to 36252 MORROBY 115kV ckt #6	30	269	138.24		
B2 Q_18	(L-1) HUMB_BS3 - HMBLT BY 60kV line	31080 HUMBOLDT 60kV to 31088 HMBLT JT 60kV ckt #2	30	346.41	131.15		
B2 Q_19	(L-1) HUMB_BS3 - HMBLT BY 60kV line	31086 EUREKA 60kV to 31090 HMBLT BY 60kV ckt #1	30	413.77	103.56		
B2 Q_20	(L-1) HUMBOLDT - FAIRHAVN 60kV line	31102 NEWBURG 60kV to 31105 RIODLLTP 60kV ckt #1	30	375.28	140.71		
B2 Q_21	(L-1) ORICK - ESSX JCT 60kV line	31104 CARLOTTA 60kV to 31105 RIODLLTP 60kV ckt #1	30	375.28	141.58		
B2 Q_22	(L-1) ORICK - ESSX JCT 60kV line	31104 CARLOTTA 60kV to 31108 SWNS FLT 60kV ckt #1	30	375.28	137.26		
B2 Q_23	(L-1) ORICK - ESSX JCT 60kV line	31108 SWNS FLT 60kV to 31110 BRDGVLL 60kV ckt #1	30	375.28	136.88		
B2 Q_24	EA60 "EA BK60 230/138 " "T-1" "B"	CHCARITA 138-SYCAMORE 138 ckt #1	22	853.89 Amps	121.37		Can be mitigated by turing on Encina generation
B2 Q_25	TL00632 "TL0632 MIGUEL-GRANITE-LOS COCHES ck 1" "N-1" "B"	EL CAJON 69-LOSCOCHS 69 ckt #1	22	594.09 Amps	123.88		Can be mitigated by disptaching peaker units in the area
B2 Q_26	TL23013 "TL23013 PENSQTOS-OLD TOWN ck 1" "N-1" "B"	FRIARS 138-DOUBLTTP 138 ckt #1	22	630.9 Amps	100.14		Can be mitigated by limiting flow on Sunrise to 1000MW
B2 Q_27	TL00663 "TL0663 KEARNY - MISSION ck 1" "N-1" "B"	MESAHGTS 69-MISSION 69 ckt #1	22	1146.33 Amps	101.16		Can be mitigated by dispatching peaker units in the area
B2 Q_28	ML80 "ML BK 80 230/500 ck 1 *assoc SPS" "T-1" "B"	MIGUEL 500-MIGUEL 230 ckt #2	22	1344 MVA	111.17	SPS to trip generation at IV is not enough to mitigate	

						overload, need new transmission to deliver generation out of IV area	
B2 Q_29	ML81 "ML BK 81 230/500 ck 2 *assoc SPS" "T-1" "B"	MIGUEL 500-MIGUELMP 500 ckt #1	22	1329 MVA	113.9	SPS to trip generation at IV is not enough to mitigate overload, need new transmission to deliver generation out of IV area	
B2 Q_30	TL00676 "TL0676 MESAHGTS-MISSION ck 1" "N-1" "B"	MISSION 69-CLAIRMNT 69 ckt #1	22	420.88 Amps	100.97		Can be mitigated by dispatching peaker units in the area
B2 Q_31	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	MONTGYTP 69-SOUTHBAY 69 ckt #1	22	1422.46 Amps	104.34		
B2 Q_32	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	MONTGYTP 69-SWEETWTR 69 ckt #1	22	1422.46 Amps	135.14	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV	
B2 Q_33	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	NATNLCTY 69-MAIN ST 69 ckt #1	22	841.76 Amps	107.44	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV	
B2 Q_34	TL23051 "TL23051 SYCAMORE-PEN ck 1" "N-1" "B"	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	132.52	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV	
B2 Q_35	TL06916 "TL06916 SYCAMORE-SCRIPPS ck 1" "N-1" "B"	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	119.76	1) need new transmission to deliver generation out of IV area or 2) upgrade local system	

B2 Q_36	TL06915 "TL06915 POMERADO-SYCAMORE ck 1 *assoc SPS" "N-1" "B"	POMERADO 69-SYCAMORE 69 ckt #2	22	1673.48 Amps	102.66	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2 Q_37	TL06924 "TL06924 POMERADO-SYCAMORE ck 2 *assoc SPS" "N-1" "B"	POMERADO 69-SYCAMORE 69 ckt #1	22	1673.48 Amps	102.54	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2 Q_38	TL06920 "TL06920 ARTESN-SYCAMORE ck 1 " "N-1" "B"	POWAY 69-R.CARMEL 69 ckt #1	22	953.88 Amps	116.45	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2 Q_39	TL06920 "TL06920 ARTESN-SYCAMORE ck 1 " "N-1" "B"	R.CARMEL 69-BERNARDO 69 ckt #1	22	568.98 Amps	106.6	1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2 Q_40	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-SOUTHBAY 69 ckt #1	22	1196.54 Amps	111.81	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
B2 Q_41	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-SWTWTRTP 69 ckt #1	22	1798.99 Amps	122.97	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
B2 Q_42	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWTWTRTP 69-NATNLCTY 69 ckt #1	22	854.31 Amps	106.95	caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
B2 Q_43	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SY230 230-SOUTHBAY 69 ckt #1	22	285 MVA	100.69	1) need new transmission to deliver

						generation out of IV area or 2) upgrade local system	
B2 Q_44	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SY230 230-SOUTHBAY 69 ckt #2	22	285 MVA	100.69	1) need new transmission to deliver generation out of IV area or 2) upgrade local system	
B2 Q_45	TL23051 "TL23051 SYCAMORE-PEN ck 1" "N-1" "B"	SYCAMORE 138-CHCARITA 138 ckt #1	22	853.89 Amps	113.66	1) need new transmission to deliver generation out of IV area or 2) upgrade local system	
B2 Q_46	SX60 "SX BK 60 230/138" "T-1" "B"	SYCAMORE 69-SCRIPPS 69 ckt #1	22	1338.78 Amps	114.22	1) need new transmission to deliver generation out of IV area or 2) upgrade local system	
B2 Q_47	TL23051 "TL23051 SYCAMORE-PEN ck 1" "N-1" "B"	SYCAMORE 230-SYCAMORE 138 ckt #1	22	477 MVA	116.11	1) need new transmission to deliver generation out of IV area or 2) upgrade local system	
B2 Q_48	IV-Wndfarms N-1	ROA-230 230.0 IMPRLVLY 230.0 #1	22	2134 Amps	111.94	Revised the existing SPS to trip more generation in IV area or reconfigure the system to loop-in the Sunrise to WNDFARM	
B2 Q_49	Sunrise N-1	ROA-230 230.0 IMPRLVLY 230.0 #1	22	2134 Amps	113.47	Revised the existing SPS to trip more generation in IV area or reconfigure the system to loop-in the Sunrise to WNDFARM	
B2 Q_50	OPEN LINE "BARRE 230.00" "LEWIS 230.00" "1" 1	VILLA PK - BARRE 230kV #1	SC E	3750.27 Amps	103.21		Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_51	OPEN LINE "BARRE 230.00" "VILLA PK 230.00" "1" 1	LEWIS - BARRE 230kV #1	SC E	3750.27 Amps	114.03		Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_52	OPEN LINE "ALBERHL5 500.00" "VALLEYSC 500.00" "1" 1	DEVERS - SANBRDNO 230kV #1	SC E	795.74 Amps	127.62	Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study	
B2	OPEN LINE "ALBERHL5 500.00"	EL CASCO - DEVERS	SC	1149	129.22	Can be mitigated	

Q_53	"VALLEYS 500.00" "1" 1	230kV #1	E	.68 Amps		by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study	
B2 Q_54	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "2" 1	SERRANO - VILLA PK 230kV #1	SC E	3810 .51 Amps	105.84		Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_55	OPEN LINE "KRAMER 500.00" "LLANO 500.00" "1" 1	KRAMER - LUGO 230kV #1	SC E	1669 .3 Amps	104.15	Build a new Kramer-Midway 500kV or Kramer-Whirlwind 500kV	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
B2 Q_56	OPEN LINE "KRAMER 500.00" "LLANO 500.00" "1" 1	KRAMER - LUGO 230kV #2	SC E	1669 .3 Amps	104.15	Build a new Kramer-Midway 500kV or Kramer-Whirlwind 500kV	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
B2 Q_57	OPEN LINE "OLYMPIC 230.00" "TARZANA 230.00" "1" 1	TARZANA - OLYMPIC 138kV #1	LAD WP	1200 .72 Amps	104.23	Upgrade TARZANA-OLYMPIC circuit from 138kV to 230 kV	Increase the phase shifter angle of the Scattergd 230/138 kV from 4 degree to 5 degree.

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_62	(L-1) LOCKFORD - BELLOTA 230kV line	LOCKFORD 230	30	6.21	Load growth	
B2 Q_63	(G-1)MEC outage	NRS 230	30	7.33		
B2 Q_66	OPEN LINE "VIEJOSC 230.00" "S.ONOFRE 230.00" "1" 1	VIEJOSC 230kV	SCE	-7.18	Shunt Cap	

Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_67	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Metcalf - Moss Landing 230 kV line #2	30	1745 Amps	100%	Existing Metcalf SPS will drop load	Gen readjustment between contingencies
B2 Q_68	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Metcalf - Moss Landing 230 kV line #1	30	1745 Amps	100%	Existing Metcalf SPS will drop load	Gen readjustment between contingencies
B2 Q_69	6924/6915 "POM-SX #1+#2 69KV *assoc SPS" "N-2" "C"	ARTESN 69-SYCAMORE 69 ckt #1	22	1079.39 Amps	100.34		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_70	23011/23003 "SA-EA 230KV + SA-ES-EA 230KV" "N-2" "C"	CHCARITA 138-SYCAMORE 138 ckt #1	22	853.89 Amps	113.32		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_71	661/664 "TL661 & TL664 69KV " "N-2" "C"	CLAIRMNT 69-MISSION 69 ckt #1	22	420.88 Amps	106.54		N-2 overload, can be mitigated by dropping load
B2 Q_72	643/627 "ML-JM 1 + 2 69KV" "N-2" "C"	EL CAJON 69-LOSCOCHS 69 ckt #1	22	594.09 Amps	104.94		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_73	23051B/230XX "PEN-ES #1+ PEN-ES #2 230KV" "N-2" "C"	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	170.07		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_74	23051A/6920B "SX-PEN 230KV + AR-SX 69KV" "N-2" "C"	POWAY 69-R.CARMEL 69 ckt #1	22	953.88 Amps	138.94		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_75	6924/6915 "POM-SX #1+#2 69KV *assoc SPS" "N-2" "C"	R.CARMEL 69-BERNARDO 69 ckt #1	22	568.98 Amps	158.75		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_76	ML61/TL632 "LC-ML61-TC 138kv + ML-LC 69kv v1" "N-2" "C"	SANTEE 138-SYCAMORE 138 ckt #1	22	1146.33 Amps	101.73		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_77	6906/675 "MR-PQ 69KV + PQ-MRM 69KV" "N-2" "C"	SCRIPPS 69-SYCAMORE 69 ckt #1	22	1338.78 Amps	120.72		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_78	23051A/6920B "SX-PEN 230KV + AR-SX 69KV" "N-2" "C"	SYCAMORE 138-CHCARITA 138 ckt #1	22	853.89 Amps	115.9		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_79	23051A/6920B "SX-PEN 230KV + AR-SX 69KV" "N-2" "C"	SYCAMORE 69-SCRIPPS 69 ckt #1	22	1338.78 Amps	118.72		N-2 overload, can be mitigated by dropping load or

				s			upgrading the local system
B2 Q_80	ML61/13809 "PV-TC + LC-SY 138kV v1" "N-2" "C"	SYCAMORE 230-SYCAMORE 138 ckt #1	22	477 MVA	120.56		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_81	23022/23023 "ML-MS 230 kV #1 *assoc SPS" "N-2" "C"	TELECYN 138-GRNT HLL 138 ckt #1	22	1142 .15 Amps	118.49		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2 Q_82	OPEN LINE "ELLIS 230.00" "SANTIAGO 230.00" "1" JOHANNA 230.00" "SANTIAGO 230.00" "1"	ELLIS - BARRE 230kV #1	SC E	3346 .12 Amps	101.96	Reconductor	Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_83	OPEN LINE "LAGUBELL 230.00" "RIOHONDO 230.00" "1" GOODRICH 230.00" "LAGUBELL 230.00" "1"	CENTER S - DELAMO 230kV #1	SC E	2480 .1 Amps	103.34	Reconductor	Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_84	OPEN LINE "LITEHIPE 230.00" "MESA CAL 230.00" "1" MESA CAL 230.00" "REDONDO 230.00" "1"	DELAMO - CENTER S 230kV #1	SC E	2480 .1 Amps	102.33	Reconductor	Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_85	OPEN LINE "LEWIS 230.00" "SERRANO 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "2"	VILLA PK - LEWIS 230kV #1	SC E	2540 .34 Amps	124.1	Reconductor	Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_86	OPEN LINE "DEVERS 500.00" "VALLEYSC 500.00" "1" DEVERS 500.00" "VALLEYSC 500.00" "2"	DEVERS - SANBRDNO 230kV #1	SC E	795.74 Amps	156.38		Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study
B2 Q_87	OPEN LINE "DEVERS 500.00" "VALLEYSC 500.00" "1" DEVERS 500.00" "VALLEYSC 500.00" "2"	EL CASCO - DEVERS 230kV #1	SC E	1149 .68 Amps	150.99		Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study
B2 Q_88	OPEN LINE "DEVERS 500.00" "VALLEYSC 500.00" "1" DEVERS 500.00" "VALLEYSC 500.00" "2"	VSTA - DEVERS 230kV #2	SC E	1240 .05 Amps	119.96		Can be mitigated by West of Devers upgrade that has been identified as deliverability upgrade in ISO's LGIP study
B2 Q_89	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "1"	SERRANO - VILLA PK 230kV #2	SC E	4048 .98 Amps	122.01		Can be mitigated by turn on local capacity in Western LA Basin
B2 Q_90	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "2" LEWIS	SERRANO - VILLA PK 230kV #1	SC E	3810 .51	129.65		Can be mitigated by turn on local

	230.00" "SERRANO 230.00" "1"			Amps			capacity in Western LA Basin
B2 Q_91	OPEN LINE "KRAMER 230.00" "INYOKERN 230.00" "1" KRAMER 230.00" "TOT254LP 230.00" "1"	INYOKERN - KRAMER 230kV #2	SC E	1674.32 Amps	117.92	Upgrade north of Inyokern transmission lines	Caused by North of Lugo renewable generation,SPS of tripping North of Inyokern
B2 Q_92	OPEN LINE "KRAMER 230.00" "INYOKERN 230.00" "2" KRAMER 230.00" "TOT254LP 230.00" "1"	INYOKERN - KRAMER 230kV #1	SC E	1674.32 Amps	117.92	Upgrade north of Inyokern transmission lines	Caused by North of Lugo renewable generation, SPS of tripping North of Inyokern generation
B2 Q_93	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" KRAMER 230.00" "LUGO 230.00" "2"	KRAMER 500/230kV #1	SC E	1230 MVA	115.61	Additional Transformer Bank	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
B2 Q_94	OPEN LINE "VINCENT 500.00" "LLANO 500.00" "1" LUGO 500.00" "LLANO 500.00" "1"	KRAMER - LUGO 230kV #1	SC E	1669.3 Amps	103.61	Kramer-Midway 500kV or Kramer-Whirlwind 500kV	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
B2 Q_95	OPEN LINE "VINCENT 500.00" "LLANO 500.00" "1" LUGO 500.00" "LLANO 500.00" "1"	KRAMER - LUGO 230kV #2	SC E	1669.3 Amps	103.61	Kramer-Midway 500kV or Kramer-Whirlwind 500kV	Caused by North of Lugo renewable generation, but can be mitigated by revising the existing SPS of tripping North of Lugo generation
B2 Q_101	OPEN LINE "BARRENDR 230.00" "HSKLLCYN 230.00" "2" BARRENDR 230.00" "HSKLLCYN 230.00" "3"	BARRENDR - HSKLLCYN 230kV #1	LAD WP	2103.56 Amps	127.18	Construct BARRENDR - HSKLLCYN #4	Trip BCON18G and LASOLAR5
B2 Q_102	OPEN LINE "COACHELV 230.00" "RAMON 230.00" "2" COACHELV 230.00" "MIRAGE 230.00" "2"	COACHELV 92kV to COACHELV 230kV ckt #1	IID	150(MVA)	138.83		
B2 Q_103	OPEN LINE "COACHELV 230.00" "RAMON 230.00" "2" COACHELV 230.00" "MIRAGE 230.00" "2"	COACHELV 92kV to COACHELV 230kV ckt #2	IID	150(MVA)	138.83		
B2 Q_104	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BA3258 161kV to AVE58 161kV ckt #1	IID	591.69(Amps)	136.63		
B2 Q_105	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANI161 161kV to BA3258 161kV ckt #1	IID	591.69(Amps)	150.37		
B2 Q_106	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANI161 161kV to BANIS230 230kV ckt #1	IID	225(MVA)	104.95		
B2 Q_107	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1"	BA3258 161kV to AVE58 161kV ckt #1	IID	591.69(A)	131.27		

Comment [SC1]: Local Issue: Upgrade Terminal Deleted: Eldorado-Pisgah Wrong series cap rating (2320 Amps emergency)

	MI46COCH 230.00" "MIDWAY X 230.00" "1"			mps)			
B2 Q_108	OPEN LINE "IMPRVLY 230.00" "IIDIVSUB 230.00" "1" IMPRVLVY 230.00" "IIDIVSUB 230.00" "2"	PILOTKNB 161kV to PILOTKNB 92kV ckt #1	IID	75(M VA)	102.27		
B2 Q_109	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANIS230 230kV to ELCENTRO 230kV ckt #1	IID	1641 .68(A mps)	102.22		

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_110	(N-2)Newark-Northern Nos. 1 & 2 115 kV lines	TEMPLETN 230	30	0.96		Under investigation, possible case divergence
B2 Q_111	(N-2)McKee - Piercy 115 kV and Milpitas - Swift 115 kV	MESA PGE 230	30	0.91		Under investigation, possible case divergence
B2 Q_115	OPEN LINE "ELLIS 230.00" "SANTIAGO 230.00" "1" JOHANNA 230.00" "SANTIAGO 230.00" "1"	JOHANNA 230kV	SCE	0.89619	Turn on generators in Western LA Basin to provide reactive support	
B2 Q_116	OPEN LINE "S.ONOFRE 230.00" "SANTIAGO 230.00" "1" VIEJOSC 230.00" "S.ONOFRE 230.00" "1"	VIEJOSC 230kV	SCE	0.88979		
B2 Q_117	OPEN LINE "S.ONOFRE 230.00" "SANTIAGO 230.00" "2" VIEJOSC 230.00" "S.ONOFRE 230.00" "1"	VIEJOSC 230kV	SCE	0.88979		
B2 Q_118	OPEN LINE "S.ONOFRE 230.00" "SERRANO 230.00" "1" VIEJOSC 230.00" "S.ONOFRE 230.00" "1"	VIEJOSC 230kV	SCE	0.89847		
B2 Q_127	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL 92	21	0.86309		

Comment [SC2]: Goleta: Local Issue

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_128	C3 (L-2): Los Banos - Tesla and Los Banos - Tracy 500 kV lines	Gualala 60 kV	30	-11%		Under investigation, possible case divergence
B2 Q_129	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Gualala 60 kV	30	-11%		Under investigation, possible case divergence
B2 Q_130	(N-2)Newark-Northern Nos. 1 & 2 115 kV lines	TEMPLETN 230	30	5.39		Under investigation, possible case divergence
B2 Q_131	(N-2)McKee - Piercy 115 kV and Milpitas - Swift 115 kV	MESA PGE 230	30	12.44		Under investigation, possible case divergence
B2	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL	HOLTVILL	21	-13.24		

Q_132	92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	92				
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Diverged Cases

ID	Contingency	Area	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2 Q_133	TL230MMx "TL230MM SY230-OTAYMESA " "N-1" "B"	22	can be mitigated by dispatching internal SDG&E generation	
B2 Q_134	23041/42A "OMGP-ML #1+#2 230kV" "N-2" "C"	22	can be mitigated by dispatching internal SDG&E generation	
B2 Q_135	Miguel - WINDFARMS 500 kV N-1	22	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines out of IV area	
B2 Q_136	Sunrise and SWPL 500 kV lines N-2	22		
B2 Q_137	SONGS G-1	22		
B2 Q_138	SONGS G-2	22	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)	
B2 Q_139	OPEN LINE "BARRE 230.00" "ELLIS 230.00" "1" DELAMO 230.00" "ELLIS 230.00" "1"	24	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)	
B2 Q_140	OPEN LINE "BARRE 230.00" "VILLA PK 230.00" "1" BARRE 230.00" "LEWIS 230.00" "1"	24	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)	
B2 Q_141	OPEN LINE "DEVERS 230.00" "MIRAGE 230.00" "1" DEVERS 230.00" "MIRAGE 230.00" "2"	24	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)	
B2 Q_143	SONGS G-1	24	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)	
B2 Q_144	SONGS G-2	24	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)	
B2 Q_145	OPEN LINE "ANTELOPE 500.00" "WINDHUB 500.00" "1" WINDHUB 500.00" "WIRLWIND 500.00" "1"	24	Antelope-Windhub 500kV #2 or Whirlwind-Windhub 500kV #2	
B2 Q_147	J. HINDS - EAGLE MOUNTAIN 230kV No. 1 with SPS	24		
B2 Q_149	IVANPAH - PRIMM 230kV No. 1 with SPS	24	Second Ivanpah-Primm or additional Ivanpah-Eldorado 230 kV	

1.3.2 Transient Stability Analysis Result Templates:

ID	Category	Switching File	Substation	Bus Type	Area	Voltage Dip (%)	Min. Frequency (Hz)	Mitigation
B2 Q_152	C	Lugo-MiraLoma-N-2			24	Undamped oscillation		The transmission upgrades for mitigating thermal and voltage violations may help to mitigate the undamped oscillation. Will be further investigated.
B2 Q_153	C	Lugo-Pisgah Mohave-dlo			24	Undamped oscillation		
B2 Q_154	B	Lugo-Victorville-slo			24	Undamped oscillation		
B2 Q_155	C	Lugo-Vincent-dlo			24	Undamped oscillation		
B2 Q_156	C	Midway - Vincent-dlo-RAS			24	Undamped oscillation		
B2 Q_157	C	SONG S-Santiago-RAS	Johanna 66kV	Load	24	24.6		Can be mitigated by dispatch more Western LA Basin generators
B2 Q_158	B	Adelanto-Victorville-slo			LAD WP	Undamped oscillation		
B2 Q_159	C	Adelanto-Victorville-dlo			LAD WP	Undamped oscillation		
B2 Q_160	B	Lugo-Victorville-slo			LAD WP	Undamped oscillation		
B2 Q_161	C	McCullough-Victorville-dlo			LAD WP	Undamped oscillation		

7.5 In-State Scenario with CAISO Resource Queue – Once Through Cooling generator retirement assumptions

Normal Conditions (N-0):

Thermal Overloads

Overloaded Facilities	Area	Rating	Loading (%)			Transmission Upgrade Mitigating Criteria Violation
			OTC-A	OTC-B	OTC-AS	
ARCO 230/70KV TRANS BANK #2	PG&E	134	112.3%	<	112.8%	Load Growth

		MVA		100.0%		
BORDEN – GREGG #1 230KV LINE	PG&E	675 A	104.5%	< 100.0%	109.2%	Reconductor
WESTLEY–LOSBANOS 230KV LINE	PG&E	1484 A	104.1%	<100%	107.2%	Reconductor
CARMICAL 230/69KV BANK #1	SMUD	224 MVA	100.9%	< 100.0%	100.9%	Load Growth
ORANGEVL 230/69KV BANK #1	SMUD	224 MVA	100.6%	< 100.0%	100.7%	Load Growth
PISGAH – LUGO #1 500KV LINE	SCE	1900 A	134.2%	132.5%	140.2%	Pisgah – Mira Loma 500kV line
LUGO – BARSTOW #1 500KV LINE	SCE	1900 A	105.5%	106.2%	109.1%	Not identified
VINCENT 500/230KV BANK #4	SCE	1120 MVA	< 100.0%	110.2%	< 100.0%	Not identified
VINCENT 500/230KV BANK #3	SCE	1120 MVA	< 100.0%	105.5%	< 100.0%	Not identified
BARRE – LEWIS #1 230KV LINE	SCE	3000 A	103.2%	119.7%	104.6%	SCE's planned upgrades to the 230 kV Barre-Ellis line
BARRE – ELLIS #1 230KV LINE	SCE	2480 A	<100.0%	101.3%	<100.0%	SCE's planned upgrades to the 230 kV Barre-Ellis line
INYO 230/115kV BANK #1	SCE	50 MVA	107.9%	111.3%	108.2%	Install 3 rd 230/115kV transformer bank
INYO 230/115kV BANK #2	SCE	50 MVA	107.9%	111.3%	108.2%	Install 3 rd 230/115kV transformer bank
OLYMPIC–TARZANA 230KV LINE	LADWP	959 A	121.1%	132.4%	121.9%	Reconductor

Low Voltages

ID	Substation	Area	Steady State Voltage (p.u.)	Transmission Upgrade Mitigating Criteria Violation
OTC-B	CHEVMAIN 230kV	SCE	0.927	Install voltage supports in southern Ca
OTC-B	EL NIDO 230kV	SCE	0.927	Install voltage supports in southern Ca
OTC-B	ELSEGNDO 230kV	SCE	0.927	Install voltage supports in southern Ca
OTC-B	LEWIS 230kV	SCE	0.927	Install voltage supports in southern Ca
OTC-B	BARRE 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	REDONDO 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	ALMITOSW 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	LCIENEGA 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	ALMITOSE 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	LA FRESA 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	VILLA PK 230kV	SCE	0.928	Install voltage supports in southern Ca
OTC-B	ELLIS 230kV	SCE	0.929	Install voltage supports in southern Ca
OTC-B	HUNT BCH1 230kV	SCE	0.929	Install voltage supports in southern Ca
OTC-B	HUNTGBCH 230kV	SCE	0.929	Install voltage supports in southern Ca
OTC-B	GOODRICH 230kV	SCE	0.930	Install voltage supports in southern Ca
OTC-B	CENTER S 230kV	SCE	0.930	Install voltage supports in southern Ca
OTC-B	DELAGO 230kV	SCE	0.930	Install voltage supports in southern Ca
OTC-B	SERRANO 230kV	SCE	0.931	Install voltage supports in southern Ca
OTC-B	LITEHIPE 230kV	SCE	0.932	Install voltage supports in southern Ca
OTC-B	MESA CAL 230kV	SCE	0.933	Install voltage supports in southern Ca
OTC-B	LAGUBELL 230kV	SCE	0.933	Install voltage supports in southern Ca
OTC-B	GOULD 230kV	SCE	0.934	Install voltage supports in southern Ca
OTC-B	JOHANNA 230kV	SCE	0.934	Install voltage supports in southern Ca
OTC-B	RIOHONDO 230kV	SCE	0.934	Install voltage supports in southern Ca
OTC-B	EAGLROCK 230kV	SCE	0.936	Install voltage supports in southern Ca
OTC-B	LBEACH 230kV	SCE	0.939	Install voltage supports in southern Ca
OTC-B	HARBOR 230kV	SCE	0.940	Install voltage supports in southern Ca
OTC-B	HINSON 230kV	SCE	0.940	Install voltage supports in southern Ca
OTC-B	OLINDA 230kV	SCE	0.942	Install voltage supports in southern Ca
OTC-B	ARCO SC 230kV	SCE	0.942	Install voltage supports in southern Ca
OTC-B	SANTIAGO 230kV	SCE	0.945	Install voltage supports in southern Ca
OTC-B	MIDWAY X 230kV	IID	0.946	Install voltage supports in southern Ca
OTC-B	HIGHLINE 230kV	IID	0.947	Install voltage supports in southern Ca
OTC-B	SS6-230 230kV	IID	0.949	Install voltage supports in southern Ca

Emergency Conditions (N-1)

Thermal Overloads

Power flow study results for Case OTC-A show no emergency thermal overload in northern California for the single contingencies studied.

Voltage Deviations

Post Transient power flow study results show higher than 5% voltage deviation at various 115 kV and 230 kV buses in the Central Coast area for loss of a single facility (Category "B" contingency) that would not meet WECC voltage criteria.

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation
OTC-A	Moss Landing 500/230kV transformer bank	Central Coast Division	PG&E	VD > 5%	Voltage supports
OTC-AS	Tesla – Metcalf 500kV line	Central Coast Division	PG&E	VD > 5%	Voltage supports
OTC-AS	Los Banos – Moss Landing 500kV line	Central Coast Division	PG&E	VD > 5%	Voltage supports
OTC-AS	Moss Landing 500/230kV transformer bank	Central Coast Division	PG&E	VD > 5%	Voltage supports

Divergent Cases

Two single contingencies in northern California would potentially result in divergence in Case OTC-AS. They are the loss of the Tesla – Metcalf 500kV line with the Delta Energy Center offline (L-1/G-1), and the loss of the Metcalf – Moss Landing 500kV line with the Delta Energy Center offline (L-1/G-1). These L-1/G-1 contingencies would cause voltage collapse in the San Francisco Bay area. Power flow study results also show that Case OTC-B would diverge for various 500kV or 230kV single contingencies (have no power flow solution) due to potential voltage collapse in southern California.

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
OTC-AS	Tesla - Metcalf 500kV Line and DEC offline	Install Voltage supports in the SF Bay area	Build Collinsville 500kV Substation looped into the Vaca Dixon – Tesla 500kV line
OTC-AS	Metcalf – Moss Landing 500kV Line and DEC offline	Install Voltage supports in the SF Bay area	Build Collinsville 500kV Substation looped into the Vaca Dixon – Tesla 500kV line
OTC-B	Various 500 or 230 kV single line outage in southern California	Replace OTC units and build transmission upgrades in southern Ca	

Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation
OTC -A	Gates – Midway 500kV line and Los Banos – Midway 500kV line	Gates - Midway 230kV line	PG&E	941 A	122.4%	Reconductor
OTC -A	Gates – Midway 500kV line and Los Banos – Midway 500kV line	Arco – Midway 230kV line	PG&E	941 A	117.3%	Reconductor
OTC -A	Table Mt – Tesla & Table Mt – Vaca Dixon 500kV lines	Westley – Los Banos 230kV line	PG&E	1700 A	106.5%	Reconductor
OTC -AS	Round Mt. – Table Mt. #1 & #2 500kV lines; Open Round Mt. 500/230kV bank	CPVSTA-CORTINA 230KV LINE	PG&E	954 A	104.8%	Reconductor
		CPVSTA – CORTINA 230KV LINE	PG&E	954 A	104.1%	Reconductor
OTC -AS	Table Mt. – Tesla and Table Mt. – Vaca Dixon 500kV lines	PITSBG D – VSC_PTSB 230/180KV BANK	PG&E	450 MVA	100.6%	Redispatch Trans Bay DC Cable
OTC -AS	Gates – Midway 500kV line and Los Banos – Midway 500kV line (w/RAS)	Gates – Midway 230kV line	PG&E	941 A	120.1%	Reconductor
		Arco – Midway 230kV line	PG&E	941 A	116.0%	Reconductor

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation
OTC-AS	Gates – Midway 500kV line and Los Banos – Midway 500kV line (w/RAS)	Various Substations in Los Padre Division	PG&E	>10%	Voltage supports

Divergent Cases

Power flow study results show that Case OTC-B would diverge for various 500kV or 230kV double-line outages (have no power flow solution) due to potential voltage collapse in southern California.

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
OTC-B	Various 500 and 230 kV double-line outages in southern California	Replace OTC units and build transmission upgrades in southern California	

1.3.2 Transient Stability Analysis Results

The system is stable and damped for the contingencies studied in Case OTC-A and OTC-AS that included additional voltage supports in the Bay area. The transient voltage dip and minimum frequency also meet WECC disturbance performance criteria.

7.6 In-State Scenario with CAISO Resource Queue – Southern California Peak with CO₂ Sensitivity

Normal Conditions (N-0):

N-0 Contingency:	Overload equipment						Desert Southwest	Possible Mitigat Re-conductor
	FROM BUS	KV	TO BUS	KV	ID	AREA	Percent Loading	
	BORDEN	230	GREGG	230	#1	30	100.20%	

Low Voltages: None with above indicated upgrades

Emergency Conditions (N-1 & N-2)

Thermal Overloads

N-1	Overload equipment				
	FROM BUS	KV	TO BUS		
Contingency:					
IMPRVLY-CENTRALX 500 1	IMPRVLY	230	ROA-230		
MIGUEL 230-MIGUEL 500 2	MIGUEL	230	MIGUELMP		
MIGUEL 230-MIGUEL 500 1	MIGUEL	230	MIGUEL		
IMPRVLY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	CENTRALS	230	SYCAMORE		
IMPRVLY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	CENTRALS	230	SYCAMORE		
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	OTAYMESA	230	TJI-230		
OTAYMESA-SO BAY 230 1	SYCAMORE	230	MLSXTAP		
CENTRALX 230-CENTRLMP 1	CENTRALS	230	CENTRMPS		
CENTRALX 230-CENTRLMP 2	CENTRALS	230	CENTRMPS		
N.GILA-IMPRVLY 500 ck 1	JHINDSCE	230	MIRAGE		

N-2	Overload equipment				
	FROM BUS	KV	TO BUS		
Contingency:					
Redbluff-DEVERS 500 1&2	JHINDSCE	230	MIRAGE		
TALEGA-S.ONOFRE 230 1&2	ESCNDIDO	230	TALEGA		

Voltage Deviations

Voltage Deviations				Voltage Drop Violations				
Contingency	Bus Number	Bus Name	Area					
IMPRVLY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	22738	CENTRALS230.	22					
IMPRVLY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	22743	CENTRMPS500.	22					
IMPRVLY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	22737	CENTRALS500.	22					
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22738	CENTRALS230.	22					
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22743	CENTRMPS500.	22					
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22737	CENTRALS500.	22					
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22832	SYCAMORE230.	22					
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22738	CENTRALS230.	22					
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22743	CENTRMPS500.	22					
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22832	SYCAMORE230.	22					
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22468	MIGUEL 500.	22					

Divergent Cases

Contingency
ECO-MIGUEL SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)
ECO-MIGUEL SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)
IV-ECO & IV-CENTRAL SPS6.1(Transfer trip of IV Gen)
IV-ECO & IV-CENTRAL SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)
IV-ECO & IV-CENTRAL SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)

7.8 Southwest Scenario with CAISO Resource Queue – Northern California Peak with South-to-North bulk transmission flows

D. Results

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN Queue SW	30805 BORDEN 230 kV to 30810 GREGG 230 kV CK 1	30	269 MVA	156%	Reconductor	
A-SN Queue SW	22828 SYCAMORE 69 kV to 22756 SCRIPPS 69 kV CK 1	22	116 MVA	137%	Sycamore-Penasquitos 230kV Line	
A-SN Queue SW	21635 DX55A58 92 kV to 21065 RTAP1-6 92 kV CK 1	21	51 MVA	126%		
A-SN Queue SW	22356 IMPRVLY 230 kV to 23050 Q78 230 kV CK 1	22	338.6 MVA	123%		

A-SN Queue SW	22356 IMPRLVLY 230 kV to 23052 Q124 230 kV CK 1	22	637.4 MVA	121%		
A-SN Queue SW	33540 TESLA 115 kV to 33541 AEC TP1 115 kV CK 1	30	125.7 MVA	118%		
A-SN Queue SW	22832 SYCAMORE 230 kV to 22831 SYCAMORE 138 kV CK 1T	22	392 MVA	116%	Sycamore-Penasquitos 230kV Line	
A-SN Queue SW	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 1T	22	166.7 MVA	115%	Reactive Support	
A-SN Queue SW	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 2T	22	166.7 MVA	115%	Reactive Support	
A-SN Queue SW	23052 Q124 230 kV to 23020 Q1242A2 34.5 kV CK 1T	22	166.7 MVA	114%	Reactive Support	
A-SN Queue SW	23052 Q124 230 kV to 23020 Q1242A2 34.5 kV CK 2T	22	166.7 MVA	114%	Reactive Support	
A-SN Queue SW	30796 STOREY 1 230 kV to 30810 GREGG 230 kV CK 1	30	269 MVA	113%	Reconductor	
A-SN Queue SW	30670 WESTLEY 230 kV to 30765 LOSBANOS 230 kV CK 1	30	591.2 MVA	112%	Reconductor	
A-SN Queue SW	23052 Q124 230 kV to 23010 Q1241B1 34.5 kV CK 2T	22	166.7 MVA	102%	Reactive Support	
A-SN Queue SW	23052 Q124 230 kV to 23010 Q1241B1 34.5 kV CK 1T	22	166.7 MVA	102%	Reactive Support	
A-SN Queue SW	38208 COTTLE B 230 kV to 30515 WARNERVL 230 kV CK 1	30	269 MVA	100%	Reconductor	

Low Voltages
(No N-0 Low Voltages)

Emergency Conditions (N-1 & N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN Queue SW	Line ALBERHL5 500.0 to VALLEYSC 500.0 Circuit 1	24132 SANBRDNO 230 kV to 24804 DEVERS 230 kV CK 1	24	317 MVA	141%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line ALBERHL5 500.0 to VALLEYSC 500.0 Circuit 1	24804 DEVERS 230 kV to 25666 EL CASCO 230 kV CK 1	24	458 MVA	131%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line ALBERHL5 500.0 to VALLEYSC 500.0 Circuit 1	24901 VSTA 230 kV to 24804 DEVERS 230 kV CK 1	24	458 MVA	114%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line ALBERHL5 500.0 to VALLEYSC 500.0 Circuit 1	24804 DEVERS 230 kV to 24901 VSTA 230 kV CK 2	24	494 MVA	107%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line BLM EAST 230.0 to BLM WEST 230.0 Circuit 1	24781 NAVYCOSO 230 kV to 24706 BLM EAST 230 kV CK 1	24	1737 MVA	182%	Trip Navy and BLM East generation	
A-SN Queue SW	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30796 STOREY 1 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	152%	Reconductor	
A-SN Queue SW	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30796 STOREY 1 230 kV to 30800 WILSON 230 kV CK 1	30	339 MVA	131%	Reconductor	
A-SN Queue SW	Line COTTLE A 230.0 to MELONES 230.0 Circuit 1	38208 COTTLE B 230 kV to 30515 WARNERVL 230 kV CK 1	30	316 MVA	108%	Reconductor	
A-SN Queue SW	Line COTTLE A 230.0 to MELONES 230.0 Circuit 1	30500 BELLOTA 230 kV to 38208 COTTLE B 230 kV CK 1	30	316 MVA	100%	Reconductor	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	22356 IMPRLVLY 230 kV to 23050 Q78 230 kV CK 1	22	338.6 MVA	125%		
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	22356 IMPRLVLY 230 kV to 23052 Q124 230 kV CK 1	22	637.4 MVA	123%		
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 2T	22	166.7 MVA	118%	Reactive Support	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 1T	22	166.7 MVA	118%	Reactive Support	

A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	23052 Q124 230 kV to 23020 Q1242A2 34.5 kV CK 2T	22	166.7 MVA	117%	Reactive Support	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	23052 Q124 230 kV to 23020 Q1242A2 34.5 kV CK 1T	22	166.7 MVA	117%	Reactive Support	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	23052 Q124 230 kV to 23010 Q1241B1 34.5 kV CK 2T	22	166.7 MVA	105%	Reactive Support	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	23052 Q124 230 kV to 23010 Q1241B1 34.5 kV CK 1T	22	166.7 MVA	105%	Reactive Support	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	24132 SANBRDNO 230 kV to VALLEYSC 230 kV CK 1	24	317 MVA	155%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	24804 DEVERS 230 kV to 25666 EL CASCO 230 kV CK 1	24	458 MVA	142%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	24901 VSTA 230 kV to 24804 DEVERS 230 kV CK 1	24	458 MVA	125%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1,Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	24804 DEVERS 230 kV to 24901 VSTA 230 kV CK 2	24	494 MVA	118%	West of Devers 230 kV Upgrades	
A-SN Queue SW	Line EIGHT MI 230.0 to TESLA E 230.0 Circuit 1	30489 STAGG-J2 230 kV to 30624 TESLA E 230 kV CK 1	30	389 MVA	110%	Reconductor	
A-SN Queue SW	Line ELDORDO 500.0 to PISGAH 500.0 Circuit 1,Line LUGO 500.0 to MOHAVE 500.0 Circuit 1	24086 LUGO 500 kV to 26105 VICTORVL 500 kV CK 1	24	2598 MVA	123%	Upgrade Line (Drop, CB's, and Disconnects)	
A-SN Queue SW	Line HSKLLCYN 230.0 to RINALDI 230.0 Circuit 1	26135 HSKLLCYN 230 kV to 26094 SYLMARLA 230 kV CK 1	26	797 MVA	123%		
A-SN Queue SW	Line IMPRLVLY 230.0 to ROA-230 230.0 Circuit 1	22356 IMPRLVLY 230 kV to 22360 IMPRLVLY 500 kV CK 1T	22	1194 MVA	114%		
A-SN Queue SW	Line IMPRLVLY 500.0 to WNDFARMS 500.0 Circuit 1,Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	22356 IMPRLVLY 230 kV to 20118 ROA-230 230 kV CK 1	22	850 MVA	196%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230)	
A-SN Queue SW	Line IMPRLVLY 500.0 to WNDFARMS 500.0 Circuit 1,Line IMPRLVLY 500.0 to CENTRALS 500.0	22609 OTAYMESA 230 kV to 20149 TJI-230 230 kV CK 1	22	825 MVA	168%	SPS (Transfer trip IV Gen, cross trip 500/230 kV	

	Circuit 1					transformer #1 and IV-ROA230 or OtayMesa-TJI 230)	
A-SN Queue SW	Line IMPRLVLY 500.0 to WDNDFARMS 500.0 Circuit 1,Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	22771 SY230 230 kV to 22466 MLMS3TAP 230 kV CK 1	22	1176 MVA	101%		
A-SN Queue SW	Line INYO 230.0 to COTTONWD 230.0 Circuit 1	24728 INYO 115 kV to 24730 INYO PS 115 kV CK 1T	24	62 MVA	178%		Inyo-Cottonwood #2
A-SN Queue SW	Line INYO 230.0 to COTTONWD 230.0 Circuit 1	24723 CONTROL 115 kV to 24728 INYO 115 kV CK 1	24	88 MVA	124%	Upgrade North of Inyokern	
A-SN Queue SW	Line MCCULLGH 500.0 to VICTORVL 500.0 Circuit 1,Line MCCULLGH 500.0 to VICTORVL 500.0 Circuit 2	24042 ELDORDO 500 kV to 84226 PISGAH 500 kV CK 1	24	2009 MVA	107%	Upgrade Series Capacitors	
A-SN Queue SW	Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1,Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2	30060 MIDWAY 500 kV to 29402 WIRLWIND 500 kV CK 3	30	3031 MVA	131%	Build a new Kramer-Midway 500kV	
A-SN Queue SW	Line MIGUEL 230.0 to MISSION 230.0 Circuit 1,Line MIGUEL 230.0 to MISSION 230.0 Circuit 2	22828 SYCAMORE 69 kV to 22756 SCRIPPS 69 kV CK 1	22	136.8 MVA	133%	Sycamore-Penasquitos 230 kV Line	
A-SN Queue SW	Line MIGUEL 230.0 to MISSION 230.0 Circuit 1,Line MIGUEL 230.0 to MISSION 230.0 Circuit 2	22865 GRNT HLL 138 kV to 22852 TELECYN 138 kV CK 1	22	273 MVA	124%		
A-SN Queue SW	Line MIGUEL 230.0 to MISSION 230.0 Circuit 1,Line MIGUEL 230.0 to MISSION 230.0 Circuit 2	22831 SYCAMORE 138 kV to 22124 CHCARITA 138 kV CK 1	22	204.1 MVA	109%		
A-SN Queue SW	Line OTAYMESA 230.0 to MLMS3TAP 230.0 Circuit 1	22828 SYCAMORE 69 kV to 22756 SCRIPPS 69 kV CK 1	22	136.8 MVA	143%	Sycamore-Penasquitos 230 kV Line	
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	22356 IMPRLVLY 230 kV to 23050 Q78 230 kV CK 1	22	338.6 MVA	126%		
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	22356 IMPRLVLY 230 kV to 23052 Q124 230 kV CK 1	22	637.4 MVA	123%		
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 2T	22	166.7 MVA	119%	Reactive Support	
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 1T	22	166.7 MVA	119%	Reactive Support	

A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	23052 Q124 230 kV to 23020 Q1242A2 34.5 kV CK 2T	22	166.7 MVA	118%	Reactive Support	
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	23052 Q124 230 kV to 23020 Q1242A2 34.5 kV CK 1T	22	166.7 MVA	118%	Reactive Support	
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	23052 Q124 230 kV to 23010 Q1241B1 34.5 kV CK 2T	22	166.7 MVA	105%	Reactive Support	
A-SN Queue SW	Line OTAYMESA 230.0 to TJI-230 230.0 Circuit 1	23052 Q124 230 kV to 23010 Q1241B1 34.5 kV CK 1T	22	166.7 MVA	105%	Reactive Support	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24760 OXBOW B 230 kV to 24724 OXBOW B 115 kV CK 1T	24	77 MVA	101%	Additional Transformer Bank	
A-SN Queue SW	Line PALOVRDE 500.0 to CirDoRvr 500.0 Circuit 1	21635 DX55A58 92 kV to 21065 RTAP1-6 92 kV CK 1	21	51 MVA	139%		
A-SN Queue SW	Line PEN 230.0 to SYCAMORE 230.0 Circuit 1	22668 POWAY 69 kV to 22664 POMERADO 69 kV CK 1	22	148 MVA	129%	Sycamore-Penasquitos 230 kV Line	
A-SN Queue SW	Line PEN 230.0 to SYCAMORE 230.0 Circuit 1	22831 SYCAMORE 138 kV to 22124 CHCARITA 138 kV CK 1	22	204.1 MVA	116%	Sycamore-Penasquitos 230 kV Line	
A-SN Queue SW	Line PEN 230.0 to ENCINATP 230.0 Circuit 1, Line SANLUSRY 230.0 to ENCINA 230.0 Circuit 1	22832 SYCAMORE 230 kV to 22831 SYCAMORE 138 kV CK 1T	22	477 MVA	107%	Sycamore-Penasquitos 230 kV Line	
A-SN Queue SW	Line PENSQTOS 230.0 to OLD TOWN 230.0 Circuit 1	22192 DOUBLTTP 138 kV to 22300 FRIARS 138 kV CK 1	22	150.8 MVA	112%		
A-SN Queue SW	Line PITSBG D 230.0 to DEC PTSG 230.0 Circuit 1	30526 PITSBG D 230 kV to 30528 DEC PTSG 230 kV CK 2	30	665 MVA	131%	Re-Dispatch DEC generation	
A-SN Queue SW	Line PITSBG D 230.0 to DEC PTSG 230.0 Circuit 2	30526 PITSBG D 230 kV to 30528 DEC PTSG 230 kV CK 1	30	665 MVA	131%	Re-Dispatch DEC generation	
A-SN Queue SW	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24016 BARRE 230 kV to 24044 ELLIS 230 kV CK 1	24	1333 MVA	126%	Reconductor	
A-SN Queue SW	Line SILVERGT 230.0 to OLD TOWN 230.0 Circuit 1	22596 OLD TOWN 230 kV to 22597 OLDTWNTP 230 kV CK 1	22	456 MVA	119%		
A-SN Queue SW	Line STAGG-J2 230.0 to TESLA E 230.0 Circuit 1	30622 EIGHT MI 230 kV to 30624 TESLA E 230 kV CK 1	30	389 MVA	111%	Reconductor	
A-SN Queue SW	Line STOREY 1 230.0 to GREGG 230.0 Circuit 1	30805 BORDEN 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	174%	Reconductor	

A-SN Queue SW	Line STOREY 1 230.0 to GREGG 230.0 Circuit 1	30795 STOREY 2 230 kV to 30805 BORDEN 230 kV CK 1	30	316 MVA	119%	Reconductor	
A-SN Queue SW	Line STOREY 1 230.0 to GREGG 230.0 Circuit 1	30800 WILSON 230 kV to 30795 STOREY 2 230 kV CK 1	30	316 MVA	109%	Reconductor	
A-SN Queue SW	Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30670 WESTLEY 230 kV to 30765 LOSBANOS 230 kV CK 1	30	677.2 MVA	122%	Reconductor	
A-SN Queue SW	Line TRACY 500.0 to LOSBANOS 500.0 Circuit 1, Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30670 WESTLEY 230 kV to 30765 LOSBANOS 230 kV CK 1	30	677.2 MVA	170%	Reconductor	
A-SN Queue SW	Line TRACY 500.0 to LOSBANOS 500.0 Circuit 1, Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30805 BORDEN 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	146%	Reconductor	
A-SN Queue SW	Line TRACY 500.0 to LOSBANOS 500.0 Circuit 1, Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30796 STOREY 1 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	111%	Reconductor	
A-SN Queue SW	Line TRACY 500.0 to LOSBANOS 500.0 Circuit 1, Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	38208 COTTLE B 230 kV to 30515 WARNERVL 230 kV CK 1	30	316 MVA	107%	Reconductor	
A-SN Queue SW	Line WDNDFARMS 500.0 to MIGUEL 500.0 Circuit 1	22832 SYCAMORE 230 kV to 22831 SYCAMORE 138 kV CK 1T	22	477 MVA	124%	Sycamore-Penasquitos 230 kV Line	
A-SN Queue SW	Line WDNDFARMS 500.0 to MIGUEL 500.0 Circuit 1	22356 IMPRLVLY 230 kV to 20118 ROA-230 230 kV CK 1	22	850 MVA	124%	SPS (Transfer trip IV Gen and IV-ROA230 or Otay Mesa-TJI 230)	
A-SN Queue SW	Line WDNDFARMS 500.0 to MIGUEL 500.0 Circuit 1	22609 OTAYMESA 230 kV to 20149 TJI-230 230 kV CK 1	22	825 MVA	108%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230 or OtayMesa-TJI 230)	
A-SN Queue SW	Line WDNDFARMS 500.0 to MIGUEL 500.0 Circuit 1	22771 SY230 230 kV to 22466 MLMS3TAP 230 kV CK 1	22	1176 MVA	101%		
A-SN Queue SW	Tran CARIBOU 230.00 to CARBOU M 230.00 Circuit 1 0.00	31516 WYANDJT2 115 kV to 31512 BIG BEND 115 kV CK 2	30	75 MVA	105%	Trip Caribou generation	
A-SN Queue SW	Tran CARIBOU 230.00 to CARBOU M 230.00 Circuit 1 0.00	31482 PALERMO 115 kV to 31516 WYANDJT2 115 kV CK 2	30	75 MVA	104%	Trip Caribou generation	
A-SN Queue SW	Tran IMPRLVLY 230.00 to IMPRLVLY 500.00 Circuit 1 0.00	22356 IMPRLVLY 230 kV to 22360 IMPRLVLY 500 kV CK 2T	22	732 MVA	140%		

A-SN Queue SW	Tran MIGUEL 230.00 to MIGUEL 500.00 Circuit 2 0.00	22468 MIGUEL 500 kV to 22472 MIGUELMP 500 kV CK 1T	22	1329 MVA	118%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230 or OtayMesa-TJI 230)	
A-SN Queue SW	Tran MIGUEL 230.00 to MIGUELMP 500.00 Circuit 1 0.00	22464 MIGUEL 230 kV to 22468 MIGUEL 500 kV CK 2T	22	1344 MVA	115%		

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN Queue SW	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30805 BORDEN 230 kV	30	0.915		
A-SN Queue SW	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30795 STOREY 2 230 kV	30	0.92		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38601 BUENAVT1 230 kV	30	0.919		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38600 BUENAVJ1 230 kV	30	0.92		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38640 WHLR RJ1 230 kV	30	0.922		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38641 WHLR RT1 230 kV	30	0.922		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38650 WND GPJ1 230 kV	30	0.922		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38651 WND GPT1 230 kV	30	0.922		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	30994 WHEELER 230 kV	30	0.924		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38655 WND GPJ2 230 kV	30	0.93		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38656 WND GPT2 230 kV	30	0.93		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38645 WHLR RJ2 230 kV	30	0.932		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38646 WHLR RT2 230 kV	30	0.932		
A-SN Queue SW	Line BUENAVJ2 230.0 to MIDWAY 230.0 Circuit 1	38605 BUENAVJ2 230 kV	30	0.946		

A-SN Queue SW	Line BUENAVJ2 230.0 to MIDWAY 230.0 Circuit 1	38606 BUENAVT2 230 kV	30	0.946		
A-SN Queue SW	Line GATES 230.0 to ARCO 230.0 Circuit 1	30935 ARCO 230 kV	30	0.941		
A-SN Queue SW	Line HENTAP1 230.0 to HENRIETA 230.0 Circuit 1	30881 HENRIETA 230 kV	30	0.863		
A-SN Queue SW	Line LOCKFORD 230.0 to BELLOTA 230.0 Circuit 1	30482 LOCKFORD 230 kV	30	0.949		
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24748 OXBOW A 230 kV	24	0.719	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94244 OXBOWLP1 230 kV	24	0.729	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94425 TC08SC54 230 kV	24	0.73	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94245 TC08SC52 230 kV	24	0.732	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94421 OXBOWLP2 230 kV	24	0.732	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94422 TC08SC53 230 kV	24	0.732	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24760 OXBOW B 230 kV	24	0.83	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24723 CONTROL 115 kV	24	0.933	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24728 INYO 115 kV	24	0.934	Larger SVC for Control/Oxbow Area	
A-SN Queue SW	Line PITSBG D 230.0 to SANRAMON 230.0 Circuit 1	30555 SANRAMON 230 kV	30	0.94		
A-SN Queue SW	Line STAGG-J2 230.0 to TESLA E 230.0 Circuit 1	30489 STAGG-J2 230 kV	30	0.949		
A-SN Queue SW	Line STAGG-J2 230.0 to TESLA E 230.0 Circuit 1	30499 STAGG-E 230 kV	30	0.949		
A-SN Queue SW	Line TEMPLETN 230.0 to MORROBAY 230.0 Circuit 1	30905 TEMPLETN 230 kV	30	0.93		
A-SN Queue SW	Line TRCY PMP 230.0 to LLNL 230.0 Circuit 1	37560 LLNL 230 kV	30	0.944		
A-SN Queue SW	Line WNDFARMS 500.0 to MIGUEL 500.0 Circuit 1	22832 SYCAMORE 230 kV	22	0.938		
A-SN Queue SW	Tran GATES 230.00 to GATES 1M 230.00 Circuit 1 0.00	30901 GATES 1M 230 kV	30	0.837		
A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	25666 EL CASCO 230 kV	24	0.946	Devers-Mira Loma or Devers-Rancho Vista 500kV	

A-SN Queue SW	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	24901 VSTA 230 kV	24	0.949	Devers-Mira Loma or Devers-Rancho Vista 500kV	
A-SN Queue SW	Line IMPRLVLY 500.0 to WDNFARMS 500.0 Circuit 1, Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	21007 COACHELV 230 kV	21	0.947		
A-SN Queue SW	Line IMPRLVLY 500.0 to WDNFARMS 500.0 Circuit 1, Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	21100 IH230 230 kV	21	0.948		
A-SN Queue SW	Line IMPRLVLY 500.0 to WDNFARMS 500.0 Circuit 1, Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	25429 JH LX1 230 kV	24	0.946		
A-SN Queue SW	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24134 SANTIAGO 230 kV	24	0.916		LA Basin Generation
A-SN Queue SW	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24072 JOHANNA 230 kV	24	0.918		LA Basin Generation
A-SN Queue SW	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24044 ELLIS 230 kV	24	0.925		LA Basin Generation
A-SN Queue SW	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24069 HUNTBCH 230 kV	24	0.925		LA Basin Generation
A-SN Queue SW	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24369 HUNTBCH1 230 kV	24	0.925		LA Basin Generation
A-SN Queue SW	Line SILVERGT 230.0 to OLDTWNT 230.0 Circuit 1, Line SILVERGT 230.0 to OLD TOWN 230.0 Circuit 1	22430 SILVERGT 230 kV	22	0.948		

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN Queue SW	Tran MEAD S 230.00 to MEAD 287.00 Circuit 1 0.00	26051 MEAD 287 kV	26	12%		

A-SN Queue SW	Tran LOSBANOS 230.00 to LOSBANOS 500.00 Circuit 1L.BANS T 13.80	30069 L.BANS M 500 kV	30	5%		
A-SN Queue SW	Tran INTERMT 345.00 to INTERMT 230.00 Circuit 1 0.00	26041 INTERMT 230 kV	26	12%		
A-SN Queue SW	Tran GATES 230.00 to GATES 1M 230.00 Circuit 1 0.00	30901 GATES 1M 230 kV	30	16%		
A-SN Queue SW	Tran CORTINA 230.00 to CRTNA M 230.00 Circuit 1 0.00	30451 CRTNA M 230 kV	30	5%		
A-SN Queue SW	Line TRINITY 230.0 to J.F.CARR 230.0 Circuit 2	37640 TRINITY 230 kV	30	5%		
A-SN Queue SW	Line TRCY PMP 230.0 to LLNL 230.0 Circuit 1	37560 LLNL 230 kV	30	7%		
A-SN Queue SW	Line TEMPLETN 230.0 to MORROBAY 230.0 Circuit 1	30905 TEMPLETN 230 kV	30	7%		
A-SN Queue SW	Line ROCKCK 1 230.0 to RK C JT1 230.0 Circuit 1	30268 ROCKCK 1 230 kV	30	7%		
A-SN Queue SW	Line POE 230.0 to RK C JT1 230.0 Circuit 1	30262 RK C JT1 230 kV	30	7%		
A-SN Queue SW	Line PASTORIA 230.0 to EDMONSTN 230.0 Circuit 1	25613 EDMONSTN 230 kV	24	9%		
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24748 OXBOW A 230 kV	24	29%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94244 OXBOWLP1 230 kV	24	28%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94421 OXBOWLP2 230 kV	24	28%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94425 TC08SC54 230 kV	24	28%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94422 TC08SC53 230 kV	24	28%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	94245 TC08SC52 230 kV	24	28%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24760 OXBOW B 230 kV	24	20%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24723 CONTROL 115 kV	24	8%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OXBOWLP2 230.0 to TOT127TP 230.0 Circuit 1	24728 INYO 115 kV	24	8%	SVC in Control or Oxbow region	
A-SN Queue SW	Line OWENSMID 230.0 to OWENSCON 230.0 Circuit 1	26130 OWENSMID 230 kV	26	5%		
A-SN Queue SW	Line OWENSCON 230.0 to INYO 230.0 Circuit 1	26131 OWENSCON 230 kV	26	5%		

A-SN Queue SW	Line OWENS UP 230.0 to OWENSMID 230.0 Circuit 1	26129 OWENS UP 230 kV	26	5%		
A-SN Queue SW	Line MAGUNDEN 230.0 to OMAR 230.0 Circuit 1	24142 SYC CYN 230 kV	24	8%		
A-SN Queue SW	Line LOCKFORD 230.0 to BELLOTA 230.0 Circuit 1	30482 LOCKFORD 230 kV	30	6%		
A-SN Queue SW	Line JHINDSCE 230.0 to MIRAGE 230.0 Circuit 1	25427 EM LX1 230 kV	24	10%		
A-SN Queue SW	Line INTERMT 345.0 to INTERMTX 345.0 Circuit 1	38950 VSC_PTSB 180.5 kV	30	8%		
A-SN Queue SW	Line HENTAP1 230.0 to HENRIETA 230.0 Circuit 1	30881 HENRIETA 230 kV	30	12%		
A-SN Queue SW	Line GENE 230.0 to GENE LX2 230.0 Circuit 2X	25404 GENE BK2 230 kV	24	9%		
A-SN Queue SW	Line GENE 230.0 to GENE LX2 230.0 Circuit 2X	25432 GENE LX2 230 kV	24	9%		
A-SN Queue SW	Line GENE 230.0 to GENE LX1 230.0 Circuit 1X	25403 GENE BK1 230 kV	24	10%		
A-SN Queue SW	Line GENE 230.0 to GENE LX1 230.0 Circuit 1X	25431 GENE LX1 230 kV	24	10%		
A-SN Queue SW	Line CRESTA 230.0 to RK C JT2 230.0 Circuit 1	30272 RK C JT2 230 kV	30	6%		
A-SN Queue SW	Line BUENAVJ2 230.0 to MIDWAY 230.0 Circuit 1	38605 BUENAVJ2 230 kV	30	5%		
A-SN Queue SW	Line BUENAVJ2 230.0 to MIDWAY 230.0 Circuit 1	38606 BUENAVT2 230 kV	30	5%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38601 BUENAVT1 230 kV	30	7%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38600 BUENAVJ1 230 kV	30	7%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38640 WHLR RJ1 230 kV	30	6%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38641 WHLR RT1 230 kV	30	6%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38650 WND GPJ1 230 kV	30	6%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38651 WND GPT1 230 kV	30	6%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	30994 WHEELER 230 kV	30	6%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38655 WND GPJ2 230 kV	30	5%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38656 WND GPT2 230 kV	30	5%		

A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38645 WHLR RJ2 230 kV	30	5%		
A-SN Queue SW	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38646 WHLR RT2 230 kV	30	5%		
A-SN Queue SW	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30805 BORDEN 230 kV	30	8%		
A-SN Queue SW	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30795 STOREY 2 230 kV	30	7%		

Divergent Cases

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN Queue SW	Line CARIBOU 230.0 to BELDENTP 230.0 Circuit 1		
A-SN Queue SW	Line PRIMM 230.0 to IVANPAH 230.0 Circuit 1	Second Ivanpah-Primm or additional Ivanpah-Eldorado 230 kV	
A-SN Queue SW	Tran CRYSTAL 500.00 to CRSTL3PS 230.00 Circuit 3 0.00		
A-SN Queue SW	Tran CRYSTAL 500.00 to CRSTL2PS 230.00 Circuit 2 0.00		
A-SN Queue SW	Line PRIMM 230.0 to ELDORDO 230.0 Circuit 1	Second Eldorado-Primm or additional Ivanpah-Eldorado 230 kV	
A-SN Queue SW	Line BELDENTP 230.0 to TBL MT D 230.0 Circuit 1		
A-SN Queue SW	Line COTTONWD 230.0 to BARRENDR 230.0 Circuit 1		
A-SN Queue SW	Line TALEGA 230.0 to S.ONOFRE 230.0 Circuit 1, Line TALEGA 230.0 to S.ONOFRE 230.0 Circuit 2		

7.9 Southwest Scenario with CAISO Resource Queue – Southern California Peak

Normal Conditions (N-0):

Thermal Overloads: None with above indicated upgrades

Low Voltages: None with above indicated upgrades

Emergency Conditions (N-1 & N-2)

Thermal Overloads

N-1	Overloaded Equipment		
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Contingency:	FROM BUS	KV	TO BUS	KV	ID	AREA	Percent Loading	Possible Mitigation
IMPRVLVY-CENTRALX 500 1	IMPRVLVY	230	ROA-230	230	#1	22	121.20%	SPS (Transfer trip of IV Gen)
IMPRVLVY-CENTRALX 500 1	RUM-230	230	ROA-231	230	#1	20	101.90%	
IMPRVLVY-CENTRALX 500 1	ECO	500	MIGUEL	500	#1	22	100.50%	
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	OTAYMESA	230	TJI-230	230	#1	22	100.30%	SPS (Cross trip IV-ROA230)
IMPRVLVY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	IMPRVLVY	500	CENTRALS	500	#1	22	105.40%	Pre-contingency upward dispatch of generation in San Diego area
IMPRVLVY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	CENTRALS	500	CENTRMPS	500	#1	22	103.00%	Third 500/230 kV transformer at Central substation
CENTRALX 230-CENTRLMP 2	CENTRALS	230	CENTRMPS	500	#1	22	108.30%	
CENTRALX 230-CENTRLMP 1	CENTRALS	230	CENTRMPS	500	#2	22	108.30%	
IMPRVLVY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	CENTRALS	500	CENTRMPS	500	#2	22	103.00%	
IMPRVLVY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	CENTRALS	230	SYCAMORE	230	#1	22	119.40%	230 kV Central-Sycamore Canyon #3 line
IMPRVLVY-ECO SPS6.2(Transfer trip of IV Gen, Cross trip of IV-ROA230)	CENTRALS	230	SYCAMORE	230	#2	22	119.40%	
MIGUEL 230-MIGUEL 500 1	MIGUEL	230	MIGUEL	500	#2	22	113.70%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #2 and IV-ROA230)
MIGUEL 230-MIGUEL 500 2	MIGUEL	230	MIGUEL	500	#1	22	116.40%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230)
MIGUEL 230-MIGUEL 500 2	MIGUEL	500	MIGUELMP	500	#1	22	111.60%	
LUGO-VICTORVL 500 ck 1	ELDORDO	500	PISGAH	500	#1	24	124.70%	Upgrade series capacitor on 500 kV El Dorado-Pisgah #1 line
N.GILA-IMPRVLVY 500 ck 1	JHINDSCE	230	MIRAGE	230	#1	22	110.50%	SPS (Blythe generator run-back)

N-2	Overloaded Equipment						Percent Loading	Possible Mitigation
Contingency:	FROM BUS	KV	TO BUS	KV	ID	AREA	Percent Loading	Possible Mitigation
Redbluff-DEVERS 500 1&2	JHINDSCE	230	MIRAGE	230	#1	24	125.10%	SPS (Blythe generator run-back)
MCCULLGH-VICTORVL 1&2	ELDORDO	500	PISGAH	500	#1	24	130.10%	Upgrade series capacitor on 500 kV El Dorado-Pisgah #1 line
TALEGA-S.ONOFRE 230 1&2	ESCNDIDO	230	TALEGA	230	#1	22	110.40%	SPS (controlled load drop)

Voltage Deviations

Voltage Deviations	Voltage Drop Violations				
Contingency	Bus Number	Bus Name	Area	Limit	Delta-V
IMPRVLVY-ECO SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)	22738	CENTRALS230.	22	5.0 %	10.69 %

IMPRVLY-ECO SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)	22743	CENTRMPS500.	22	5.0 %	10.40 %
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22738	CENTRALS230.	22	5.0 %	9.49 %
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22743	CENTRMPS500.	22	5.0 %	9.20 %
IMPRVLY-ECO SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)	22737	CENTRALS500.	22	5.0 %	8.90 %
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22737	CENTRALS500.	22	5.0 %	7.78 %
IMPRVLY-ECO SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)	22832	SYCAMORE230.	22	5.0 %	7.30 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22738	CENTRALS230.	22	5.0 %	7.02 %
IMPRVLY-ECO SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)	22832	SYCAMORE230.	22	5.0 %	6.99 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22743	CENTRMPS500.	22	5.0 %	6.68 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22832	SYCAMORE230.	22	5.0 %	6.51 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22468	MIGUEL 500.	22	5.0 %	5.77 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22464	MIGUEL 230.	22	5.0 %	5.67 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22472	MIGUELMP500.	22	5.0 %	5.64 %
IMPRVLY-CENTRALX 500 1	22468	MIGUEL 500.	22	5.0 %	5.42 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22737	CENTRALS500.	22	5.0 %	5.34 %
IMPRVLY-CENTRALX 500 1	22472	MIGUELMP500.	22	5.0 %	5.16 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22430	SILVERGT230.	22	5.0 %	5.12 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22596	OLD TOWN230.	22	5.0 %	5.08 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22597	OLDTWNTP230.	22	5.0 %	5.08 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22652	PENSQTOS230.	22	5.0 %	5.05 %
ECO-MIGUEL SPS6.1(Transfer trip of IV Gen)	22771	SY230 230.	22	5.0 %	5.01 %

Divergent Cases

Contingency
ECO-MIGUEL SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)
ECO-MIGUEL SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)
IV-ECO & IV-CENTRAL SPS6.1(Transfer trip of IV Gen)
IV-ECO & IV-CENTRAL SPS6.2 (Transfer trip of IV Gen, Cross trip of IV-ROA230)
IV-ECO & IV-CENTRAL SPS6.3 (Transfer trip of IV Gen, Cross trip of OT-TJI 230)

7.11 Owens Valley Resource Scenario

a. (N-0) Normal Conditions

Table B2-OV2

Overloaded Components	Area	Rate	% Loading over rating	System Upgrades /Possible Mitigation
SYCAMORE 230/138 kV Bank	SDG&E	392 MVA	117.7%	New 230 kV SYCAMORE – PEÑASQUITO Line
POMERADO-POWWAY 69 kV Line	SDG&E	1238.4 A	102.3%	
GRANITE-GRANTTP 69 kV Line	SDG&E	818.8 A	100.7%	
MLMS3TAP-SY230 230 kV Line	SDG&E	2289.3 A	100.6%	
VINCENT 500/230 kV Bank 1	SCE	1000 MVA	114.4%	New VINCENT

Overloaded Components	Area	Rate	% Loading over rating	System Upgrades /Possible Mitigation
VINCENT 500/230 kV Bank 3	SCE	1120 MVA	106.8%	500/230 kV Bank
VINCENT 500/230 kV Bank 4	SCE	1120 MVA	102.2%	
BORDEN-GREGG 230 kV Line	PG&E	672.2 A	107.2%	Reconductoring ?
TESLA-AEC TP1 115 kV Line	PG&E	631.1 A	105.4%	Reconductoring ?
ARCO 230/70kV Bank 2	PG&E	134 MVA	103.9%	New Bank ?

b. (N-1) Single Contingency Conditions

Table B2-OV3

Contingency				Impacted Elements	Case B2 % Overload	Area
PALOV RDE	ClrdoRvr	500	1	JHINDSCE – MIRAGE 230 kV	104%	SCE
IMPRLVLY	CENTRALS	500	1	IMPRLVLY –ROA 230kV	107%	SDG&E-CFE
W. GILA	IMPRLVLY	500	1	JHINDSCE – MIRAGE 230 kV	104%	SCE
SILVERGT	SOUTHBY	230	1	SWEETWTR – MONTGYTP 69 kV	111%	SDG&E
PALOMAR	SYCAMORE	230	1	POWAY – POMERADO 69 kV	100%	SDG&E
SYCAMORE	PENSQTOS	230	1	POWAY – POMERADO 69 kV	101%	SDG&E
MIGUEL	500/230 kV		1	MIGUEL 500/230 kV Bank 2	105%	SDG&E
TOT254LP	KRAMER	230	1	INYO PS 115kV	102%	LADWP-SCE

c. (N-2) Double Contingency Conditions

Table B2-OV4

Contingency				Impacted Element	Case B2 % Overload	Area
ROUND MT	TABLE MT	500	1	CPVSTA– CORTINA 230kV	100%	PG&E
ROUND MT	TABLE MT	500	2			
TESLA	LOSBANOS	500	1	WESTLEY – LOS BANOS 230 kV	105%	PG&E
TESLA	TRACY	500	1	BORDEN – GREGG 230 kV	100%	PG&E
LUGO	MIRALOMA	500	2	JHINDSCE – MIRAGE 230 kV	101%	SCE
LUGO	MIRALOMA	500	3			
LUGO	RANCHVST	500	1	JHINDSCE – MIRAGE 230 kV	105%	SCE
LUGO	MIRALOMA	500	2			
DEVERS	REDBLUFF	500	1	JHINDSCE – MIRAGE 230 kV	116%	SCE
DEVERS	REDBLUFF	500	2			
S.ONOFRE	TALEGA	230	1	OCNSDETP – STUARTTP 69kV	131%	SDG&E
S.ONOFRE	TALEGA	230	2	JAPANESE MESA – TALEGATP 69kV	133%	SDG&E
				STUARTTP – LASPULGS 69 kV	125%	SDG&E
				LASPULGS – HORNO TP 69 kV	116%	SDG&E
				JAPANESE MESA – HORNO TP 69 kV	114%	SDG&E

Contingency				Impacted Element	Case B2 % Overload	Area
PALOMAR	ESCNDIDO	230	1	POWAY – POMERADO 69 kV	149%	SDG&E
PALOMAR	ESCNDIDO	230	2	POWAY – R. CARMEL 60 kV	108%	SDG&E
KRAMER	INYOKERN	230	1	INYO PS 115 kV	108%	LADWP-SCE
KRAMER	INYOKERN	230	2			

7.6 Northwest Scenario with CAISO Resource Queue – Northern California Peak

7.7 Northwest Scenario with CAISO Resource Queue – Southern California Peak

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_Q_NW_6	30005 ROUND MT 500kV to 40687 MALIN 500kV ckt #2	30	1799.9 Amp	105.7	MA-RM #2 SC @ MA	Comi proje
B2_Q_NW_10	30015 TABLE MT 500kV to 30030 VACA-DIX 500kV ckt #1	30	2477.9 Amp	100.9	Re-conductor TM-VD	COI

Comment [SC3]: Deleted Vincent Transformer Overload: Fourth Bank In-Service mitigates

Emergency Conditions (N-1)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_Q_NW_12	Olinda - Tracy slo	ROUND MT 500kV to TABLE MT 500kV ckt #1	30	3280.51 Amps	101.9%	COI upgrade	COI upgrade
B2_Q_NW_13		ROUND MT 500kV to TABLE MT 500kV ckt #2	30	3280.51 Amps	102.7%		
B2_Q_NW_14		CPVSTA 230kV to CORTINA 230kV ckt #1	30	953.88 Amps	102.3%		
B2_Q_NW_15	Round Mt-Table Mt. slo	ROUND MT 500kV to TABLE MT 500kV ckt #2	30	3280.51 Amps	115.7%	COI upgrade	COI upgrade
B2_Q_NW_16	Midway - Vincent1 slo	VINCENT 500kV to MIDWAY 500kV ckt #2	24	2849.8 Amps	105.1%	Kramer-Midway 500kV or Kramer-Whirlwind 500kV	

Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_Q_NW_19	Round Mt. sb	ROUND MT 500kV to TABLE MT 500kV ckt #1	30	3280.51 Amps	103.8%	COI upgrade	COI upgrade
B2_Q_NW_20	Round Mt.-Table Mt. Dlo	OLINDA 500kV to MAXWELL 500kV ckt #1	30	4300.11 Amps	119.0%	COI upgrade	COI upgrade
B2_Q_NW_21		MAXWELL 500kV to TRACY 500kV ckt #1	30	4300.11 Amps	119.0%		
B2_Q_NW_22		CPVSTA 230kV to CORTINA 230kV ckt #1	30	953.88 Amps	115.7%		
B2_Q_NW_23	Table Mt. South dlo	OLINDA 500kV to MAXWELL 500kV ckt #1	30	4300.11 Amps	110.0%	COI upgrade	COI upgrade
B2_Q_NW_24		MAXWELL 500kV to TRACY 500kV ckt #1	30	4300.11 Amps	110.0%		
B2_Q_NW_25		CPVSTA 230kV to CORTINA 230kV ckt #1	30	953.88 Amps	112.2%		
B2_Q_NW_26	Devers - Valley dlo	DEVERS 230kV to EL CASCO 230kV ckt #1	24	1149.68 Amps	107.4%	West of Devers 230kV Upgrades	
B2_Q_NW_29	PV-Wwing dlo	BRANDOW 230kV to KYRENE 230kV ckt #1	14	1600.01 Amps	108.7%		
B2_Q_NW_30	Lugo - MiraRvst dlo	MIRAGE 230kV to JHINDSCE 230kV ckt #1	24	896.15 Amps	104.1%	Reconductor	
B2_Q_NW_31	Midway-Vincent dlo	WIRLWIND 500kV to MIDWAY 500kV ckt #3	24	3499.9 Amps	139.7%	Kramer-Midway 500kV	
B2_Q_NW_32	Midway-Vincent dlo-RAS	WIRLWIND 500kV to MIDWAY 500kV ckt #3	24	3499.9 Amps	117.8%	Kramer-Midway 500kV	

7.12 RETI Heavy In-State Scenario – Northern California Peak

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation
ISO CTPG RETI case "a2"	Westley - Los Banos 230 kV line #1	30	1938 Amps	131%	Reconductor
ISO CTPG RETI case "a2"	Whirlwind - Tc08Sc56 230 kV line #1	24	1051 Amps	109%	
ISO CTPG RETI case "a2"	Whirlwind - Tc08Sc57 230 kV line #1	24	1052 Amps	109%	

ISO CTPG RETI case "a2"	Templeton - Morro Bay 230 kV line #1	30	877 Amps	106%	Reconductor	
ISO CTPG RETI case "a2"	Borden - Gregg 230 kV line #1	30	872 Amps	129%	Reconductor	
ISO CTPG RETI case "a2"	Whirlwind - Tc08Sc59 230 kV line #1	24	795 Amps	100%		
ISO CTPG RETI case "a2"	Safeway Tap1 - AEC Tap1 115 kV line #1	30	767 Amps	103%		
ISO CTPG RETI case "a2"	Corcoran 115/70 kV transformer #2	30	23 MVA	121%	Load growth	
ISO CTPG RETI case "a2"	Twisselman - Texaco Lost Hills 70 kV line #1	30	484 Amps	111%	Load growth	
ISO CTPG RETI case "a2"	Arco - Twisselman 70 kV line #1	30	547 Amps	125%	Load growth	
ISO CTPG RETI case "a2"	Arco 230/70 kV transformer #2	30	169 MVA	126%	Load growth	
ISO CTPG RETI case "a2"	Tesla - AEC Tap1 115 kV line #1	30	767 Amps	122%		
ISO CTPG RETI case "a2"	CPV Station - Cortina 230 kV line #1	30	841 Amps	101%	Loop second 23 line into Cortina	
a2_ctpg_ph2_reti_v9_4.sav	IMPRLVLY 500-CENTRALS 500 ckt #1	22	1000 MW	102.1	WECC Path Ra for Sunrise is 1000MW, need transmission to deliver generati out of IV area	
a2_ctpg_ph2_reti_v9_4.sav	SYCAMORE 230-SYCAMORE 138 ckt #1	22	392 MVA	103.57	Can be mitigate limiting the flow Sunrise to 1000	

Low Voltages

- Low Voltage Levels not reported under normal operating conditions

Emergency Conditions (N-1)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmis Upgrade Mi Criteria Vid	
ISO CTPG RETI case "a2"	B2 (L-1): Olinda - Tracy 500 kV line	CPV Station - Cortina 230 kV line #1	30	977 Amps	103%	Loop secur kV line into Cortina	
ISO CTPG RETI case "a2"	B2 (L-1): Metcalf - Moss Landing 500 kV line	Metcalf - Moss Landing 230 kV line #1	30	1768 Amps	102%		
ISO CTPG RETI case "a2"	B2 (L-1): Metcalf - Moss Landing 500 kV line	Metcalf - Moss Landing 230 kV line #2	30	1767 Amps	102%		
ISO CTPG RETI case "a2"	B2 (L-1): Gates - Midway 500 kV line	Templeton - Morro Bay 230 kV line #1	30	1003 Amps	103%	Reconduct	
ISO CTPG RETI case "a2"	B2 (L-1): Metcalf - Moss Landing 500 kV line	Borden - Gregg 230 kV line #1	30	938 Amps	118%	Reconduct	
ISO CTPG RETI case "a2"	B2 (L-1): Tesla - Los Banos 500 kV line	Westley - Los Banos 230 kV line #1	30	2370 Amps	140%	Reconduct	
ISO CTPG RETI case "a2"	B2 (L-1): Los Banos - Midway 500 kV line	Whirlwind - Tc08Sc59 230 kV line #1	24	798 Amps	101%		
ISO CTPG RETI case "a2"	B2 (L-1): Los Banos - Midway 500 kV line	Whirlwind - Tc08Sc57 230 kV line #1	24	1055 Amps	109%		
ISO CTPG RETI case "a2"	B2 (L-1): Metcalf - Moss Landing 500 kV line	Whirlwind - Tc08Sc56 230 kV line #1	24	1055 Amps	109%		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	JHINDMWD - EAGLEMTN 230kV #1	SCE	901.17 Amps	145.11	Reconduct or upgrade rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	JHINDMWD - JHINDSCE 230kV #r1	SCE	853.47 Amps	168.75	Reconduct or upgrade rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "JHINDMWD 230.00" "JHINDSCE 230.00" "r1" 1	JHINDSCE - MIRAGE 230kV #1	SCE	896.15 Amps	151.94	Reconduct or upgrade rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN XFMR "KRAMER 500.00" "KRAMER 230.00" "1" 0	KRAMER - KRAMER 500kV #2	SCE	1230 MVA	159.08	Add the thi 500/230 kV in Kramer	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" 1	KRAMER - KRAMER 500kV #1	SCE	1230 MVA	101.8	Add the thi 500/230 kV in Kramer	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "INYO	INYO - CONTROL	SCE	441.8	116.47	Reconduct	

	230.00" "COTTONWD 230.00" "1" 1	115kV #1		Amps		or upgrade rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "INYO 230.00" "COTTONWD 230.00" "1" 1	INYO - INYO PS 115kV #1	SCE	62 MVA	166.23	Upgrade th Phase shift	
a2_ctpg_ph2_reti_v9_4.sav	TL06920 "TL06920 ARTESN-SYCAMORE ck 1" "N-1" "B"	POWAY 69- POMERADO 69 ckt #1	22	1238.37 Amps	103.22		
a2_ctpg_ph2_reti_v9_4.sav	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69- MONTGYTP 69 ckt #1	22	1422.46 Amps	110.79		
a2_ctpg_ph2_reti_v9_4.sav	EA60 "EA BK60 230/138 " "T-1" "B"	SYCAMORE 138- CHCARITA 138 ckt #1	22	853.89 Amps	100.87		
a2_ctpg_ph2_reti_v9_4.sav	TL230MMx "TL230MM SY230-OTAYMESA " "N- 1" "B"	SYCAMORE 230- SYCAMORE 138 ckt #1	22	477 MVA	109.66		
a2_ctpg_ph2_reti_v9_4.sav	TL230MMx "TL230MM SY230-OTAYMESA " "N- 1" "B"	SYCAMORE 69- SCRIPPS 69 ckt #1	22	1338.78 Amps	106.08		

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Up Mitigating Crit Violation
ISO CTPG RETI case "a2"	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	RTAP1-6	IID	0.85544	

ISO CTPG RETI case "a2"	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	DX55A58	IID	0.92033		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	JH LX1 230kV	SCE	0.86257		

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible
ISO CTPG RETI case "a2"	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	RTAP1-6	IID	14.93		
ISO CTPG RETI case "a2"	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	DX55A58	IID	8.55		

a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "INYO 230.00" "COTTONWD 230.00" "1" 1	COSO 115kV	SCE	-7.93		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "OXBOWLP2 230.00" "OXBOWLP1 230.00" "1" 1	OXBOW B 230kV	SCE	-9.13		install
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "OXBOWLP2 230.00" "TOT127TP 230.00" "1" 1	OXBOW B 230kV	SCE	-16.98		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	EM LX1 230kV	SCE	-12.03		Voltag the co gener: does r model gener: study for the adjust system reserv help to power Recor transn reactiv reactiv
a2_ctpg_ph2_reti_v9_4_rev	Wind Farms-Miguel 500kV "N-1" "B"	MIGUEL 500	22	5.40%		turn on provide

Divergent Cases

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	Possible
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a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "KRAMER 500.00" "LLANO 500.00" "1" 1		New tra to the s or Kran or Kran
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Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transm Upgr Mitigating Viola	
ISO CTPG RETI case "a2"	C3 (L-2): Midway - Vincent 500 kV	Whirlwind - Tc08Sc57 230 kV line #1	24	1056 Amps	109%		
ISO CTPG RETI case "a2"	C3 (L-2): Midway - Vincent 500 kV	Whirlwind - Tc08Sc56 230 kV line #1	24	1056 Amps	109%		
ISO CTPG RETI case "a2"	C3 (L-2): Midway - Vincent 500 kV	Whirlwind - Tc08Sc59 230 kV line #1	24	799 Amps	101%		
ISO CTPG RETI case "a2"	C3 (L-2): Tesla - Tracy and Tracy - Los Banos 500 kV lines	Westley - Los Banos 230 kV line #1	30	2426 Amps	143%	Recondu	
ISO CTPG RETI case "a2"	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Metcalf - Moss Landing 230 kV line #1	30	2246 Amps	129%		
ISO CTPG RETI case "a2"	C3 (L-2): Metcalf - Moss Landing and Tesla - Metcalf 500 kV lines	Metcalf - Moss Landing 230 kV line #2	30	2246 Amps	129%		
ISO CTPG RETI case "a2"	C3 (L-2): Tesla - Tracy and Tracy - Los Banos 500 kV lines	Borden - Gregg 230 kV line #1	30	931 Amps	117%	Recondu	
ISO CTPG RETI case "a2"	C3 (L-2): Tesla - Tracy and Tesla - Table Mt. 500 kV lines	TRACY #1 500/230 kV Bank	30	1041.00 MVA	100.51%		
ISO CTPG RETI case "a2"	C3 (L-2): Tesla - Tracy and Tesla - Table Mt. 500 kV lines	TRACY #2 500/230 kV Bank	30	1041.00 MVA	100.51%		
ISO CTPG RETI case "a2"	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV	BA3258 161kV to AVE58 161kV ckt #1	IID	591.69 (Amps)	100.37		

	230.00" "MI46COCH 230.00" "1"						
ISO CTPG RETI case "a2"	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANI161 161kV to BA3258 161kV ckt #1	IID	591.69(Amps)	112.18		
ISO CTPG RETI case "a2"	OPEN LINE "COACHELV 230.00" "RAMON 230.00" "2" COACHELV 230.00" "MIRAGE 230.00" "2"	COACHELV 92kV to COACHELV 230kV ckt #1	IID	150(MVA)	124.55		
ISO CTPG RETI case "a2"	OPEN LINE "COACHELV 230.00" "RAMON 230.00" "2" COACHELV 230.00" "MIRAGE 230.00" "2"	COACHELV 92kV to COACHELV 230kV ckt #2	IID	150(MVA)	124.55		
ISO CTPG RETI case "a2"	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL 92 kV to DROP4 92 kV ckt #1	IID	98.23 Amps	135.89		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "OLIVE 230.00" "NRTHRDGE 230.00" "1" HSKLLCYN 230.00" "NRTHRDGE 230.00" "1"	HSKLLCYN - SYLMARLA 230kV #1	LADWP	2000.64 Amps	101.7		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "HSKLLCYN 230.00" "RINALDI 230.00" "1" HSKLLCYN 230.00" "SYLMARLA 230.00" "1"	HSKLLCYN - NRTHRDGE 230kV #1	LADWP	1797.32 Amps	101.33		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "HSKLLCYN 230.00" "RINALDI 230.00" "1" HSKLLCYN 230.00" "NRTHRDGE 230.00" "1"	HSKLLCYN - SYLMARLA 230kV #1	LADWP	2000.64 Amps	100.84		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "HOLYWD_E 230.00" "TOLUCA	HOLYWDLD - TOLUCA 138kV #2	LADWP	1200.72 Amps	120.78		

	230.00" "1" HOLYWD_F 230.00" "TOLUCA 230.00" "3"						
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "HOLYWD_E 230.00" "TOLUCA 230.00" "1" HOLYWD_F 230.00" "TOLUCA 230.00" "3"	TOLUCA - TOLUCA 138kV #1	LADWP	325 MVA	104.61		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "ALMITOSE 230.00" "BARRE 230.00" "1" BARRE 230.00" "VILLA PK 230.00" "1"	LEWIS - BARRE 230kV #1	SCE	3750.27 Amps	100.87	Recondu or upgrac rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "2" LEWIS 230.00" "SERRANO 230.00" "2"	SERRANO - VILLA PK 230kV #1	SCE	3810.51 Amps	112.01	Recondu or upgrac rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "2"	SERRANO - VILLA PK 230kV #2	SCE	4048.98 Amps	105.42	Recondu or upgrac rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "LEWIS 230.00" "SERRANO 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "2"	VILLA PK - LEWIS 230kV #1	SCE	2540.34 Amps	106.73	Recondu or upgrac rating	
a2_ctpg_ph2_reti_v9_4.sav	Devers - Redbluff 500kV No. 1 & no. 2	JHINDSCE - MIRAGE 230kV #1	SCE	896.15 Amps	108.29	Recondu or upgrac rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "PARDEE 230.00" "MOORPARK 230.00" "1" PARDEE 230.00" "MOORPARK 230.00" "3"	PARDEE - MOORPARK 230kV #2	SCE	2279.28 Amps	102.42	Recondu or upgrac rating	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "PARDEE 230.00" "MOORPARK	PARDEE - MOORPARK 230kV #3	SCE	2279.28 Amps	102.42	Recondu or upgrac rating	

	230.00" "1" PARDEE 230.00" "MOORPARK 230.00" "2"						
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "LUGO 500.00" "MOHAVE 500.00" "1" LUGO 500.00" "VICTORVL 500.00" "1"	PISGAH - ELDORDO 500kV #1	SCE	1600.41 Amps	108.5	Upgrade cap	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" KRAMER 230.00" "LUGO 230.00" "2"	KRAMER - KRAMER 500kV #1	SCE	1230 MVA	124.29	Add the t 500/230 l Bank in k	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" KRAMER 230.00" "LUGO 230.00" "2"	KRAMER - KRAMER 500kV #2	SCE	1230 MVA	124.29	Add the t 500/230 l Bank in k	
a2_ctpg_ph2_reti_v9_4.sav	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	JAP MESA 69- TALEGATP 69 ckt #1	22	200.82 Amps	105.53		
a2_ctpg_ph2_reti_v9_4.sav	13836/13833 "TA-TB + TA-PI 138KV *assoc OLS" "N-2" "C"	LAGNA NL 138-TA TAP 138 ckt #1	22	571.07 Amps	130.08		
a2_ctpg_ph2_reti_v9_4.sav	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	LASPULGS 69- STUARTTP 69 ckt #1	22	270.27 Amps	101.44		
a2_ctpg_ph2_reti_v9_4.sav	23051B/230XX "PEN-ES #1+ PEN- ES #2 230KV" "N-2" "C"	POMERADO 69- POWAY 69 ckt #1	22	1238.37 Amps	140.6		
a2_ctpg_ph2_reti_v9_4.sav	23051A/6920B "SX- PEN 230KV + AR-SX 69KV" "N-2" "C"	POWAY 69- R.CARMEL 69 ckt #1	22	953.88 Amps	111.77		
a2_ctpg_ph2_reti_v9_4.sav	6924/6915 "POM-SX #1+#2 69KV *assoc SPS" "N-2" "C"	R.CARMEL 69- BERNARDO 69 ckt #1	22	568.98 Amps	136.29		

a2_ctpg_ph2_reti_v9_4.sav	6906/675 "MR-PQ 69KV + PQ-MRM 69KV" "N-2" "C"	SCRIPPS 69- SYCAMORE 69 ckt #1	22	1338.78 Amps	102.82		
a2_ctpg_ph2_reti_v9_4.sav	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	STUARTTP 69- OCNSDETP 69 ckt #1	22	270.27 Amps	106.46		
a2_ctpg_ph2_reti_v9_4.sav	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 230- SYCAMORE 138 ckt #1	22	477 MVA	112.68		
a2_ctpg_ph2_reti_v9_4.sav	ML61/13809 "PV-TC + LC-SY 138KV v1" "N-2" "C"	SYCAMORE 230- SYCAMORE 138 ckt #1	22	477 MVA	103.71		
a2_ctpg_ph2_reti_v9_4.sav	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 69- SCRIPPS 69 ckt #1	22	1338.78 Amps	108.37		
a2_ctpg_ph2_reti_v9_4.sav	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230- ESCNDIDO 230 ckt #1	22	1144.66 Amps	110.67		
a2_ctpg_ph2_reti_v9_4.sav	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	TALEGA 230- ESCNDIDO 230 ckt #1	22	1144.66 Amps	104.25		
a2_ctpg_ph2_reti_v9_4.sav	HNGila-dlo (Hassaympa-N. Gila # 1 and 2) "N-2" "C"	BRANDOW - KYRENE 230.0 #1	14	1600 Amps	100.75		

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmis Upgrade Mit Criteria Vic
ISO CTPG RETI case "a2"	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL	IID	0.89357	
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "DEVERS 230.00" "MIRAGE 230.00" "1" JHINDSCE	JH LX1 230kV	SCE	0.86252	

	230.00" "MIRAGE 230.00" "1"					
a2_ctpg_ph2_reti_v9_4_rev	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230kV	22	0.89127		

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigation Criteria Violation
ISO CTPG RETI case "a2"	C3 (L-2): Los Banos - Tesla and Los Banos - Tracy 500 kV lines	Gualala 60 kV	30	-13%	
ISO CTPG RETI case "a2"	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Gualala 60 kV	30	-13%	
ISO CTPG RETI case "a2"	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Gualala 60 kV	30	-11%	
a2_ctpg_ph2_reti_v9_4_rev	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230kV	22	-10.4	

ISO CTPG RETI case "a2"	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL	IID	11.08		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "DEVERS 230.00" "MIRAGE 230.00" "2" JHINDSCE 230.00" "MIRAGE 230.00" "1"	EM LX1 230kV	SCE	-12.04		
a2_ctpg_ph2_reti_v9_4.sav	Ellis - Barre 230 kV No. 1 & Ellis - Delamo 230 kV No. 1	Ellis 66kV	SCE	-11.2		

Divergent Cases

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	P
A2 RETI scenario	MossLand-g2		
A2 RETI scenario	MidwayNorth-dlo-sn-noRAS		
A2 RETI scenario	Diablo-Midway-dlo		
A2 RETI scenario	Diablo-g1		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "MARKETPL 500.00" "MCCULLGH 500.00" "1" 1		

a2_ctpg_ph2_reti_v9_4.sav	McCullough - Victorville 500kV No. 1 & No.2		
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "PRIMM 230.00" "IVANPAH 230.00" "1" 1		The enoi supp genr Also new EI D
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "EL NIDO 230.00" "LCIENEGA 230.00" "1" LCIENEGA 230.00" "LA FRESA 230.00" "1"		The enoi supp genr Also new load
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "ELSEGND 230.00" "EL NIDO 230.00" "1" ELSEGND 230.00" "CHEVMAIN 230.00" "1"		The enoi supp genr Also new load
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "LUGO 500.00" "MOHAVE 500.00" "1" MOHAVE 500.00" "ELDORDO 500.00" "1"		Add deliv to th reac
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "ANTELOPE 500.00" "WINDHUB 500.00" "1" WINDHUB 500.00" "WIRLWIND 500.00" "1"		The enoi supp genr Also new Teh WIN
a2_ctpg_ph2_reti_v9_4.sav	OPEN LINE "VINCENT 500.00" "LLANO 500.00" "1" LUGO 500.00" "LLANO 500.00" "1"		New Krar Krar Pisg or K
a2_ctpg_ph2_reti_v9_4.sav	Lugo - Mohave 500kV No. 1 & Lugo - Pisgah 500kV No. 1		Add deliv genr instt
a2_ctpg_ph2_reti_v9_4.sav	Lugo - Pisgah 500kV No. 1 & No. 2		Add deliv genr instt

a2_ctpg_ph2_reti_v9_4.sav	Serrano - Alberhill 500 kV No. 1 & Serrano - Rancho Vista 500kV No. 1		The enor supp genr Also new load
a2_ctpg_ph2_reti_v9_4.sav	Valley - Alberhill 500kV No. 1		The enor supp genr Also new load
a2_ctpg_ph2_reti_v9_4.sav	J.Hinds - Mirage 230 kV with SPS		The enor supp the l syst so th genr
a2_ctpg_ph2_reti_v9_4.sav	J. Hinds - Eagle Mountain with SPS		The enor supp the l syst so th genr
a2_ctpg_ph2_reti_v9_4.sav	SONGS G-1		The enor supp genr
a2_ctpg_ph2_reti_v9_4.sav	SONGS G-2		The enor supp genr
ISO CTPG RETI case "a2"	Sunrise and SWPL 500 kV lines N-2		The enor supp reco Also new areæ
ISO CTPG RETI case "a2"	SONGS G-1		The enor supp to re genr by a into Basi
ISO CTPG RETI case "a2"	SONGS G-2		

1.3.2 Transient Stability Analysis Result Templates:

ID	Category	Contingency	Substation	Bus Type	Area	Vo
ISO CTPG RETI case "a2"	B	B2 (L-1): Diablo Canyon - Midway 500 kV Line	Tc08Sc36 66 kV		24	
ISO CTPG RETI case "a2"	B	B2 (L-1): Midway - Vincent	Tc08Sc36 66 kV		24	
ISO CTPG RETI case "a2"	B	B3 (T-1): Midway 500/230 kV transformer	Tc08Sc36 66 kV		24	
a2_ctpg_ph2_reti_v9_5_31.sav	B	Adelanto-Victorville-slo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	B	Kramer-Llano-slo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	B	Lugo-Victorville-slo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	B	Lugo-Vincent-slo				L (
ISO CTPG RETI case "a2"	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Tc08Sc36 66 kV		24	
ISO CTPG RETI case "a2"	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV linesS	Tc08Sc36 66 kV		24	
ISO CTPG RETI case "a2"	C	C3 (L-2): Diablo - Midway 500 kV	Tc08Sc36 66 kV		24	
ISO CTPG RETI case "a2"	C	C3 (L-2): Midway - Vincent 500 kV	Tortoise 66 kV		24	
ISO CTPG RETI case "a2"	C	C3 (L-2): Midway - Vincent 500 kV	Tc08Sc36 66 kV		24	
ISO CTPG RETI case "a2"	C	C3 (L-2): Midway - Vincent 500 kV	Palmdale 66 kV		24	
a2_ctpg_ph2_reti_v9_5_31.sav	C	Adelanto-Victorville-dlo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	C	McCullough-Victorville-dlo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	C	Vincent-Llano-Lugo-dlo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	C	Lugo-Miraloma-dlo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	C	Lugo-Pisgah-Mohave-dlo				L (
a2_ctpg_ph2_reti_v9_5_31.sav	C	Midway-Vincent-dlo				L (

7.13 RETI Heavy In-State Scenario – Northern California Peak with South-to-North bulk transmission flows

D. Results

1.3.1 Power Flow Contingency Analysis Result Templates:

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN RETI	30805 BORDEN 230 kV to 30810 GREGG 230 kV CK 1	30	269 MVA	153%	Reconductor	
A-SN RETI	24760 OXBOW B 230 kV to 24724 OXBOW B 115 kV CK 1T	24	70 MVA	151%	Reactive Support to decrease losses	
A-SN RETI	22828 SYCAMORE 69 kV to 22756 SCRIPPS 69 kV CK 1	22	116 MVA	125%	Sycamore-Penasquitos 230KV line	
A-SN RETI	22356 IMPRLVLY 230 kV to 23050 Q78 230 kV CK 1	22	338.6 MVA	121%	Reactive Support	
A-SN RETI	23050 Q78 230 kV to 23005 Q78 1A2 34.5 kV CK 1T	22	166.7 MVA	115%	Reactive Support	
A-SN RETI	23050 Q78 230 kV to 23005 Q78 1A2 34.5 kV CK 2T	22	166.7 MVA	115%	Reactive Support	
A-SN RETI	29408 WIRLWIND 230 kV to 94641 TC08SC57 230 kV CK 1	24	385 MVA	111%	Voltage Support	
A-SN RETI	29408 WIRLWIND 230 kV to 94636 TC08SC56 230 kV CK 1	24	385 MVA	111%	Voltage Support	
A-SN RETI	30796 STOREY 1 230 kV to 30810 GREGG 230 kV CK 1	30	269 MVA	110%	Reconductor	
A-SN RETI	26135 HSKLLCYN 230 kV to 26094 SYLMARLA 230 kV CK 1	26	739 MVA	108%	Reconductor	
A-SN RETI	30670 WESTLEY 230 kV to 30765 LOSBANOS 230 kV CK 1	30	591.2 MVA	108%	Reconductor	
A-SN RETI	22356 IMPRLVLY 230 kV to 23052 Q124 230 kV CK 1	22	637.4 MVA	107%	Reactive Support	
A-SN RETI	22832 SYCAMORE 230 kV to 22831 SYCAMORE 138 kV CK 1T	22	392 MVA	107%	Sycamore-Penasquitos 230KV line	
A-SN RETI	29408 WIRLWIND 230 kV to 94206 TC08SC59 230 kV CK 1	24	316 MVA	103%	Voltage Support	

Low Voltages

(No N-0 Low Voltages)

Emergency Conditions (N-1 & N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN RETI	Line ADELANTO 500.0 to TOLUCA 500.0 Circuit 1	24760 OXBOW B 230 kV to 24724 OXBOW B 115 kV CK 1T	24	77 MVA	209%	Additional Transformer	
A-SN RETI	Line ADELANTO 500.0 to TOLUCA 500.0 Circuit 1	24728 INYO 115 kV to 24730 INYO PS 115 kV CK 1T	24	62 MVA	141%		
A-SN RETI	Line ADELANTO 500.0 to TOLUCA 500.0 Circuit 1	24723 CONTROL 115 kV to 24728 INYO 115 kV CK 1	24	88 MVA	120%		
A-SN RETI	Line ALBERHL5 500.0 to VALLEYS 500.0 Circuit 1	24132 SANBRDNO 230 kV to 24804 DEVERS 230 kV CK 1	24	317 MVA	101%	West of Devers 230 kV Upgrades	
A-SN RETI	Line ALBERHL5 500.0 to VALLEYS 500.0 Circuit 1	24804 DEVERS 230 kV to 25666 EL CASCO 230 kV CK 1	24	458 MVA	101%	West of Devers 230 kV Upgrades	
A-SN RETI	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30796 STOREY 1 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	148%	Reconductor	
A-SN RETI	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30796 STOREY 1 230 kV to 30800 WILSON 230 kV CK 1	30	339 MVA	127%	Reconductor	
A-SN RETI	Line COTTLE A 230.0 to MELONES 230.0 Circuit 1	38208 COTTLE B 230 kV to 30515 WARNERVL 230 kV CK 1	30	316 MVA	104%	Reconductor	
A-SN RETI	Line EIGHT MI 230.0 to TESLA E 230.0 Circuit 1	30489 STAGG-J2 230 kV to 30624 TESLA E 230 kV CK 1	30	389 MVA	111%	Reconductor	
A-SN RETI	Line HSKLLCYN 230.0 to RINALDI 230.0 Circuit 1	26135 HSKLLCYN 230 kV to 26094 SYLMARLA 230 kV CK 1	26	797 MVA	135%	Reconductor	
A-SN RETI	Line IMPRLVLY 230.0 to Q124 230.0 Circuit 1	22356 IMPRLVLY 230 kV to 23050 Q78 230 kV CK 1	22	338.6 MVA	134%	Reactive Support	
A-SN RETI	Line IMPRLVLY 230.0 to Q124 230.0 Circuit 1	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 1T	22	166.7 MVA	129%	Reactive Support	
A-SN RETI	Line IMPRLVLY 230.0 to Q124 230.0 Circuit 1	23050 Q78 230 kV to 23005 Q78_1A2 34.5 kV CK 2T	22	166.7 MVA	129%	Reactive Support	
A-SN RETI	Line IMPRLVLY 230.0 to Q78 230.0 Circuit 1	23005 Q78_1A2 34.5 kV to 23003 Q78_1A1Q 34.5 kV CK 1	22	150 MVA	677%	Reactive Support	

A-SN RETI	Line IMPRLVLY 230.0 to ROA-230 230.0 Circuit 1	22356 IMPRLVLY 230 kV to 23052 Q124 230 kV CK 1	22	637.4 MVA	108%	Reactive Support	
A-SN RETI	Line OTAYMESA 230.0 to MLMS3TAP 230.0 Circuit 1	22832 SYCAMORE 230 kV to 22831 SYCAMORE 138 kV CK 1T	22	477 MVA	113%	Sycamore-Penasquitos 230KV line	
A-SN RETI	Line PEN 230.0 to SYCAMORE 230.0 Circuit 1	22668 POWAY 69 kV to 22664 POMERADO 69 kV CK 1	22	148 MVA	109%	Sycamore-Penasquitos 230KV line	
A-SN RETI	Line SILVERGT 230.0 to SY230 230.0 Circuit 1	22820 SWEETWTR 69 kV to 22520 MONTGYTP 69 kV CK 1	22	170 MVA	112%	SPS close tap at MLMS3TAP at Miguel	
A-SN RETI	Line SILVERGT 230.0 to SY230 230.0 Circuit 1	22820 SWEETWTR 69 kV to 22824 SWTWTRTP 69 kV CK 1	22	215 MVA	101%	SPS close tap at MLMS3TAP at Miguel	
A-SN RETI	Line STAGG-J2 230.0 to TESLA E 230.0 Circuit 1	30622 EIGHT MI 230 kV to 30624 TESLA E 230 kV CK 1	30	389 MVA	112%	Reconductor	
A-SN RETI	Line STOREY 1 230.0 to GREGG 230.0 Circuit 1	30805 BORDEN 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	171%	Reconductor	
A-SN RETI	Line STOREY 1 230.0 to GREGG 230.0 Circuit 1	30795 STOREY 2 230 kV to 30805 BORDEN 230 kV CK 1	30	316 MVA	116%	Reconductor	
A-SN RETI	Line STOREY 1 230.0 to GREGG 230.0 Circuit 1	30800 WILSON 230 kV to 30795 STOREY 2 230 kV CK 1	30	316 MVA	105%	Reconductor	
A-SN RETI	Line SY230 230.0 to MLMS3TAP 230.0 Circuit 1	22828 SYCAMORE 69 kV to 22756 SCRIPPS 69 kV CK 1	22	136.8 MVA	130%	Sycamore-Penasquitos 230KV line	
A-SN RETI	Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30670 WESTLEY 230 kV to 30765 LOSBANOS 230 kV CK 1	30	677.2 MVA	117%	Reconductor	
A-SN RETI	Line WNDFARMS 500.0 to MIGUEL 500.0 Circuit 1	22356 IMPRLVLY 230 kV to 20118 ROA-230 230 kV CK 1	22	850 MVA	109%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230)	
A-SN RETI	Tran KRAMER 500.00 to KRAMER 230.00 Circuit 1 0.00	94768 KRAMER 500 kV to 24701 KRAMER 230 kV CK 2T	24	1230 MVA	142%	Second 500kV Line out of Kramer	Additional Transformer
A-SN RETI	Tran KRAMER 500.00 to KRAMER 230.00 Circuit 2 0.00	94768 KRAMER 500 kV to 24701 KRAMER 230 kV CK 1T	24	1230 MVA	142%	Second 500kV Line out of Kramer	Additional Transformer
A-SN RETI	Tran MIGUEL 230.00 to MIGUEL 500.00 Circuit 2 0.00	22468 MIGUEL 500 kV to 22472 MIGUELMP 500 kV CK 1T	22	1329 MVA	100%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230 or OtayMesa-TJI 230)	
A-SN RETI	Tran WIRLWIND 500.00 to WIRLWIND 230.00 Circuit 1 0.00	29402 WIRLWIND 500 kV to 29408 WIRLWIND 230 kV CK 2T	24	1230 MVA	159%	Additional Whirlwind 500/230 kV Transformer	

A-SN RETI	Tran WIRLWIND 500.00 to WIRLWIND 230.00 Circuit 1 0.00	29408 WIRLWIND 230 kV to 94641 TC08SC57 230 kV CK 1	24	385 MVA	112%	Additional Whirlwind 500/230 kV Transformer	
A-SN RETI	Tran WIRLWIND 500.00 to WIRLWIND 230.00 Circuit 1 0.00	29408 WIRLWIND 230 kV to 94636 TC08SC56 230 kV CK 1	24	385 MVA	112%	Additional Whirlwind 500/230 kV Transformer	
A-SN RETI	Tran WIRLWIND 500.00 to WIRLWIND 230.00 Circuit 1 0.00	29408 WIRLWIND 230 kV to 94206 TC08SC59 230 kV CK 1	24	316 MVA	105%	Additional Whirlwind 500/230 kV Transformer	
A-SN RETI	Tran WDNDFARMS 230.00 to WDNDFARMS 500.00 Circuit 2 0.00	23124 Q159ABus 230 kV to 22931 WDNDFARMS 230 kV CK 2	22	1013.5 MVA	221%	Reactive Support	Additional Transformer
A-SN RETI	Tran WDNDFARMS 230.00 to WDNDFARMS 500.00 Circuit 2 0.00	23124 Q159ABus 230 kV to 22931 WDNDFARMS 230 kV CK 1	22	1013.5 MVA	221%	Reactive Support	Additional Transformer
A-SN RETI	Line IMPRLVLY 500.0 to WDNDFARMS 500.0 Circuit 1, Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	22356 IMPRLVLY 230 kV to 20118 ROA-230 230 kV CK 1	22	850 MVA	179%	SPS (Transfer trip IV Gen and IV-ROA230 or OtayMesa-TJI 230)	
A-SN RETI	Line TRACY 500.0 to LOSBANOS 500.0 Circuit 1, Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30670 WESTLEY 230 kV to 30765 LOSBANOS 230 kV CK 1	30	677.2 MVA	164%	Reconductor	
A-SN RETI	Line IMPRLVLY 500.0 to WDNDFARMS 500.0 Circuit 1, Line IMPRLVLY 500.0 to CENTRALS 500.0 Circuit 1	22609 OTAYMESA 230 kV to 20149 TJI-230 230 kV CK 1	22	825 MVA	155%	SPS (Transfer trip IV Gen, cross trip 500/230 kV transformer #1 and IV-ROA230 or OtayMesa-TJI 230)	
A-SN RETI	Line TRACY 500.0 to LOSBANOS 500.0 Circuit 1, Line TESLA 500.0 to LOSBANOS 500.0 Circuit 1	30805 BORDEN 230 kV to 30810 GREGG 230 kV CK 1	30	316 MVA	143%	Reconductor	
A-SN RETI	Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1, Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2	24760 OXBOW B 230 kV to 24724 OXBOW B 115 kV CK 1T	24	77 MVA	139%	Build new Kramer-Midway 500 kV line	
A-SN RETI	Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1, Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2	30060 MIDWAY 500 kV to 29402 WIRLWIND 500 kV CK 3	30	3031 MVA	125%	Build new Kramer-Midway 500 kV line	

A-SN RETI	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	22356 IMPRLVLY 230 kV to 23050 Q78 230 kV CK 1	22	338.6 MVA	123%	Reactive Support	
A-SN RETI	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1, Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24016 BARRE 230 kV to 24044 ELLIS 230 kV CK 1	24	1333 MVA	120%	Reconductor	
A-SN RETI	Line MIGUEL 230.0 to MISSION 230.0 Circuit 1, Line MIGUEL 230.0 to MISSION 230.0 Circuit 2	22828 SYCAMORE 69 kV to 22756 SCRIPPS 69 kV CK 1	22	136.8 MVA	119%	Sycamore-Penasquitos 230KV line	
A-SN RETI	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1, Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	24132 SANBRDNO 230 kV to 24804 DEVERS 230 kV CK 1	24	317 MVA	115%	West of Devers 230 kV Upgrades	
A-SN RETI	Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1, Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2	29408 WIRLWIND 230 kV to 94206 TC08SC59 230 kV CK 1	24	316 MVA	104%	New Kramer-Midway 500 kV Line	
A-SN RETI	Line PARDEE 230.0 to SYLMAR S 230.0 Circuit 1, Line PARDEE 230.0 to SYLMAR S 230.0 Circuit 2	26135 HSKLLCYN 230 kV to 26094 SYLMARLA 230 kV CK 1	26	797 MVA	102%	Reconductor	

Low Voltages

ID	Contingency	Substation	Area	Min. Post-Contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN RETI	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30805 BORDEN 230 kV	30	0.921		
A-SN RETI	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30795 STOREY 2 230 kV	30	0.925		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38601 BUENAVT1 230 kV	30	0.922		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38600 BUENAVJ1 230 kV	30	0.923		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38640 WHLR RJ1 230 kV	30	0.925		

A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38641 WHLR RT1 230 kV	30	0.925		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38650 WND GPJ1 230 kV	30	0.925		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38651 WND GPT1 230 kV	30	0.925		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	30994 WHEELER 230 kV	30	0.927		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38655 WND GPJ2 230 kV	30	0.933		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38656 WND GPT2 230 kV	30	0.933		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38645 WHLR RJ2 230 kV	30	0.935		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38646 WHLR RT2 230 kV	30	0.935		
A-SN RETI	Line BUENAVJ2 230.0 to MIDWAY 230.0 Circuit 1	38605 BUENAVJ2 230 kV	30	0.948		
A-SN RETI	Line BUENAVJ2 230.0 to MIDWAY 230.0 Circuit 1	38606 BUENAVT2 230 kV	30	0.948		
A-SN RETI	Line GATES 230.0 to ARCO 230.0 Circuit 1	30935 ARCO 230 kV	30	0.932		
A-SN RETI	Line INYOKERN 230.0 to TOT254LP 230.0 Circuit 1	24787 INYOKERN 230 kV	24	0.944	Shunt Cap	
A-SN RETI	Line INYOKERN 230.0 to TOT254LP 230.0 Circuit 1	24706 BLM EAST 230 kV	24	0.947	Shunt Cap	
A-SN RETI	Line INYOKERN 230.0 to TOT254LP 230.0 Circuit 1	24707 BLM WEST 230 kV	24	0.947	Shunt Cap	
A-SN RETI	Line INYOKERN 230.0 to TOT254LP 230.0 Circuit 1	24781 NAVYCOSO 230 kV	24	0.947	Shunt Cap	
A-SN RETI	Line KRAMER 230.0 to TOT254LP 230.0 Circuit 1	94646 TOT254LP 230 kV	24	0.945	Shunt Cap	
A-SN RETI	Line KRAMER 230.0 to TOT254LP 230.0 Circuit 1	94453 TC08SC22 230 kV	24	0.945	Shunt Cap	
A-SN RETI	Line PITSBG D 230.0 to SANRAMON 230.0 Circuit 1	30555 SANRAMON 230 kV	30	0.944		

A-SN RETI	Line TEMPLETN 230.0 to MORROBAY 230.0 Circuit 1	30905 TEMPLETN 230 kV	30	0.933		
A-SN RETI	Line TRCY PMP 230.0 to LLNL 230.0 Circuit 1	37560 LLNL 230 kV	30	0.949		
A-SN RETI	Tran GATES 230.00 to GATES 1M 230.00 Circuit 1 0.00	30901 GATES 1M 230 kV	30	0.84		
A-SN RETI	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1,Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24134 SANTIAGO 230 kV	24	0.929		LA Basin Generation
A-SN RETI	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1,Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24072 JOHANNA 230 kV	24	0.93		LA Basin Generation
A-SN RETI	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1,Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24044 ELLIS 230 kV	24	0.937		LA Basin Generation
A-SN RETI	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1,Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24069 HUNTGBCH 230 kV	24	0.937		LA Basin Generation
A-SN RETI	Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 1,Line S.ONOFRE 230.0 to SANTIAGO 230.0 Circuit 2	24369 HUNTGBCH1 230 kV	24	0.937		LA Basin Generation

Voltage Deviations

ID	Contingency	Substation	Area	Post-Contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN RETI	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30805 BORDEN 230 kV	30	8%		
A-SN RETI	Line BORDEN 230.0 to GREGG 230.0 Circuit 1	30795 STOREY 2 230 kV	30	7%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38601 BUENAVT1 230 kV	30	7%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38600 BUENAVJ1 230 kV	30	7%		

A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38640 WHLR RJ1 230 kV	30	6%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38641 WHLR RT1 230 kV	30	6%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38650 WND GPJ1 230 kV	30	6%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38651 WND GPT1 230 kV	30	6%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	30994 WHEELER 230 kV	30	6%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38655 WND GPJ2 230 kV	30	5%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38656 WND GPT2 230 kV	30	5%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38645 WHLR RJ2 230 kV	30	5%		
A-SN RETI	Line BUENAVJ1 230.0 to MIDWAY 230.0 Circuit 1	38646 WHLR RT2 230 kV	30	5%		
A-SN RETI	Line CRESTA 230.0 to RK C JT2 230.0 Circuit 1	30272 RK C JT2 230 kV	30	6%		
A-SN RETI	Line GENE 230.0 to GENE LX1 230.0 Circuit 1X	25403 GENE BK1 230 kV	24	9%		
A-SN RETI	Line GENE 230.0 to GENE LX1 230.0 Circuit 1X	25431 GENE LX1 230 kV	24	9%		
A-SN RETI	Line GENE 230.0 to GENE LX2 230.0 Circuit 2X	25404 GENE BK2 230 kV	24	9%		
A-SN RETI	Line GENE 230.0 to GENE LX2 230.0 Circuit 2X	25432 GENE LX2 230 kV	24	9%		
A-SN RETI	Line LOCKFORD 230.0 to BELLOTA 230.0 Circuit 1	30482 LOCKFORD 230 kV	30	6%		
A-SN RETI	Line MWC345 345.0 to INTERMT 345.0 Circuit 1	27135 MWC345 345 kV	26	5%		
A-SN RETI	Line OWENS UP 230.0 to OWENSMID 230.0 Circuit 1	26129 OWENS UP 230 kV	26	6%		
A-SN RETI	Line OWENSCON 230.0 to INYO 230.0 Circuit 1	26131 OWENSCON 230 kV	26	6%		

A-SN RETI	Line OWENSMID 230.0 to OWENSCON 230.0 Circuit 1	26130 OWENSMID 230 kV	26	6%		
A-SN RETI	Line PITSBG D 230.0 to PITSBG E 230.0 Circuit 1	38950 VSC_PTSB 180.5 kV	30	7%		
A-SN RETI	Line POE 230.0 to RK C JT1 230.0 Circuit 1	30262 RK C JT1 230 kV	30	7%		
A-SN RETI	Line ROCKCK 1 230.0 to RK C JT1 230.0 Circuit 1	30268 ROCKCK 1 230 kV	30	7%		
A-SN RETI	Line TEMPLETN 230.0 to MORROBAY 230.0 Circuit 1	30905 TEMPLETN 230 kV	30	7%		
A-SN RETI	Line TRCY PMP 230.0 to LLNL 230.0 Circuit 1	37560 LLNL 230 kV	30	7%		
A-SN RETI	Line TRINITY 230.0 to J.F.CARR 230.0 Circuit 2	37640 TRINITY 230 kV	30	5%		
A-SN RETI	Line ZETA 1 500.0 to RAVEN_CA 500.0 Circuit 1	39215 RAVEN_CA 500 kV	30	6%		
A-SN RETI	Tran CORTINA 230.00 to CRTNA M 230.00 Circuit 1 0.00	30451 CRTNA M 230 kV	30	5%		
A-SN RETI	Tran GATES 230.00 to GATES 1M 230.00 Circuit 1 0.00	30901 GATES 1M 230 kV	30	16%		
A-SN RETI	Tran INTERMT 345.00 to INTERMT 230.00 Circuit 1 0.00	26041 INTERMT 230 kV	26	12%		
A-SN RETI	Tran MEAD S 230.00 to MEAD 287.00 Circuit 1 0.00	26051 MEAD 287 kV	26	12%		

Divergent Cases

ID	Contingency	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
A-SN RETI	Line KRAMER 500.0 to LLANO 500.0 Circuit 1	Kramer-Midway 500kV or Kramer-Whirlwind 500 kV	
A-SN RETI	Line OXBOWLP2 230.0 to OXBOWLP1 230.0 Circuit 1		
A-SN RETI	Line INYO 230.0 to COTTONWD 230.0 Circuit 1		
A-SN RETI	Line PRIMM 230.0 to ELDORDO 230.0 Circuit 1	Ivanpah-Eldorado line or Second Primm-Eldorado 230kV line	
A-SN RETI	Tran CRYSTAL 500.00 to CRSTL2PS 230.00 Circuit 2 0.00		

A-SN RETI	Tran CRYSTAL 500.00 to CRSTL3PS 230.00 Circuit 3 0.00		
A-SN RETI	Line PRIMM 230.0 to IVANPAH 230.0 Circuit 1	Ivanpah-Eldorado line or second Primm-Ivanpah 230 kV	

7.14 RETI Heavy In-State Scenario – Southern California Peak

Normal Conditions (N-0):

Thermal Overloads

ID	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	Whirlwind - Tc08Sc56 230 kV line #1	24	1048 Amps	109%		
B2_RETI	Whirlwind - Tc08Sc57 230 kV line #1	24	1048 Amps	109%		
B2_RETI	Arco - Twisselman 70 kV line #1	30	494 Amps	113%	Load growth driven	
B2_RETI	Arco 230/70 kV transformer #2	30	151 MVA	112%	Load growth driven	
B2_RETI	Corcoran 115/70 kV transformer #2	30	21 MVA	111%	Load growth driven	
B2_RETI	Tesla - AEC Tap1 115 kV line #1	30	668 Amps	106%		Turn on GWF Tracy
B2_RETI	Borden - Gregg 230 kV line #1	30	705 Amps	104%	Reconductor	
B2_RETI	IMPRLVLY 500-CENTRALS 500 ckt #1	22	1000 MW	113.8	WECC Path Rating for Sunrise is 1000MW, need new transmission to deliver generation out of IV area	
B2_RETI	SYCAMORE 230-SYCAMORE 138 ckt #1	22	392 MVA	113.29	can be mitigated by limiting the flow on Sunrise to 1000MW	can be mitigated by turning on internal SDG&E generation

Emergency Conditions (N-1)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	(L-1) HUMBOLDT - BRDGVILLE 115 kV line	31104 CARLOTTA 60kV to 31105 RIODLLTP 60kV ckt #1	30	375.28	110.07	Reconductor Rio Dell Junction to Bridgeville 60 kV	
B2_RETI	(L-1) HUMBOLDT - BRDGVILLE 115 kV line	31104 CARLOTTA 60kV to 31108 SWNS FLT 60kV ckt #1	30	375.28	105.67	Reconductor Rio Dell Junction to Bridgeville 60 kV	
B2_RETI	(L-1) HUMBOLDT - BRDGVILLE 115 kV line	31108 SWNS FLT 60kV to 31110 BRDGVILLE 60kV ckt #1	30	375.28	105.32	Reconductor Rio Dell Junction to Bridgeville 60 kV	
B2_RETI	(L-1) HUMBOLDT - HMBLT BY 60 kV line #1	31080 HUMBOLDT 60kV to 31088 HMBLT JT 60kV ckt #2	30	346.41	102.09	Reconductor Humboldt to Humboldt Bay #2 60 kV	
B2_RETI	B2 (L-1): Lose Midway - Vincent	Whirlwind - Tc08Sc56 230 kV line #1	24	1053 Amps	109%		Install reactive power support to reduce Var flow
B2_RETI	B2 (L-1): Lose Midway - Vincent	Whirlwind - Tc08Sc57 230 kV line #1	24	1053 Amps	109%		Install reactive power support to reduce Var flow
B2_RETI	B2 (L-1): Lose Midway - Vincent	Whirlwind - Tc08Sc59 230 kV line #1	24	795 Amps	100%		Install reactive power support to reduce Var flow
B2_RETI	OPEN LINE "BARRE 230.00" "LEWIS 230.00" "1" 1	VILLA PK - BARRE 230kV #1	SC E	3750.27 Amps	103.81	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "BARRE 230.00" "VILLA PK 230.00" "1" 1	LEWIS - BARRE 230kV #1	SC E	3750.27 Amps	114.68	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "2" 1	SERRANO - VILLA PK 230kV #1	SC E	3810.51 Amps	105.19	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "JHINDMWD 230.00" "JHINDSCE 230.00" "r1" 1	JHINDSCE - MIRAGE 230kV #1	SC E	896.15 Amps	151.74	Reconductoring or upgrade the rating	Existing SPS may cause case diverged hence may need reconductoring the overloaded line
B2_RETI	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	JHINDMWD - EAGLEMTN 230kV #1	SC E	901.17 Amps	144.75	Reconductoring or upgrade the rating	Existing SPS may cause case diverged hence may need reconductoring the overloaded line
B2_RETI	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	JHINDMWD - JHINDSCE 230kV #1	SC E	853.47 Amps	168.3	Reconductoring or upgrade the rating	Existing SPS may cause case diverged hence may need reconductoring the overloaded

							line
B2_RETI	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	MONTGYTP 69-SWEETWTR 69 ckt #1	22	1422.46 Amps	126.26		caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
B2_RETI	TL23051 "TL23051 SYCAMORE-PEN ck 1" "N-1" "B"	POMERADO 69-POWAY 69 ckt #1	22	1238.37 Amps	116.61		1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2_RETI	TL06920 "TL06920 ARTESN-SYCAMORE ck 1 " "N-1" "B"	POWAY 69-POMERADO 69 ckt #1	22	1238.37 Amps	116.38		1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2_RETI	TL06916 "TL06916 SYCAMORE-SCRIPPS ck 1" "N-1" "B"	POWAY 69-POMERADO 69 ckt #1	22	1238.37 Amps	110.28		1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2_RETI	TL06920 "TL06920 ARTESN-SYCAMORE ck 1 " "N-1" "B"	POWAY 69-R.CARMEL 69 ckt #1	22	953.88 Amps	109.24		1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2_RETI	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-SOUTHBAY 69 ckt #1	22	1196.54 Amps	104.7		caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
B2_RETI	TL230LL "TL230LL SY230-SILVERGT " "N-1" "B"	SWEETWTR 69-SWTWTRTP 69 ckt #1	22	1798.99 Amps	110.18		caused by both load growth and renewable generation in the IV area, can be mitigated by upgrading the local system and new transmission to deliver generation from IV
B2_RETI	TL230MMx "TL230MM SY230-	SYCAMORE 69-SCRIPPS	22	1338	118.9		1) need new

	OTAYMESA "N-1" "B"	69 ckt #1		.78 Amps			transmission to deliver generation out of IV area or 2) upgrade local system
B2_RETI	TL230MMx "TL230MM SY230-OTAYMESA "N-1" "B"	SYCAMORE 230-SYCAMORE 138 ckt #1	22	477 MVA	121.28		1) need new transmission to deliver generation out of IV area or 2) upgrade local system
B2_RETI	TL23042B "TL23042 OTAYMESA-SILVERGT "N-1" "B"	SYCAMORE 230-SYCAMORE 138 ckt #1	22	477 MVA	121.28		1) need new transmission to deliver generation out of IV area or 2) upgrade local system

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	JH LX1 230kV	SC E	0.86536	Voltage in Julian Hinds area is low; the contingencies trigger SPS to trip generation at Buck230; the case does not solve with the SPS modeled. It is mainly because the generation dispatch in the CTPG study does not have enough margin for the governor power flow to adjust the generation over the system. Increase the operating reserve level in the basecases can help to solve the case in governor power flow.	Reconductoring the local transmission lines to reduce the reactive power losses and install reactive power support
B2_RETI	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	RTAP1-6 92kV	IID	0.8183		
B2_RETI	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	DX55A58 92kV	IID	0.8927		

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	OPEN LINE "JHINDSCE 230.00" "MIRAGE 230.00" "1" 1	EM LX1 230kV	SC E	-11.86	Voltage in Julian Hinds area is low; the contingencies trigger SPS to trip generation at Buck230; the case does not solve with the SPS modeled. It is mainly because the generation dispatch in the CTPG study does not have enough margin for the governor power flow to adjust the generation over the system. Increase the operating reserve level in the basecases can help to solve the case	

						in governor power flow. Reconductoring the local transmission lines to reduce the reactive power losses and install reactive power support
B2_RETI	OPEN LINE "INYO 230.00" "COTTONWD 230.00" "1" 1	COSO 115kV	SC E	-7.38	install reactive power support	
B2_RETI	OPEN LINE "OXBOWLP2 230.00" "OXBOWLP1 230.00" "1" 1	OXBOW B 230kV	SC E	-9.13		
B2_RETI	OPEN LINE "OXBOWLP2 230.00" "TOT127TP 230.00" "1" 1	OXBOW B 230kV	SC E	-16.98		
B2_RETI	IV-Wind Farms 500kV "N-1" "B"	SYCAMORE	22	5.2		turn on internal SDG&E generation to provide reactive power support
B2_RETI	Wind Farms-Miguel 500kV "N-1" B"	BORREGO 12kV (224 buses total)	22	11		turn on internal SDG&E generation to provide reactive power support
B2_RETI	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	RTAP1-6 92kV	IID	18.24		
B2_RETI	OPEN LINE "AVE58 92.00" "RTAP1-6 92.00" "1" 1	DX55A58 92kV	IID	10.65		
B2_RETI	(L-1)LOCKFORD - BELLOTA 230kV line	LOCKFORD 2320'	30	6.24	Load growth	
B2_RETI	(L-1) HUMBOLDT to BRDGVILLE 115 kV line	BRDGVILLE 115	30	6.91		
B2_RETI	(T-1) BRDGVILLE 115/60kV bank #1	BRDGVILLE 60	30	7.54		

Emergency Conditions (N-2)

Thermal Overloads

ID	Contingency	Overloaded Facility	Area	Rating	Loading (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	(N-2)Humboldt 115kV gen tie & Humboldt- Humboldt Bay 60kV line #1	31080 HUMBOLDT 60kV to 31088 HMBLT JT 60kV ckt #2	30	346.41	109.57	Load growth	
B2_RETI	(N-2)Morro Bay-Mesa and Diablo-Mesa 230kV lines	30915 MORROBAY 230kV to 36252 MORROBY 115kV ckt #6	30	269	145.13		
B2_RETI	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Whirlwind - Tc08Sc56 230 kV line #1	24	1054 Amps	109%		Install reactive power support to reduce Var flow
B2_RETI	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Whirlwind - Tc08Sc57 230 kV line #1	24	1054 Amps	109%		Install reactive power support to reduce Var flow
B2_RETI	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Whirlwind - Tc08Sc59 230 kV line #1	24	796 Amps	100%		Install reactive power support to reduce Var flow
B2_RETI	OPEN LINE "ALMITOSE 230.00" "BARRE 230.00" "1" BARRE 230.00" "LEWIS 230.00" "1"	VILLA PK - BARRE 230kV #1	SC E	3750.27 Amps	109.74	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "ALMITOSE 230.00" "BARRE 230.00" "1" BARRE 230.00" "VILLA PK 230.00" "1"	LEWIS - BARRE 230kV #1	SC E	3750.27 Amp	119.86	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in

				s			Western LA Basin
B2_RETI	OPEN LINE "ALMITOSW 230.00" "BARRE 230.00" "2" BARRE 230.00" "ELLIS 230.00" "1"	DELAMO - CENTER S 230kV #1	SC E	2480 .1 Amp s	106.88	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "BARRE 230.00" "VILLA PK 230.00" "1" BARRE 230.00" "LEWIS 230.00" "1"	MESA CAL - LITEHIPE 230kV #1	SC E	2540 .34 Amp s	105.67	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "BARRE 230.00" "VILLA PK 230.00" "1" BARRE 230.00" "LEWIS 230.00" "1"	OLINDA - MIRALOME 230kV #1	SC E	2480 .1 Amp s	102.1	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "LAGUBELL 230.00" "RIOHONDO 230.00" "1" GOODRICH 230.00" "LAGUBELL 230.00" "1"	CENTER S - DELAMO 230kV #1	SC E	2480 .1 Amp s	107.4	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "LEWIS 230.00" "SERRANO 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "2"	VILLA PK - LEWIS 230kV #1	SC E	2540 .34 Amp s	124.21	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "1" LEWIS 230.00" "SERRANO 230.00" "1"	SERRANO - VILLA PK 230kV #2	SC E	4048 .98 Amp s	121.26	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "2" LEWIS 230.00" "SERRANO 230.00" "1"	SERRANO - VILLA PK 230kV #1	SC E	3810 .51 Amp s	128.85	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "SERRANO 230.00" "VILLA PK 230.00" "1" SERRANO 230.00" "VILLA PK 230.00" "2"	SERRANO - LEWIS 230kV #1	SC E	3361 .18 Amp s	108.14	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Western LA Basin
B2_RETI	OPEN LINE "ClrdoRvr 500.00" "RedBluff 500.00" "1" ClrdoRvr 500.00" "RedBluff 500.00" "2"	JHINDSCE - MIRAGE 230kV #1	SC E	896. 15 Amp s	118.54	Reconductoring or upgrade the rating	Existing SPS may cause case diverged hence may need reconductoring the overloaded line
B2_RETI	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" KRAMER 230.00" "LUGO 230.00" "2"	KRAMER - KRAMER 500kV #1	SC E	1230 MVA	123.01	Add the third 500/230 kV Bank in Kramer	
B2_RETI	OPEN LINE "KRAMER 230.00" "LUGO 230.00" "1" KRAMER 230.00" "LUGO 230.00" "2"	KRAMER - KRAMER 500kV #2	SC E	1230 MVA	123.01	Add the third 500/230 kV Bank in Kramer	
B2_RETI	OPEN LINE "LUGO 500.00" "MOHAVE 500.00" "1" LUGO 500.00" "VICTORVL 500.00" "1"	PISGAH - ELDORDO 500kV #1	SC E	1600 .41 Amp s	101.55	Upgrade series cap	
B2_RETI	OPEN LINE "PARDEE 230.00" "MOORPARK 230.00" "1" PARDEE 230.00" "MOORPARK 230.00" "3"	PARDEE - MOORPARK 230kV #2	SC E	2279 .28 Amp s	112.72	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Moorpark LCR sub-area
B2_RETI	OPEN LINE "PARDEE 230.00" "MOORPARK 230.00" "1" PARDEE 230.00" "MOORPARK 230.00" "2"	PARDEE - MOORPARK 230kV #3	SC E	2279 .28 Amp s	112.72	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Moorpark LCR sub-area

B2_RETI	OPEN LINE "S.CLARA 230.00" "MOORPARK 230.00" "1" S.CLARA 230.00" "MOORPARK 230.00" "2"	PARDEE - S.CLARA 230kV #1	SC E	1240 .05 Amp s	106.62	Reconductoring or upgrade the rating	Can be mitigated by turn on local capacity in Moorpark LCR sub-area
B2_RETI	23011/23003 "SA-EA 230KV + SA- ES-EA 230KV" "N-2" "C"	CHCARITA 138- SYCAMORE 138 ckt #1	22	853. 89 Amp s	104.59		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	661/664 "TL661 & TL664 69KV " "N-2" "C"	CLAIRMNT 69- MISSION 69 ckt #1	22	420. 88 Amp s	104.51		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	JAP MESA 69-HORNO TP 69 ckt #1	22	270. 27 Amp s	115.16		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	23051B/230XX "PEN-ES #1+ PEN- ES #2 230KV" "N-2" "C"	POMERADO 69- POWAY 69 ckt #1	22	1238 .37 Amp s	156.96		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	23051A/6920B "SX-PEN 230KV + AR-SX 69KV" "N-2" "C"	POWAY 69- R.CARMEL 69 ckt #1	22	953. 88 Amp s	125.86		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	6924/6915 "POM-SX #1+#2 69KV *assoc SPS" "N-2" "C"	R.CARMEL 69- BERNARDO 69 ckt #1	22	568. 98 Amp s	155.11		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	616/6939 "TL616 & TL6939 69KV " "N-2" "C"	R.CARMEL 69- POWAY 69 ckt #1	22	953. 88 Amp s	102.51		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	626/637 "TL626 & TL637 69KV " "N-2" "C"	RINCON 69- WARNERS 69 ckt #1	22	270. 27 Amp s	113.23		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	ML61/TL632 "LC-ML61-TC 138kV + ML-LC 69kV v1" "N-2" "C"	SANTEE 138- SYCAMORE 138 ckt #1	22	1146 .33 Amp s	100.91		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	6906/675 "MR-PQ 69KV + PQ- MRM 69KV" "N-2" "C"	SCRIPPS 69- SYCAMORE 69 ckt #1	22	1338 .78 Amp s	115.69		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	23052/23007 "TA-SO 1 + 2 230KV *assoc SPS" "N-2" "C"	STUARTTP 69- OCNSDETP 69 ckt #1	22	270. 27 Amp s	131.86		N-2 overload, can be mitigated by dropping load or upgrading the local system; caused by load growth
B2_RETI	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 138- CHCARITA 138 ckt #1	22	853. 89 Amp s	101.92		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 69- SCRIPPS 69 ckt #1	22	1338 .78 Amp s	121.53		N-2 overload, can be mitigated by

				Amps			dropping load or upgrading the local system
B2_RETI	13815B/23042 "13815 + 23042 138 & 230 KV" "N-2" "C"	SYCAMORE 230-SYCAMORE 138 ckt #1	22	477 MVA	124.51		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	ML61/13809 "PV-TC + LC-SY 138KV v1" "N-2" "C"	SYCAMORE 230-SYCAMORE 138 ckt #1	22	477 MVA	113.17		N-2 overload, can be mitigated by dropping load or upgrading the local system
B2_RETI	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230-ESCNDIDO 230 ckt #1	22	1144.66 Amps	140.02		N-2 overload, can be mitigated by dropping load or upgrading the local system; caused by load growth
B2_RETI	HNGila-dlo (Hassaympa-N. Gila # 1 and 2) "N-2" "C"	BARRE - ELLIS 230.0 #1	24	3346 Amps	103.48		
B2_RETI	HNGila-dlo (Hassaympa-N. Gila # 1 and 2) "N-2" "C"	MIRAGE - JHINDSCE 230.0 #1	24	896 Amps	105.65		
B2_RETI	IV-Wind Farms "N-1" "B"	ROA-230 - IMPRLVLY 230.0 #1	22	2134 Amps	101.82		
B2_RETI	Windfarms-Miguel "N-1" "B"	ROA-230 - IMPRLVLY 230.0 #1	22	2134 Amps	104.15		
B2_RETI	Windfarms-Miguel "N-1" "B"	MLMS3TAP-SY230 230.0 #1	22	2952.02 Amps	101.56		
B2_RETI	IV-Ngila "N-1" "B"	MIRAGE - JHINDSCE 230.0 #1	24	896.15 Amps	109.87		
B2_RETI	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BA3258 161kV to AVE58 161kV ckt #1	IID	591.69(Amps)	102.66		
B2_RETI	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" COACHELV 230.00" "MI46COCH 230.00" "1"	BANI161 161kV to BA3258 161kV ckt #1	IID	591.69(Amps)	112.88		
B2_RETI	OPEN LINE "COACHELV 230.00" "MIDWAY X 230.00" "1" MI46COCH 230.00" "MIDWAY X 230.00" "1"	BANI161 161kV to BA3258 161kV ckt #1	IID	591.69(Amps)	105.35		
B2_RETI	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL 92 kV to DROP4 92kV ckt #1	IID	507.69Amps	149.85		

Low Voltages

ID	Contingency	Substation	Area	Min. Post-contingency Voltage (PU)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	OPEN LINE "DEVERS 230.00" "MIRAGE 230.00" "1" JHINDSCE 230.00" "MIRAGE 230.00" "1"	JH LX1 230kV	SC E	0.86527		Voltage in Julian Hinds area is low; the contingencies trigger SPS to trip generation at Buck230; the case does not solve with the SPS modeled. It is

					mainly because the generation dispatch in the CTPG study does not have enough margin for the governor power flow to adjust the generation over the system. Increase the operating reserve level in the basecases can help to solve the case in governor power flow. Reconductoring the local transmission lines to reduce the reactive power losses and install reactive power support
B2_RETI	OPEN LINE "S.CLARA 230.00" "GOLETA 230.00" "1" VINCENT 230.00" "S.CLARA 230.00" "1"	GOLETA 230kV	SC E	0.88905	This is related to the load growth at Goleta and there is not enough local generation turned on in the basecase for renewable. More reactive compensation is needed at Goleta at higher load.
B2_RETI	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230kV	22	0.77632	
B2_RETI	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL 92kV	21	0.8744	

Voltage Deviations

ID	Contingency	Substation	Area	Post-contingency Voltage Deviation (%)	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	C3 (L-2): Banos - Tesla and Los Banos - Tracy 500 kV lines	Gualala 60 kV	30	-11%		
B2_RETI	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Gualala 60 kV	30	-11%		
B2_RETI	OPEN LINE "DEVERS 230.00" "MIRAGE 230.00" "1" JHINDSCE 230.00" "MIRAGE 230.00" "1"	EM LX1 230kV	SC E	-11.87		Voltage in Julian Hinds area is low; the contingencies trigger SPS to trip generation at Buck230; the case does not solve with the SPS modeled. It is mainly because the generation dispatch in the CTPG study does not have enough margin for the governor power flow to adjust the generation over the system. Increase the operating reserve level in the basecases can help to solve the case in governor power flow. Reconductoring the local transmission lines to reduce the reactive power losses and install reactive power support
B2_RETI	OPEN LINE "S.CLARA 230.00" "GOLETA 230.00" "2" VINCENT 230.00" "S.CLARA 230.00" "1"	GOLETA 230kV	SC E	-8.03		This is related to the load growth at Goleta and there is not enough local generation turned on in the basecase for renewable. More reactive compensation is needed at Goleta at higher load.
B2_RETI	23052/23007 "23007/52 & TA69: SPS9.7" "N-2" "C"	TALEGA 230kV	22	-21.91		due to load growth
B2_RETI	OPEN LINE "ELSTEAMP 92.00" "HOLTVILL 92.00" "1" ELSTEAMP 92.00" "HOLTVILL 92.00" "2"	HOLTVILL 92kV	21	12.73		
B2_RETI	(N-2)Morro Bay-Mesa and Diablo-Mesa 230kV lines	MESA PGE 230	30	16.59		

Diverged Cases

ID	Contingency	Area	Transmission Upgrade Mitigating Criteria Violation	Possible Alternatives Mitigating Criteria Violations
B2_RETI	MossLand-g2	30	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines out of the El Dorado-Ivanpah area
B2_RETI	Diablo-Midway-dlo	30	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines out of the El Dorado-Ivanpah area
B2_RETI	OPEN LINE "PRIMM 230.00" "ELDORDO 230.00" "1" 1 with SPS	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)
B2_RETI	OPEN LINE "PRIMM 230.00" "IVANPAH 230.00" "1" 1 with SPS	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)
B2_RETI	OPEN LINE "ALMITOSE 230.00" "BARRE 230.00" "1" ALMITOSE 230.00" "CENTER S 230.00" "1"	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)
B2_RETI	OPEN LINE "BARRE 230.00" "ELLIS 230.00" "1" DELAMO 230.00" "ELLIS 230.00" "1"	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)
B2_RETI	OPEN LINE "BARRE 230.00" "VILLAPK 230.00" "1" BARRE 230.00" "LEWIS 230.00" "1"	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)
B2_RETI	OPEN LINE "EL NIDO 230.00" "CHEVMAIN 230.00" "1" ELSEGND 230.00" "EL NIDO 230.00" "1"	24	The system does not have enough reserve and reactive support.	Can be mitigated by adding new transmission lines into the load pockets or disptach more generation in LA Basin
B2_RETI	OPEN LINE "ELSEGND 230.00" "EL NIDO 230.00" "1" ELSEGND 230.00" "CHEVMAIN 230.00" "1"	24	Add new transmission line to deliver El Dorado new generation to the system and/or install reactive power devices	
B2_RETI	OPEN LINE "SERRANO 500.00" "ALBERHL5 500.00" "1" ALBERHL5 500.00" "VALLEYSC 500.00" "1"	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines out of Tehachapi (e.g. WIRWIND-WINDHUB-KRAMER)
B2_RETI	OPEN LINE "LUGO 500.00" "MOHAVE 500.00" "1" MOHAVE 500.00" "ELDORDO 500.00" "1"	24	New transmission line from Kramer to the system (e.g Kramer-Wirwind or Kramer to Pisgah or Kramer - Rancho Vista)	
B2_RETI	OPEN LINE "ANTELOPE 500.00" "WINDHUB 500.00" "1" WINDHUB 500.00" "WIRLWIND 500.00" "1"	24	New transmission line from Kramer to the system (e.g Kramer-Wirwind or Kramer to Pisgah or Kramer - Rancho Vista)	
B2_RETI	OPEN LINE "KRAMER 500.00" "LLANO 500.00" "1" 1	24	The system does not have enough reserve and reactive support.	Need to reconductoring the local systems to mitigate the overload so that the SPS of tripping generation can be eliminated.
B2_RETI	OPEN LINE "VINCENT 500.00" "LLANO 500.00" "1" LUGO 500.00" "LLANO 500.00" "1"	24	The system does not have enough reserve and reactive support.	Need to reconductoring the local systems to mitigate the overload so that the SPS of tripping generation can be eliminated.
B2_RETI	J.Hinds - Mirage 230 kV with SPS	24	The system does not have enough reserve and reactive support to recover from loss of generation.	
B2_RETI	J. Hinds - Eagle Mountain with SPS	24	The system does not have enough reserve and reactive support to recover from loss of generation.	
B2_RETI	Palo Verde G-2	24	The system does not have enough reserve and reactive support to recover from loss of generation.	
B2_RETI	SONGS G-1	24	The system does not have enough reserve and reactive support to recover from loss of generation.	Also can be mitigated by adding new transmission lines out of the El

			Dorado-Ivanpah area
B2_RET1	SONGS G-2	24	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines out of the El Dorado-Ivanpah area
B2_RET1	23041/42A "OMGP-ML #1+#2 230kV" "N-2" "C"	22	can be mitigated by dispatching internal SDG&E generation
B2_RET1	Sunrise and SWPL 500 kV lines N-2	22	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines out of IV area
B2_RET1	SONGS G-1	22	The system does not have enough reserve and reactive support to recover from loss of generation. Also can be mitigated by adding new transmission lines into the load pockets (e.g. LA Basin)
B2_RET1	SONGS G-2	22	

Transient Stability Analysis Result Templates:

ID	Category	Switching File	Substation	Bus Type	Area	Voltage Dip (%)	Min. Frequency (Hz)	Mitigation
B2_RETI	B	B2 (L-1): Tesla - Los Banos 500 kV line	Tc08Sc36 66 kV		24	41%		Install reactive power support
B2_RETI	B	B2 (L-1): Los Banos - Midway 500 kV line	Tc08Sc36 66 kV		24	41%		Install reactive power support
B2_RETI	B	B2 (L-1): Los Banos - Gates 500 kV line	Tc08Sc36 66 kV		24	41%		Install reactive power support
B2_RETI	B	B2 (L-1): Gates - Midway 500 kV line	Tc08Sc36 66 kV		24	50%		Install reactive power support
B2_RETI	B	B2 (L-1): Gates - Diablo Canyon 500 kV line	Tc08Sc36 66 kV		24	49%		Install reactive power support
B2_RETI	B	B2 (L-1): Diablo Canyon - Midway 500 kV Line	Tc08Sc36 66 kV		24	58%		Install reactive power support
B2_RETI	B	B2 (L-1): Midway - Vincent	Tc08Sc36 66 kV		24	60%		Install reactive power support
B2_RETI	B	B3 (T-1): Gates 500/230 kV transformer	Tc08Sc36 66 kV		24	49%		Install reactive power support
B2_RETI	B	B3 (T-1): Midway 500/230 kV transformer	Tc08Sc36 66 kV		24	57%		Install reactive power support
B2_RETI	C	C3 (L-2): Banos - Tesla and Los Banos - Tracy 500 kV lines	Tc08Sc36 66 kV		24	42%		Install reactive power support
B2_RETI	C	C3 (L-2): Los Banos - Gates and Los Banos - Midway 500 kV lines	Tc08Sc36 66 kV		24	44%		Install reactive power support
B2_RETI	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Tortoise 66 kV		24	38%		Install reactive power support
B2_RETI	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Tc08Sc36 66 kV		24	68%		Install reactive power support
B2_RETI	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines	Palmdale 66 kV		24	33%		Install reactive power support
B2_RETI	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines, no RAS	Tortoise 66 kV		24	38%		Install reactive power support
B2_RETI	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines, no RAS	Tc08Sc36 66 kV		24	68%		Install reactive power support
B2_RETI	C	C3 (L-2): Gates - Midway and Los Banos - Midway 500 kV lines, no RAS	Palmdale 66 kV		24	33%		Install reactive power support
B2_RETI	C	C3 (L-2): Diablo Canyon - Midway 500 kV	Tc08Sc36 66 kV		24	55%		Install reactive power support
B2_RETI	C	C3 (L-2): Midway - Vincent 500 kV	Tortoise 66 kV		24	72%		Install reactive power support
B2_RETI	C	C3 (L-2): Midway - Vincent 500 kV	Tc08Sc36 66 kV		24	79%		Install reactive power support
B2_RETI	C	C3 (L-2): Midway - Vincent 500 kV	Palmdale 66 kV		24	59%		Install reactive power support
B2_RETI	B	Adelanto-Victorville-slo			24	Undamped oscillation		
B2_RETI	C	Adelanto-Victorville-dlo			24	Undamped oscillation		
B2_RETI	B	Kramer-Llano-slo			24	Undamped		

						oscillation		
B2_RET1	C	Vincent-Llano-Lugo-dlo			24	Undamped oscillation		
B2_RET1	C	Lugo-Miraloma-dlo			24	Undamped oscillation		
B2_RET1	C	Lugo-Pisgah-Mohave-dlo			24	Undamped oscillation		
B2_RET1	B	Lugo-Victorville-slo			24	Undamped oscillation		
B2_RET1	B	Lugo-Vincent-slo			24	Undamped oscillation		
B2_RET1	C	McCullough-Victorville-dlo			24	Undamped oscillation		
B2_RET1	C	Midway-Vincent-dlo			24	Undamped oscillation		
B2_RET1	C	Midway-Vincent-dlo-RAS			24	Undamped oscillation		
B2_RET1	C	Lugo-Pisgah-dlo			24	Undamped oscillation		