

APPENDIX C: Reliability Assessment Study

Results

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk - Summer Peak**



High/Low Voltage

ID	Substation	Contingency	Category	Category Description	Voltage (PU)				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-V-1	voltages below 0.95 p.u. on multiple buses in all cases	normal conditions	A						mitigation in area studies
BULK-PK-V-2	voltages above 1.05 p.u. on multiple buses in all cases	normal conditions	A						mitigation in area studies
BULK-PK-V-3	500 kV buses in Northwest	PDCI bi-pole	C	Bi-pole DC	up to 1.14	up to 1.13	up to 1.12	up to 1.14	trip Celilo capacitors, turn off capacitors at Ostrander 500 kV
BULK-PK-V-4	Robinson 345 kV, Sierra area	PDCI bi-pole	C	Bi-pole DC	0.89	>0.9	>0.9	>0.9	turn on shunt capacitor on Robinson 345kV
BULK-PK-V-5	500 kV buses in Northwest	Table Mtn-Tesla and Table Mtn-Vaca Dix 500 kV	C	L-2	up to 1.10	up to 1.10	<1.1	up to 1.10	turn on shunt reactor at Grizzly or turn off shunt capacitors at Ostrander and Celilo
BULK-PK-V-6	500 kV buses in Northwest	Table Mtn-Tesla and Tesla-Vaca Dix 500 kV	C	L-2	up to 1.11	up to 1.11	up to 1.11	up to 1.11	turn on shunt reactor at Grizzly or turn off shunt capacitors at Ostrander and Celilo

ID	Substation	Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Summer Off-Peak	
BULK-NP-V-1	500kV buses in Northwest	Diablo unit # 2	B	G-1	up to 1.11	<1.1	<1.1	turn off shunt capacitors at Ostrander and Monroe
BULK-NP-V-2	Diablo 500 kV	Diablo unit # 2	B	G-1	<1.1	1.1	<1.1	open Diablo-Midway 500 kV line if hi vlt on Diablo
BULK-NP-V-3	500kV buses in Northwest	Diablo-Midway # 1 and 2 500 kV	C	L-2	up to 1.11	up to 1.11	<1.1	turn off shunt capacitors at Ostrander and Monroe
BULK-NP-V-4	500kV buses in Northwest	Tesla-Los Banos and Tracy-Los Banos 500 kV	C	L-2	up to 1.11	<1.1	<1.1	turn off shunt capacitors at Ostrander and Monroe
BULK-NP-V-5	500kV buses in Northwest	Los Banos-Gates # 1 and Los Banos-Midway 500 kV	C	L-2	up to 1.11	<1.1	<1.1	turn off shunt capacitors at Ostrander and Monroe
BULK-NP-V-6	500kV buses in Northwest	Midway-Gates and Los Banos-Midway 500 kV	C	L-2	up to 1.11	<1.1	<1.1	turn off shunt capacitors at Ostrander and Monroe

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance				Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-SP-TS-1	3-phase fault Table Mtn 500 kV Table Mtn 500/230 kV x-former	B	T-1	no violations	no violations	frq below 59.6 Hz for up to 11.6 cyc on buses 60 kV system off Table Mtn	no violations	Possible modeling error, or consider tripping small units: WIN&MADE, JELD-WN, and HONEYLK
BULK-SP-TS-2	3phase fault Gates 230 kV, Gates-Midway 230 kV	B	L-1	no violations	no violations	no violations	Q650AB tripped for hi frq with fault	consider changing protection settings
BULK-SP-TS-3	3phase fault Midway 230 kV, Gates-Midway 230 kV	B	L-1	Q622B, Q621A tripped for under-vlt, Q557 for under-frq, Wheeler Rdg, Windgap and Buenavst pumps tripped for under-freq, Smyrna and Charka Id tripped for under-frq, vlt dev up to 41.1% and slow frq recovery in Wheeler Rdg area	Q622B, Q621A tripped for under-vlt, Q557 for under-frq, Wheeler Rdg, Windgap and Buenavst pumps tripped for under-freq, Smyrna and Charka Id tripped for under-frq, vlt dev up to 40.5% and slow frq recovery in Wheeler Rdg area	Wheeler Rdg, Windgap and Buenavst pumps tripped for under-freq, vlt dev up to 37.0% and slow frq recovery in Wheeler Rdg area	Windgap vlt dev up to 29.3%, and slow frq recovery in Wheelr Ridge area, Q622B, Q621A tripped for under-vlt, Q557 for under-frq, Smyrna and Charka Id tripped for under-frq	consider changing protection settings on renewable generators tripped with fault. Midway pumps need to have fast protection to be tripped with 3-phase faults
BULK-SP-TS-4	3 phase 230 kV C.Costa, CCosta-LasPositas 230 kV	B	L-1	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	these are old units, don't have Under-Voltage Ride Through
BULK-SP-TS-5	3phase fault Gates 230 kV, Gates-Arco and Gates-Midway 230 kV	C	L-2	no violations	no violations	no violations	Q650AB tripped for hi frq with fault	consider changing protection settings
BULK-SP-TS-6	3phase fault Gates 230 kV, Gates-Gregg and Gates-Mc Call230 kV	C	L-2	no violations	no violations	no violations	Q650AB tripped for hi frq with fault	consider changing protection settings

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance				Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-SP-TS-7	3phase fault Midway 230 kV, Midway-Kern 230 kV #1 and 2 230 kV	C	L-2	Q622B, Q621A tripped for under-vlt, Q557 for under-frq, Wheeler Rdg, Windgap and Buenavst pumps tripped for under-freq, Smyrna and Charka Id tripped for under-frq, vlt dev up to 40.8% and slow freq recovery in Wheeler Rdg area	Q622B, Q621A tripped for under-vlt, Q557 for under-frq, Wheeler Rdg, Windgap and Buenavst pumps tripped for under-freq, Smyrna and Charka Id tripped for under-frq, vlt dev up to 40.3% and slow freq recovery in Wheeler Rdg area	Wheeler Rdg, Windgap and Buenavst pumps tripped for under-freq, vlt dev up to 36.8% slow freq recovery in Wheeler Rdg area	slow freq recovery in Wheel Rdg area. Q622B, Q621A tripped for under-vlt, Q557 for under-frq, Smyrna and Charka Id tripped for under-frq	consider changing protection settings on renewable generators tripped with fault. Midway pumps need to have fast protection to be tripped with 3-phase faults
BULK-SP-TS-8	3 phase 230 kV C.Costa, C.Costa-LasPositas, Ccos-Lonetree 230 kV	C	L-2	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	these are old units, don't have Under-Voltage Ride Through
BULK-SP-TS-9	3 phase 230 kV C.Costa, C.Costa-Brentwd, Ccos-Delta 230 kV	C	L-2	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	these are old units, don't have Under-Voltage Ride Through

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	2024 Summer Off-Peak	
BULK-NP-TS-1	3phase 500 kV Midway, Midway-Diablo 500 kV	B	L-1	Q621A tripped for low vlt, Q559 and Q622B tripped for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-2	3phase 500 kV Midway, Midway-Gates 500 kV	B	L-1	Q621A tripped for low vlt, Q559 and Q622B tripped for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-3	3phase 500 kV Midway, Midway-Los Banos 500 kV	B	L-1	Q621A tripped for low vlt, Q559 and Q622B tripped for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-4	3phase 500 kV Midway, Midway-Vincent #1, 2 or 3 500 kV	B	L-1	Q621A tripped for low vlt, Q559 and Q622B tripped for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-5	3phase 500 kV Midway, Midway 500/230 kV x-former	B	T-1	Q621A tripped for low vlt, Q559 and Q622B tripped for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-6	3phase fault Gates 230 kV, Midway-Gates 230 kV	B	L-1	Q650AB and Q636 tripped for low vlt	no violations, these units are off in the base case	Q650AB and Q636 tripped for low vlt	consider changing protection settings
BULK-NP-TS-7	3phase fault Midway 230 kV, Midway-Gates 230 kV	B	L-1	Windgap, Wheelr Rdg and Buenavsta pumps tripped for under-frequency, Q621A and Q622B tripped for low vlt, Q559 for hi frq, Q557 for low frq; slow frq recovery in Wheel Rdg area	Windgap, Wheel Rdg and Buenavs pumps tripped for under-frq	Q621A and Q622B tripped for low vlt, Q557 tripped for low frq, slow frq recovery in Wheelr Rdg area, Buenavst 1, Smyrna and Charka tripped for under-frq. Vlt dip Windgap2 29.9%	consider changing protection settings on renewable generators tripped with fault. Midway pumps need to have fast protection to be tripped with 3-phase faults

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	2024 Summer Off-Peak	
BULK-NP-TS-8	3 phase fault Round Mtn, Round Mtn 500/230 kV x-former	B	T-1	frq dip Round Mtn 230 kV bus	Kilarc gen out-of-step	no violations	possible modeling error
BULK-NP-TS-9	3 phase fault 230 kV Newark, Newark-Ravenswood 230 kV	B	L-1	2 wind gen tripped for undervlt (32176, 32177)	no violations	no violations	these are old units, don't have Under-Voltage Ride Through
BULK-NP-TS-10	3 phase fault 230 kV Tesla, Newark-Tesla 230 kV	B	L-1	2 wind gen tripped for undervlt (32176, 32177)	no violations	no violations	these are old units, don't have Under-Voltage Ride Through
BULK-NP-TS-11	3 phase fault 230 kV C.Costa, C.Costa-LasPositas 230 kV	B	L-1	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	these are old units, don't have Under-Voltage Ride Through
BULK-NP-TS-12	3phase fault Olinda 500 kV,Olinda 500/230 kV	B	T-1	no violations	Kilarc gen out-of-step	no violations	possible modeling error
BULK-NP-TS-13	3phase fault Cottonwd 230 kV, Cottonwd-Olinda 230 kV	B	L-1	no violations	Kilarc gen out-of-step	no violations	possible modeling error
BULK-NP-TS-14	3 phase fault Midway 500 kV, Midway-Vincent # 1 and #2 500 kV	C	L-2	Q621A tripped for low vlt, Q559 and Q622B for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-15	3 phase fault Midway 500 kV, Midway-Gates and Midway-Los Banos 500 kV	C	L-2	Q621A tripped for low vlt, Q559 and Q622B for hi frq	no violations, these units are off in the base case	Q621A and Q622B tripped for low vlt	consider changing protection settings
BULK-NP-TS-16	3phase fault Midway 230 kV, Midway-Kern #1 and 2 230kV	C	L-2	Windgap, Wheel Rdg and Buenavs pumps tripped for under-frq, slow frq recovery in Wheel Rdg area, Q621A and Q622B tripped for low vlt, Q559 for hi frq, Q557 for low frq;	Windgap, Wheel Rdg and Buenavs pumps tripped for under-frq	Q621A and Q622B tripped for low vlt, Q557 tripped for low frq, slow frq recovery in Wheelr Rdg area, Buenavst 1, Smyrna and Charka tripped for under-frq. WIndgap2 vlt dip 30.4%	consider changing protection settings on renewable generators tripped with fault. Midway pumps need to have fast protection to be tripped with 3-phase faults

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk - Summer Off-Peak & Summer Light Load**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	2024 Summer Off-Peak	
BULK-NP-TS-17	3phase fault Gates 230 kV, Gates-Arco and Gates-Midway 230 kV	C	L-2	Q650AB and Q636 tripped for low vlt	no violations, these units are off in the base case	Q650AB and Q636 tripped for low vlt	consider changing protection settings
BULK-NP-TS-18	3 phase 230 kV C.Costa, CCosta-LasPositas, Ccos-Lonetree 230 kV	C	L-2	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	these are old units, don't have Under-Voltage Ride Through
BULK-NP-TS-19	3 phase 230 kV C.Costa, CCosta-Brentwd, Ccos-Delta230 kV	C	L-2	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	3 wind gen tripped for undervlt (32171, 32176, 32177)	these are old units, don't have Under-Voltage Ride Through
BULK-NP-TS-20	3phase fault Gates 230 kV, Gates-Gregg and Gates-Mc Call230 kV	C	L-2	Q650AB and Q636 tripped for low vlt	no violations, these units are off in the base case	Q650AB and Q636 tripped for low vlt	consider changing protection settings

ID	Overloaded Facility	Contingency	Category	Category Description	Loading (%)				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTT-1	Table Mtn-Vaca Dixon 500 kV	normal conditions	A	normal	<95%	<95%	98.7%	<95%	operate within seasonal COI nomogram
BULK-PK-PTT-2	Eight Mile-Lodi 230 kV	normal conditions	A	normal	<95%	<95%	113.4%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-3	Oro Loma 115/70 # 2	normal conditions	A	Normal	107.5%	<95%	<95%	<95%	mitigation in the area studies
BULK-PK-PTT-4	Rnd Mtn –Table Mtn #1 or #2 500 kV	Rnd Mtn –Table Mtn #2 or #1 500 kV	B	L-1	101.7%	102.3%	106.0%	100.8%	bypass ser caps on the remaining Round Mtn-Table Mtn 500 kV line or reduce COI flow according to seasonal nomogram
BULK-PK-PTT-5	Eight Mile-Lodi 230 kV	Captain Jack-Olinda 500 kV	B	L-1	<95%	<95%	99.4%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-6	Eight Mile-Lodi 230 kV	Olinda-Tracy 500 kV	B	L-1	<95%	<95%	104.2%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-7	Eight Mile-Lodi 230 kV	Table Mtn-Tesla 500 kV	B	L-1	<95%	<95%	110.7%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-8	Eight Mile-Lodi 230 kV	Table Mtn 500/230 kV x-former	B	L-1	<95%	<95%	116.5%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-9	Eight Mile-Lodi 230 kV	Table Mtn-Vaca Dixon 500 kV	B	L-1	<95%	<95%	115.8%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-10	Eight Mile-Lodi 230 kV	Tesla 500/230 kV x-former	B	L-1	<95%	<95%	98.9%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-11	Eight Mile-Lodi 230 kV	Vaca Dixon-Tesla 500 kV	B	L-1	<95%	<95%	100.4%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line

ID	Overloaded Facility	Contingency	Category	Category Description	Loading (%)				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTT-12	Eight Mile-Lodi 230 kV	PDCI mono-pole	B	PDCI	<95%	<95%	100.6%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-13	Eight Mile-Lodi 230 kV	Diablo unit 2	B	G-1	<95%	<95%	100.6%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-14	Captain Jack-Olinda 500 kV	Malin- Round Mtn #1 and #2 500 kV	C	L-2	100.4%	105.3%	104.1%	100.1%	operate within seasonal COI nomogram
BULK-PK-PTT-15	Captain Jack-Olinda 500 kV	Round Mtn-Table Mtn # 1 and # 2 500 kV	C	L-2	101.2%	104.9%	105.9%	100.6%	operate within seasonal COI nomogram
BULK-PK-PTT-16	Olinda-Tracy 500 kV	Round Mtn-Table Mtn # 1 and 2 500 kV	C	L-2	<95%	<95%	105.1%	<95%	operate within seasonal COI nomogram
BULK-PK-PTT-17	Olinda-Tracy 500 kV	Table Mtn-Tesla and Table Mtn-Vaca Dix 500 kV	C	L-2	<95%	<95%	101.9%	<95%	operate within seasonal COI nomogram
BULK-PK-PTT-18	Table Mtn-Vaca Dixon 500 kV	Tesla 500 kV stuck breaker	C	BRK	<95%	<95%	98.6%	<95%	not a violation
BULK-PK-PTT-19	Round Mtn 500/230 kV x-former	Malin-Round Mtn # 1 and 2 500 kV	C	L-2	<95%	<95%	101.0%	<95%	operate within COI nomogram
BULK-PK-PTT-20	Delta-Cascade 115 kV	Malin- Round Mtn #1 and #2 500 kV	C	L-2	100.7%	102.3%	102.2%	99.7%	adjust Weed phase shifter
BULK-PK-PTT-21	Delevan-Cortina 230 kV	Round Mtn-Table Mtn # 1 and # 2 500 kV	C	L-2	102.8%	104.1%	97.0%	101.7%	assess the use of COI nomogram and determine if additional mitigation is required
BULK-PK-PTT-22	Delevan-Cortina 230 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	106.0%	106.5%	104.8%	103.7%	assess the use of COI nomogram and determine if additional mitigation is required
BULK-PK-PTT-23	Cottonwood E-Round Mtn 230kV #3	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	105.0%	106.1%	117.0%	104.8%	upgrade the line, or limit COI import within nomogram
BULK-PK-PTT-24	Cottonwood-Round Mtn # 2 230 kV	Table Mtn-Tesla and Table Mtn-Vaca Dix 500 kV	C	L-2	<95%	<95%	106.1%	<95%	upgrade the line, or limit COI import within nomogram
BULK-PK-PTT-25	Pease-E.Marysville 115 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	96.3%	<95%	<95%	<95%	South of Palermo Project. Prior to the project: limit COI import within nomogram

ID	Overloaded Facility	Contingency	Category	Category Description	Loading (%)				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTT-26	Table Mtn-Rio Oso 230 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	102.1%	107.2%	103.4%	107.8%	Upgrade terminal equipment on this line (approved project)
BULK-PK-PTT-27	Eight Mile-Lodi 230 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	99.9%	97.5%	136.0%	103.0%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-28	Eight Mile-Lodi 230 kV	PDCI bi-pole	C	PDCI	<95%	<95%	104.9%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-29	Eight Mile-Lodi 230 kV	Diablo-Midway #1 and 2 500 kV	C	L-2	<95%	<95%	100.7%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-30	Eight Mile-Lodi 230 kV	Tesla-Vaca Dix & Tesla-Table Mtn 500 kV	C	L-2	<95%	<95%	115.6%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-31	Eight Mile-Lodi 230 kV	Round Mtn 500 kV stuck breaker	C	BRK	<95%	<95%	104.4%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-32	Eight Mile-Lodi 230 kV	Table Mtn 500 kV stuck breaker	C	BRK	<95%	<95%	106.1%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-33	Eight Mile-Lodi 230 kV	Tesla 500 kV stuck breaker	C	BRK	<95%	<95%	104.0%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-34	Eight Mile-Lodi 230 kV	Vac Dixon 500 kV stuck breaker	C	BRK	<95%	<95%	106.8%	<95%	reduce Lodi and Stig generation or install series reactor on this line, or upgrade the line
BULK-PK-PTT-35	Bellota-Weber 230 kV	Table Mtn-Tesla and Table Mtn-Vaca Dix 500 kV	C	L-2	<95%	<95%	101.9%	<95%	reduce Collierville generation
BULK-PK-PTT-36	Vaca Dix-Parkway 230 kV	Tesla-Vaca Dix and Tesla-Table Mtn 500 kV	C	L-2	<95%	<95%	100.7%	<95%	operate COI within seasonal nomogram
BULK-PK-PTT-37	Drum-Brunswick # 2 115 kV	Round Mtn-Table Mtn # 1 and 2 500 kV	C	L-2	<95%	<95%	104.9%	<95%	reduce Drum generation

ID	Overloaded Facility	Contingency	Category	Category Description	Loading (%)				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTT-38	Dutch Fl-Brunsw tap # 1 115 kV	Round Mtn-Table Mtn # 1 and 2 500 kV	C	L-2	<95%	<95%	98.1%	<95%	reduce Drum generation
BULK-PK-PTT-39	Rio Oso-Gleaf Tp 115 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	96.8%	<95%	<95%	<95%	South of Palermo Project. Prior to the project: limit COI import within nomogram
BULK-PK-PTT-40	E. Marysvl-Olivenhn 115 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	C	L-2	100.8%	<95%	<95%	<95%	South of Palermo Project. Prior to the project: limit COI import within nomogram
BULK-PK-PTT-41	C. Costa-Moraga # 2 230 kV (Rosstap-Moraga)	C.Costa-La Positas and C. Costa-Lone Tree 230 kV	C	L-2	102.9%	<95%	<95%	<95%	upgrade modeled starting from 2019 case, existing SPS to trip Mossing prior to upgrade
BULK-PK-PTT-42	Midway-Kern #1 230 kV	Midway-Kern 230 kV # 2 and 3	C	L-2	103.9%	<95%	<95%	<95%	trip Bakersfield load prior to upgrade
BULK-PK-PTT-43	Gregg-Ashlan 230 kV	Gregg-Herndon 230 kV # 1 and 2	C	L-2	155.4%	<95%	<95%	<95%	Ashlan upgrade project, SPS prior to upgrade

ID	Overloaded Facility	Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Summer Off-Peak	
BULK-NP-PTT-1	Gates-Midway 500 kV	normal conditions	A	normal	95.5%	<95%	99.5%	if overload, reduce Path 15 flow
BULK-NP-PTT-2	Los Banos -Q577 SS 230 kV	Los Banos-Tesla and Los Banos-Tracy 500 kV	C	L-2	105.0%	<95%	117.2%	reconductor the line or congestion management
BULK-NP-PTT-3	Panoche-Gates 230 kV # 1 & 2	Los Banos-Gates #1 and Los Banos-Midway 500 kV	C	L-2	<95%	<95%	98.4%	no overload with appropriate RAS
BULK-NP-PTT-4	Gates-Midway 230 kV	Midway-Gates and Midway-Los Banos 500 kV	C	L-2	<95%	<95%	96.3%	may need to limit Path 15 if overload

Study Area: **PG&E Bulk - Summer Peak**



Post-Transient Voltage Deviations

ID	Substation	Contingency	Category	Category Description	Post Cont. Voltage Deviation %				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTVD-1	HOLLISTR 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-2	NTVD SW2 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-3	NTVD SW1 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-4	PRUNEDLE 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.10%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-5	SOLEDAD 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-6	SALINAS 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-7	CSTRVLE 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.00%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-8	DEL MNTE 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-9	HOLST D 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-10	SNBENITO 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-11	WTSNVLE 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.00%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-12	GRANT RK 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.10%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-13	BRIGTANO 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.10%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-14	LGNTS J1 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.50%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-15	GABILAN 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.50%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-16	SALINAS2 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus

Study Area: **PG&E Bulk - Summer Peak**



Post-Transient Voltage Deviations

ID	Substation	Contingency	Category	Category Description	Post Cont. Voltage Deviation %				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTVD-17	SALINAS1 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-18	BORONDA 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-19	FORT ORD 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-20	DEL MNTE 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-21	MONTEREY 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-22	NAVY SCHL 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-23	VIEJO 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-24	HATTON 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-25	NAVY LAB 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-26	RSVTN RD 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-27	LAURELES 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.80%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-28	OTTER 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.90%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-29	FRSHXPRS 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.50%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-30	BNA VSTA 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-31	FIRESTNE 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-32	SPENCE 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus

Study Area: **PG&E Bulk - Summer Peak**



Post-Transient Voltage Deviations

ID	Substation	Contingency	Category	Category Description	Post Cont. Voltage Deviation %				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTVD-33	SNBRN JT 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-34	IND.ACRE 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.40%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-35	9 ST JCT 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.80%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-36	CMPHR J2 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.70%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-37	GONZALES 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.80%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-38	CAMPHORA 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.70%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-39	SOLEDAD 60.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-40	SLD ENRG 12.5	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.60%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-41	CRZY_HRS 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.20%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-42	NATIVDAD 115.0	Moss Landing 500/230 kV x-former	B	T-1	<5%	<5%	<5%	5.30%	adjust svds and transformer taps, or add a breaker to Moss Landing 500 kV bus
BULK-PK-PTVD-43	MAXWELL 500 kV	Captain Jack-Olinda 500kV	B	L-1	-5.60%	-5.50%	<5%	-5.40%	turn off shunt capacitor at Olinda or request exemption
BULK-PK-PTVD-44	MAXWELL 500 kV	Olinda-Tracy 500 kV	B	L-1	<5%	<5%	-5.20%	<5%	turn off shunt capacitor at Olinda or request exemption
BULK-PK-PTVD-45	buses in NW 115 kV and below	PDCI mono-pole outage	B	PDCI	54 buses up to 6.7%	63 buses up to 6.6%	85 buses up to 6.3%	<5%	need to turn on shunt caps in Northwest
BULK-PK-PTVD-46	Round Mtn 500 kV	PDCI mono-pole outage	B	PDCI	<5%	<5%	5.10%	<5%	turn on shunt capacitors at Malin
BULK-PK-PTVD-47	Malin 500 kV	PDCI mono-pole outage	B	PDCI	<5%	<5%	5.30%	<5%	turn on shunt capacitors at Malin
BULK-PK-PTVD-48	Malin 230 kV	PDCI mono-pole outage	B	PDCI	<5%	<5%	5.20%	<5%	turn on shunt capacitors at Malin

Study Area: **PG&E Bulk - Summer Peak**



Post-Transient Voltage Deviations

ID	Substation	Contingency	Category	Category Description	Post Cont. Voltage Deviation %				Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2019 Spring Peak	2024 Summer Peak	
BULK-PK-PTVD-49	Capt Jack 500 kV	PDCI mono-pole outage	B	PDCI	<5%	<5%	5.20%	<5%	turn on shunt capacitors at Malin
BULK-PK-PTVD-50	Burns 500 kV	PDCI mono-pole outage	B	PDCI	<5%	<5%	5.20%	<5%	turn on shunt capacitors at Malin
BULK-PK-PTVD-51	Rusel City 230 kV	East Shore-San Mateo 230 kV	B	L-1	<5%	<5%	5.30%	<5%	due to Russel City generation being off, further review with PTO
BULK-PK-PTVD-52	East Shore 230	East Shore-San Mateo 230 kV	B	L-1	<5%	<5%	5.30%	<5%	due to Russel City generation being off, further review with PTO
BULK-PK-PTVD-53	Rusel City 15 kV# 1 and 2	East Shore-San Mateo 230 kV	B	L-1	<5%	<5%	5.30%	<5%	due to Russel City generation being off, further review with PTO
BULK-PK-PTVD-54	Rusel City 18 kV	East Shore-San Mateo 230 kV	B	L-1	<5%	<5%	5.30%	<5%	due to Russel City generation being off, further review with PTO



Post-Transient Voltage Deviations

ID	Substation	Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					Select..	Select..	Select..	

No post-transient voltage deviations identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk - Summer Peak**



Single Contingency Load Drop

ID	Contingency	Category	Category Description	Amount of Load Drop (MW)				Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				Select..	Select..	Select..	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)				Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)				Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
HUMB-SP-T-1	Essex Jct - Arcata - Fairhaven 60kV line (Between Fairhaven - Arcata JCT2)	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA & BLUELKPP 12.47 Unit ID 1	C	L-1/G-1	< 100%	< 100%	102%	Increase output from Fairhaven. Northern Humboldt Long term study (reconfigure lines at Arcata) / Demand Response / Energy storage solutions.
HUMB-SP-T-2	Humboldt Bay - Humboldt No.1 60 kV Line (HUMBOLDT-HMBLT JT)	Humboldt Bay - Eureka 60 kV Line & Humboldt Bay - Humboldt No.2 60 kV Line	C	L-1-1	101%	93%	101%	Adjust generation at Humboldt Bay
HUMB-SP-T-3	Humboldt Bay - Eureka 60 kV Line	Humboldt Bay - Humboldt No.1 60 kV Line (HUMBOLDT-HMBLT & Humboldt Bay - Humboldt No.2 60 kV Line	C	L-1-1	101%	< 100%	100%	Implement operating procedure to reduce output from Humboldt Bay 60 kV generation following first contingency for Category C
HUMB-SP-T-4	Laytonville - Willits 60kV line	Bridgeville 60/12 kV Transformer & Humboldt Bay - Rio Dell 60kV line	C	L-1-1	< 100%	102%	< 100%	Bridgeville - Garberville 115kV line

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
HUMB-WP-T-1	Essex Jct - Arcata - Fairhaven 60kV line (Between Fairhaven - Arcata JCT2)	BLUELKPP 12.47 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	B	G-1 / L-1	< 100%	< 100%	120%	Increase Output from Fairhaven unit. Drop load at Arcata if overload persists. Northern Humboldt Long term study (reconfigure lines at Arcata) / Demand Response / Energy storage solutions.
HUMB-WP-T-2	Fairhaven - Humboldt 60kV line(Between Arcata JCT2 - Sierra Pac Lumber Sub Tap)	FAIRHAVN 13.80 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	B	G-1 / L-1	< 100%	< 100%	103%	Increase Output from Fairhaven unit. Drop load at Fairhaven / Sierra Pac Lumber sub if overload persists. Alternatively explore SPS / Demand Response / Energy storage solutions.
HUMB-WP-T-3	Fairhaven - Humboldt 60kV line(Between Fairhaven - Sierra Pac Lumber Sub Tap)	FAIRHAVN 13.80 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	B	G-1 / L-1	< 100%	< 100%	101%	
HUMB-WP-T-4	Fairhaven - Humboldt 60kV line(Between Arcata JCT2 - Humboldt)	FAIRHAVN 13.80 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	B	G-1 / L-1	< 100%	< 100%	113%	
HUMB-WP-T-5	Fairhaven - Humboldt 60kV line(Between Arcata JCT2 - Sierra Pac Lumber Sub Tap)	FAIRHAVN 13.80 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	C	L-1-1	< 100%	< 100%	103%	Increase Output from Fairhaven unit. Drop load at Fairhaven / Sierra Pac Lumber sub if overload persists. Alternatively explore SPS / Demand Response / Energy storage solutions.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
HUMB-WP-T-6	Fairhaven - Humboldt 60kV line(Between Fairhaven - Sierra Pac Lumber Sub Tap)	FAIRHAVN 13.80 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	C	L-1-1	< 100%	< 100%	101%	
HUMB-WP-T-7	Fairhaven - Humboldt 60kV line(Between Arcata JCT2 - Humboldt)	FAIRHAVN 13.80 Unit ID 1 & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	C	L-1-1	< 100%	< 100%	113%	Increase Output from Blue Lake PP. Drop Load at Arcata if Overload persists.
HUMB-WP-T-8	Humboldt Bay - Humboldt No.1 60 kV Line (HUMBOLDT-HMBLT JT)	Humboldt Bay - Eureka 60 kV Line & Humboldt Bay - Humboldt No.2 60 kV Line	C	L-1-1	< 100%	100%	100%	Adjust generation at Humbltd 60kV
HUMB-WP-T-9	Humboldt Bay - Rio Dell Jct 60kV line (Between Newburg - Rio Dell Tap)	Humboldt 115/60 No.2 Transformer & Humboldt 115/60 No.1 Transformer	C	T-1-1	110%	< 100%	< 100%	Adjust generation at Humbltd 60kV
HUMB-WP-T-10	Rio Dell Jct-Bridgeville 60 kV (between Carlotta-Swns Flat)	Humboldt 115/60 No.2 Transformer & Humboldt 115/60 No.1 Transformer	C	T-1-1	101%	< 100%	< 100%	Adjust generation at Humbltd 60kV
HUMB-WP-T-11	Rio Dell Jct-Bridgeville 60 kV (between Swns Flat - Bridgeville 60 kV)	Humboldt 115/60 No.2 Transformer & Humboldt 115/60 No.1 Transformer	C	T-1-1	101%	< 100%	< 100%	Adjust generation at Humbltd 60kV
HUMB-WP-T-12	Laytonville - Willits 60kV line	Rio Dell Tap 60 kV Line(SCOTIATP-RIODLLTP) & Bridgeville 60/12 kV Transformer	C	L-1-1	< 100%	106%	< 100%	Bridgeville - Garberville 60kV line

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
HUMB-NP-T-1	Humboldt Bay - Rio Dell Jct 60kV line (Between Newburg - Rio Dell Tap)	Humboldt 115/60 No.1 Transformer & Humboldt 115/60 No.2 Transformer	C	T-1-1	< 100%	103%	N/A	Reduce Humboldt 60kV generation.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Summer Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
HUMB-SP-VD-1	HOOPA 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	16%	< 5%	< 5%	Maple Creek SVC
HUMB-SP-VD-2	MPLE CRK 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	15%	< 5%	< 5%	
HUMB-SP-VD-3	RDGE CBN 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	12%	< 5%	< 5%	
HUMB-SP-VD-4	RUSS RCH 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	15%	< 5%	< 5%	
HUMB-SP-VD-5	WILLWCRK 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	16%	< 5%	< 5%	

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Winter Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
HUMB-WP-VD-1	ORICK 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	8%	9%	13%	New Cap bank needed in the 7-10 year timeframe. In the short term use PG&E action plan.
HUMB-WP-VD-2	ARCATA 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	8%	9%	13%	
HUMB-WP-VD-12	TRINIDAD 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-Arcata)	B	L-1	8%	9%	13%	
HUMB-WP-VD-3	SIMPSON 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	7%	8%	13%	
HUMB-WP-VD-4	BCHIPMIL 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	7%	8%	12%	
HUMB-WP-VD-5	BIG_LAGN 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	8%	9%	13%	
HUMB-WP-VD-6	BLUE LKE 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	7%	8%	13%	
HUMB-WP-VD-7	BLUELKPP 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	7%	8%	13%	
HUMB-WP-VD-8	HOOPA 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	16%	< 5%	< 5%	Maple Creek SVC
HUMB-WP-VD-9	MPLC CRK 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	15%	< 5%	< 5%	
HUMB-WP-VD-10	RDGE CBN 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	12%	< 5%	< 5%	
HUMB-WP-VD-11	RUSS RCH 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	15%	< 5%	< 5%	
HUMB-WP-VD-13	WILLWCRK 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	16%	< 5%	< 5%	



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concern identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Winter Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
HUMB-WP-V-1	ORICK 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.9085	0.9012	0.8473	May need a cap bank in the 7 - 10 year time frame. In the short term use PG&E's Summer action plan.
HUMB-WP-V-2	ARCATA 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.937	0.9297	0.882	
HUMB-WP-V-3	SIMPSON 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.9307	0.9236	0.8698	
HUMB-WP-V-4	BCHIPMIL 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.9325	0.9255	0.8738	
HUMB-WP-V-5	BIG_LAGN 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.9124	0.9051	0.8514	
HUMB-WP-V-6	BLUE LKE 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.931	0.924	0.8702	
HUMB-WP-V-7	TRINIDAD 60 kV	Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCA)	B	L-1	0.9151	0.9077	0.8542	
HUMB-WP-V-8	MPLE CRK 60 kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.8597	>0.9	>0.9	Maple Creek SVC
HUMB-WP-V-9	HOOPA 60 kV	Humboldt 115/60 No.2 Transformer & Humboldt 115/60 No.1 Transformer	C	L-1-1	0.8892	>0.9	>0.9	Maple Creek SVC
HUMB-WP-V-10	BRDGVILLE 60 kV	Bridgeville 60/12 kV Transformer & Rio Dell Jct - Bridgeville 60 kV Line (CARLOTTA-PCLUMBER)	C	L-1-1	0.8099	>0.9	>0.9	Bridgeville - Garberville 115kV line
HUMB-WP-V-11	FRT SWRD 60 kV	Bridgeville 60/12 kV Transformer & Rio Dell Jct - Bridgeville 60 kV Line (CARLOTTA-PCLUMBER)	C	L-1-1	0.821	>0.9	>0.9	
HUMB-WP-V-12	FRUITLND 60 kV	Bridgeville 60/12 kV Transformer & Rio Dell Jct - Bridgeville 60 kV Line (CARLOTTA-PCLUMBER)	C	L-1-1	0.81	>0.9	>0.9	
HUMB-WP-V-13	GRBRVILLE 60 kV	Bridgeville 60/12 kV Transformer & Rio Dell Jct - Bridgeville 60 kV Line (CARLOTTA-PCLUMBER)	C	L-1-1	0.8367	>0.9	>0.9	

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Winter Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
HUMB-WP-V-14	KEKAWAKA 60 kV	Bridgeville 60/12 kV Transformer & Rio Dell Jct - Bridgeville 60 kV Line (CARLOTTA-PCLUMBER)	C	L-1-1	0.8403	>0.9	>0.9	



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	Select..	

No high/low voltage concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Winter Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Winter Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Humboldt - Summer Off-Peak & Summer Light Load**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NCNB-SP-T-1	Mendocino - Clear Lake 60 kV Line #1 between Mendocino - Upper Lake	Konocti - Eagle Rock 60kV	B	L-1	96%	104%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-2	Clear Lake-Hopland 60kV line (between Clear Lake-Granite)	Konocti - Eagle Rock 60kV	B	L-1	133%	148%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-3	Clear Lake-Hopland 60kV line (between Granite-Hopland)	Konocti - Eagle Rock 60kV	B	L-1	139%	154%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-4	Clear Lake - Eagle Rock 60 kV Line #1 (Between CLER LKE - KONOCTI)	Konocti - Eagle Rock 60kV	B	L-1	111%	127%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-5	Hopland 115/60kV Transformer	Konocti - Eagle Rock 60kV	B	L-1	99%	101%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-6	Clear Lake - Eagle Rock 60 kV Line #1 (Between KONOCTI6 - EGGLE RCK)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA	B	L-1	98%	102%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-7	Tulucay - Napa 60kV line #1 (between TULCAY1 - TULCY JT)	Tulucay - Napa #2 60 kV (Tulucay 60 kV to Basalt 60 kV)	B	L-1	110%	< 100%	< 100%	Napa - Tulucay No. 1 60kV line updgrade will mitigate the overload
NCNB-SP-T-8	Mendocino - Clear Lake 60 kV Line #1 between Mendocino - Upper Lake	POTTRVLY Unit ID 1 & Konocti - Eagle Rock 60kV	B	G-1 / L-1	< 100%	107%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-9	Clear Lake-Hopland 60kV line (between Clear Lake-Granite)	POTTRVLY Unit ID 1 & Konocti - Eagle Rock 60kV	B	G-1 / L-1	135%	150%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-10	Clear Lake-Hopland 60kV line (between Granite-Hopland)	POTTRVLY Unit ID 1 & Konocti - Eagle Rock 60kV	B	G-1 / L-1	140%	156%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-SP-T-11	Clear Lake - Eagle Rock 60 kV Line #1 (Between CLER LKE - KONOCTI)	POTTRVLY Unit ID 1 & Konocti - Eagle Rock 60kV	B	G-1 / L-1	113%	131%	< 100%	Clear Lake 60kV system Reinforcement Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NCNB-SP-T-12	Bridgeville - Garberville 60kV line (Between Bridgeville - Fruitland JCT)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & Cortina - Mendocino 115 kV Line	C	L-1-1	115%	113%	< 100%	Bridgeville - Garberville 115kV line. Adjust Humboldt Bay Generation
NCNB-SP-T-13	Garberville - Laytonville 60kV line (between Garberville - Kekawaka Jct)	Geysers #5 - Geysers #3 115 kV (Q184 Tap to Geysers 56) & Cortina - Mendocino 115 kV Line	C	L-1-1	< 100%	< 100%	108%	
NCNB-SP-T-14	Bridgeville - Garberville 60kV line (Between Fruitland JCT - Fort Seward Jct)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & Cortina - Mendocino 115 kV Line	C	L-1-1	116%	114%	< 100%	
NCNB-SP-T-15	Cortina - Mendocino 115kV line (Between Mendocino - Lucern1 Jt)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & EAGLE ROCK 115/60 KV BANK NO.1	C	L-1-1	108%	107%	< 100%	Disable Flip Flop scheme at Lucern. Adjust Geysers 115kV generation at Eagle Rock & at Indian Vly. Drop Load at Ukiah and Lucern if Overload persists.
NCNB-SP-T-16	Cortina - Mendocino 115kV line (Between Lucern Jt - Indian Vly)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & EAGLE ROCK 115/60 KV BANK NO.1	C	L-1-1	106%	106%	< 100%	
NCNB-SP-T-17	Eagle Rock - Cortina 115kV line (Between Eagle Rock - HomeStk Tap)	MENDOCINO 115/60 KV BANK NO.1 & Cortina - Mendocino 115 kV Line	C	L-1-1	< 100%	100%	< 100%	Adjust Geysers 115kV generation at Eagle Rock
NCNB-SP-T-18	Eagle Rock - Cortina 115kV line (Between HomeStk Tap - Highland Jct2)	Mendocino - Ukiah 115 kV(Mendocino 115kV to CALPELLA 115k & Cortina - Mendocino 115 kV Line	C	L-1-1	100%	100%	100%	Adjust Geysers 115kV generation at Eagle Rock
NCNB-SP-T-19	Eagle Rock - Cortina 115kV line (Between Highland Jct2 - Cache Jct1)	Geysers #5 - Geysers #3 115 kV (Q184 Tap to Geysers 56) & Cortina - Mendocino 115 kV Line	C	L-1-1	< 100%	< 100%	102%	Adjust Geysers 115kV generation at Eagle Rock

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-T-1	Philo Jct - Elk 60kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV)	B	L-1	102%	< 100%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-WP-T-2	Tulucay - Napa #1 60kV line (Between Tulucay - Tulucay Jct)	Tulucay - Napa #2 60 kV (Tulucay 60 kV to Basalt 60 kV)	B	L-1	115%	< 100%	< 100%	Napa - Tulucay No. 1 60kV line updgrade will mitigate the overload
NCNB-WP-T-3	Philo Jct - Elk 60kV	GEYSER 7&8 Unit ID 1 & Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV)	B	G-1/L-1	104%	< 100%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-WP-T-4	Cortina - Mendocino 115kV line (Between Mendocino - Lucern1 Jt)	Eagle Rock- Cortina 115 kV (Eagle Rock 115kV to Lower Lake) & GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE Tap)	C	L-1-1	113%	108%	< 100%	Disable Flip Flop scheme at Lucern. Adjust Geysers 115kV generation at Eagle Rock & at Indian Vly. Drop Load at Ukiah and Lucern if Overload persists.
NCNB-WP-T-5	Eagle Rock - Rede Bud 115kV line (Between Highland Jct 1 - Cache Jct 2)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE Tap) & Cortina - Mendocino 115 kV Line	C	L-1-1	103%	93%	< 100%	Adjust Geyserys generation at Eagle Rock
NCNB-WP-T-6	Eagle Rock - Rede Bud 115kV line (Between Cache Jct 2 - Redbud Jct 2)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE Tap) & Cortina - Mendocino 115 kV Line	C	L-1-1	103%	93%	< 100%	Adjust Geyserys generation at Eagle Rock
NCNB-WP-T-7	Eagle Rock - Rede Bud 115kV line (Between Redbud Jct 2 - Redbud)	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE Tap) & Cortina - Mendocino 115 kV Line	C	L-1-1	103%	93%	< 100%	Adjust Geyserys generation at Eagle Rock
NCNB-WP-T-8	Santa Rosa - Corona 115kV (Between Bellevue - Penngrove)	FULTON 230/115 kV Bank # 4 & FULTON 230/115 kV Bank # 9	C	L-1-1	118%	< 100%	< 100%	3rd 230/115kV transformer at Fulton
NCNB-WP-T-9	Santa Rosa - Corona 115kV (Between Penngrove - Corona)	FULTON 230/115 kV Bank # 4 & FULTON 230/115 kV Bank # 9	C	L-1-1	119%	< 100%	< 100%	3rd 230/115kV transformer at Fulton
NCNB-WP-T-10	Corona - Lakeville 115kV line	FULTON 230/115 kV Bank # 4 & FULTON 230/115 kV Bank # 9	C	L-1-1	126%	< 100%	< 100%	3rd 230/115kV transformer at Fulton

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-T-11	Philo Jct - Elk 60kV	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopl & Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV	C	L-1-1	124%	< 100%	< 100%	Clear Lake 60kV system Reinforcement Project
NCNB-WP-T-12	Mendocino - Philo Jct - Hopland 60kV line (Between Philo Jct - Hopland Jct)	MENDOCINO 115/60 KV BANK NO.1 & MENDOCINO 115/60 kV BANK # 3	C	T-1-1	96%	128%	105%	Drop Load at Elk, Philo and Big River as needed.
NCNB-WP-T-13	Mendocino - Hartley 60kV(Between Mendocino - Upper Lake)	Clear Lake- Hopland 60 Kv(Clear Lake 60 KV sub to Granite) & Konocti - Eagle Rock 60kV	C	L-1-1	Diverged	Diverged	Diverged	Install a new 45 MVAR Cap Bank in the Mendocino Willits area.
NCNB-WP-T-14	Mendocino - Hartley 60kV(Between Upper Lake - Hartley)	EAGLE ROCK 115/60 KV BANK NO.1 & Clear Lake- Hopland 60 Kv(Clear Lake 60 KV sub to Granit	C	L-1-1	Diverged	Diverged	Diverged	Install a new 45 MVAR Cap Bank in the Mendocino Willits area.
NCNB-WP-T-15	Hartley - Clear Lake 60kV	EAGLE ROCK 115/60 KV BANK NO.1 & Clear Lake- Hopland 60 Kv(Clear Lake 60 KV sub to Granit	C	L-1-1	Diverged	Diverged	Diverged	Install a new 45 MVAR Cap Bank in the Mendocino Willits area.
NCNB-WP-T-16	Clear Lake - Holpand 60kV (Between Clear Lake - Granite)	Mendocino -Clearlake 60 kV (Mendocino Sub 60 kV to Upper & Konocti - Eagle Rock 60kV	C	L-1-1	Diverged	Diverged	Diverged	Install a new 45 MVAR Cap Bank in the Mendocino Willits area.
NCNB-WP-T-17	Clear Lake - Holpand 60kV (Between Granite - Hopland Jct)	Mendocino -Clearlake 60 kV (Mendocino Sub 60 kV to Upper & Konocti - Eagle Rock 60kV	C	L-1-1	Diverged	Diverged	Diverged	Install a new 45 MVAR Cap Bank in the Mendocino Willits area.
NCNB-WP-T-18	Hopland Jct 115/60kV transformer	Mendocino- Ukiah 115 kV(Mendocino 115kV to CALPELLA 115k & GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA	C	L-1-1	Diverged	Diverged	Diverged	Install a new 45 MVAR Cap Bank in the Mendocino Willits area.
NCNB-WP-T-19	Fulton - Hopland 60kV (Between Hopland Jct - Cloverdale)	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopl & Konocti - Eagle Rock 60kV	C	L-1-1	105%	110%	< 100%	Drop Load at Ukaiah

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-T-20	Eagle Rock - Konocti 60kV	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & Cortina - Mendocino 115 kV Line	C	L-1-1	136%	119%	< 100%	Drop Load at Ukiah
NCNB-WP-T-21	Fulton - Hopland 60kV (Between Cloverdale Jct - Geysers Jct)	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopl & Konocti - Eagle Rock 60kV	C	L-1-1	98%	103%	< 100%	Drop Load at Ukiah
NCNB-WP-T-22	Fulton - Hopland 60kV (Between Geysers Jct - Fitch Mnt Tap)	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopl & Konocti - Eagle Rock 60kV	C	L-1-1	98%	102%	< 100%	Drop Load at Ukiah
NCNB-WP-T-23	Fulton - Hopland 60kV (Between FTCHMTNP - Fulton)	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopl & Konocti - Eagle Rock 60kV	C	L-1-1	136%	< 100%	< 100%	Drop Load at Ukiah
NCNB-WP-T-24	Ignacio - San Rafael 115kV #3 (Between Ignacio - Las Gallinas)	Ignacio - San Rafael No. 3 115 kV & Ignacio - San Rafael No. 2 115 kV(New)	C	L-1-1	< 100%	121%	120%	The line is overloaded after the Ignacio - Alto Voltage Conversion Project. Reconductor the Ignacio - Sanrafael #3 115kV line to a higher rating.
NCNB-WP-T-25	Ignacio - San Rafael 115kV #3 (Between Las Gallinas - San Rafael)	Ignacio - San Rafael No. 2 115 kV(New) & Ignacio - San Rafael No. 3 115 kV	C	L-1-1	< 100%	101%	99%	The line is overloaded after the Ignacio - Alto Voltage Conversion Project. Reconductor the Ignacio - Sanrafael #3 115kV line to a higher rating.
NCNB-WP-T-26	Ignacio - San Rafael #2 115kV	Ignacio - San Rafael No. 3 115 kV & Ignacio - San Rafael No.3 115 kV (Ignacio 115 kv to Las	C	L-1-1	< 100%	117%	115%	This is the new 115kV line being built as a part of Ignacio - Alto Voltage conversion project. Build the line to a minimum of 620 Amps LTE rating.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-T-27	Ignacio - San Rafael #2 115kV (Between San Rafael - Greenbrae)	IGNACO B 115/60.00 kV BANK No. 1 & IGNACO A 115/60.00 kV BANK No. 2	C	L-1-1	< 100%	107%	110%	This is the new 115kV line being built as a part of Ignacio - Alto Voltage conversion project. Build the line to a minimum of 620 Amps LTE rating.
NCNB-WP-T-28	Tulucay - Napa #1 60kV line (Between Tulucay - Tulucay Jct)	FULTON 230/115 kV Bank # 4 & Tulucay - Napa #2 60 kV (Tulucay 60 kV to Basalt 60 kV)	C	L-1-1	122%	< 100%	< 100%	Napa - Tulucay No. 1 60kV line upgrade will mitigate the overload
NCNB-WP-T-29	Ignacio A - Ignacio B 60kV	FULTON 230/115 kV Bank # 4 & IGNACO A 115/60.00 kV BANK No. 2	C	L-1-1	101%	< 100%	< 100%	Ignacio - Alto Voltage Conversion Project.
NCNB-WP-T-30	32664 IGNACO A 60.0 32677 HMLTNBFD 60.0 1	Ignacio _Alto 60 kV (Ignacio A 60kv to Ignacio Jct 60 k & Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A 60.00 t	C	L-1-1	146%	< 100%	< 100%	Ignacio - Alto Voltage Conversion Project.
NCNB-WP-T-31	32677 HMLTNBFD 60.0 32684 ALTOJT1 60.0 1	Ignacio _Alto 60 kV (Ignacio A 60kv to Ignacio Jct 60 k & Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A 60.00 t	C	L-1-1	152%	< 100%	< 100%	Ignacio - Alto Voltage Conversion Project.
NCNB-WP-T-32	Ignacio - Alto 60kV (Between Ignacio Jct - San Rafael Jct)	Ignacio - Alto - Sausalito # 1 60 kV (IGNACO A 60.00 t & Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A 60.00 t	C	L-1-1	137%	< 100%	< 100%	Ignacio - Alto Voltage Conversion Project.
NCNB-WP-T-33	Ignacio - Alto 60kV (Between San Rafael Jct - GreenBrae)	Ignacio - Alto - Sausalito # 1 60 kV (IGNACO A 60.00 t & Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A 60.00 t	C	L-1-1	137%	< 100%	< 100%	Ignacio - Alto Voltage Conversion Project.
NCNB-WP-T-34	Ignacio - Alto 60kV (Between GreenBrae - Alto)	IGNACO B 115/60.00 kV BANK No. 1 & IGNACO A 115/60.00 kV BANK No. 2	C	L-1-1	< 100%	108%	111%	This line is overloaded after the Ignacio - Alto voltage conversion project. Build the line to a higher rating.

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-T-35	Ignacio - Alto 60kV (Between Alto - Alto Jct 1)	Ignacio _Alto 60 kV (Ignacio A 60kv to Ignacio Jct 60 k & Ignacio - Alto - Saulsalito # 2 60 kV (IGNACO A 60.00 t	C	L-1-1	121%	< 100%	< 100%	Ignacio - Alto Voltage Conversion Project.



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NCNB-SP-VD-1	UKIAH 115 kV	Mendocino- Ukiah 115 kV(Mendocino 115kV to CALPELLA 115k	B	L-1	6%	6%	5%	PG&E Summer Action Plan
NCNB-SP-VD-2	GRANITE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	10%	12%	<5%	Clear Lake 60kV system reinforcement project
NCNB-SP-VD-3	HARTLEY 60 kV	Konocti - Eagle Rock 60kV	B	L-1	11%	12%	<5%	Clear Lake 60kV system reinforcement project
NCNB-SP-VD-4	CLER LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	12%	15%	<5%	Clear Lake 60kV system reinforcement project
NCNB-SP-VD-5	KONOCTI6 60 kV	Konocti - Eagle Rock 60kV	B	L-1	22%	26%	5%	Clear Lake 60kV system reinforcement project
NCNB-SP-VD-6	LOWR LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	23%	27%	<5%	Clear Lake 60kV system reinforcement project
NCNB-SP-VD-7	MIDDLTWN 60 kV	Konocti - Eagle Rock 60kV	B	L-1	25%	29%	<5%	Clear Lake 60kV system reinforcement project
NCNB-SP-VD-8	UPPR LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	8%	10%	<5%	Clear Lake 60kV system reinforcement project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-VD-1	ELK 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV	B	L-1	16%	< 5%	< 5%	Big River SVC
NCNB-WP-VD-2	PHILO 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV	B	L-1	11%	< 5%	< 5%	Big River SVC
NCNB-WP-VD-3	GARCIA 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV	B	L-1	16%	< 5%	< 5%	Big River SVC
NCNB-WP-VD-4	GRANITE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	7%	7%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-WP-VD-5	HARTLEY 60 kV	Konocti - Eagle Rock 60kV	B	L-1	7%	7%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-WP-VD-6	BIG RIVR 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV	B	L-1	18%	< 5%	< 5%	Big River SVC
NCNB-WP-VD-7	CLER LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	9%	9%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-WP-VD-8	KONOCTI6 60 kV	Konocti - Eagle Rock 60kV	B	L-1	16%	16%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-WP-VD-9	LOWR LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	17%	16%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-WP-VD-10	MIDDLTWN 60 kV	Konocti - Eagle Rock 60kV	B	L-1	17%	17%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-WP-VD-11	PNT ARNA 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV	B	L-1	16%	< 5%	< 5%	Big River SVC
NCNB-WP-VD-12	UPPR LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	6%	6%	< 5%	Clear Lake 60kV system reinforcement project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NCNB-NP-VD-1	KONOCI6 60 kV	Konocti - Eagle Rock 60kV	B	L-1	< 5%	6%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-NP-VD-2	LOWR LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	< 5%	6%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-NP-VD-3	MIDDLTWN 60 kV	Konocti - Eagle Rock 60kV	B	L-1	< 5%	6%	< 5%	Clear Lake 60kV system reinforcement project
NCNB-NP-VD-4	NRTH TWR 115 kV	Oleum - North Tower-Christie 115 kV (North tower sub to	B	L-1	-6%	-6%	< 5%	PG&E Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NCNB-SP-V-1	GRANITE 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.8989	0.8793	0.9871	Clear Lake 60kV system reinforcement project
NCNB-SP-V-2	HARTLEY 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.8824	0.8615	0.9725	
NCNB-SP-V-3	CLER LKE 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.8693	0.8456	0.9764	
NCNB-SP-V-4	KONOCTI6 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.7867	0.749	0.9772	
NCNB-SP-V-5	LOWR LKE 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.7518	0.7073	0.9993	
NCNB-SP-V-6	LOWR LKE 60kV	EAGLE ROCK 115/60 KV BANK NO.1	B	T-1	0.7531	0.7071	0.9997	
NCNB-SP-V-7	MIDDLTWN 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.6982	0.6441	1.0372	
NCNB-SP-V-8	UPPR LKE 60kV	Konocti - Eagle Rock 60kV	B	L-1	0.9118	0.8947	0.9835	

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-V-1	ELK 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV)	B	L-1	0.8698	> 0.9	> 0.9	Big River SVC
NCNB-WP-V-2	GARCIA 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV)	B	L-1	0.8731	> 0.9	> 0.9	Big River SVC
NCNB-WP-V-3	BIG RIVR 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV)	B	L-1	0.8566	> 0.9	> 0.9	Big River SVC
NCNB-WP-V-4	PNT ARNA 60 kV	Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV)	B	L-1	0.873	> 0.9	> 0.9	Big River SVC
NCNB-WP-V-5	FRT BRGG 60 kV	Fort Bragg - Elk 60kV (Fort Bragg to Big River)	B	L-1	0.9047	0.8831	0.8622	Install 45 MVAR Cap bank in the Mendocino Willits area
NCNB-WP-V-6	GREENBRE 60 kV	Ignacio _Alto 60 kV (Ignacio A 60kv to Ignacio Jct 60 k	B	L-1	0.8991	> 0.9	> 0.9	Ignacio - Alto Voltage conversion project
NCNB-WP-V-7	KONOCI16 60 kV	Konocti - Eagle Rock 60kV	B	L-1	0.8507	0.853	> 0.9	Clear Lake 60kV system reinforcement project
NCNB-WP-V-8	LOWR LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	0.8322	0.8345	> 0.9	Clear Lake 60kV system reinforcement project
NCNB-WP-V-9	MIDDLTWN 60 kV	Konocti - Eagle Rock 60kV	B	L-1	0.8027	0.805	> 0.9	Clear Lake 60kV system reinforcement project
NCNB-WP-V-10	SAUSALTO 60 kV	Ignacio - Alto - Saulsalito # 2 60 kV (IGNACO A 60.00 t	B	L-1	0.8834	> 0.9	> 0.9	Ignacio - Alto Voltage conversion project
NCNB-WP-V-11	CORONA 115 kV	FULTON 230/115 kV Bank # 4 & Corona-Lakeville 115kV)	C	L-1-1	0.8832	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-12	COTATI 60 kV	FULTON 230/115 kV Bank # 4 & FULTON 230/115 kV Bank # 9	C	L-1-1	0.7794	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-13	FULTON 115 kV		C	L-1-1	0.8116	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-14	LAGUNA 60 kV		C	L-1-1	0.7942	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-15	MOLINO 60 kV		C	L-1-1	0.8073	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-16	MONROE1 115 kV		C	L-1-1	0.8185	> 0.9	> 0.9	3rd 230/115kV Fulton transformer

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-V-17	MONROE2 115 kV		C	L-1-1	0.8178	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-18	CALISTGA 60 kV		C	L-1-1	0.6881	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-19	FORT RSS 60 kV		C	L-1-1	0.7284	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-20	SLMN CRK 60 kV		C	L-1-1	0.74	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-21	ST.HELNA 60 kV		C	L-1-1	0.7616	> 0.9	> 0.9	3rd 230/115kV Fulton transformer
NCNB-WP-V-22	ELK 60 kV	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & Cortina - Mendocino 115 kV Line	C	L-1-1	0.7721	0.8881	> 0.9	Install 45 MVAR Cap bank in the Mendocino Willits area
NCNB-WP-V-23	PHILO 60 kV		C	L-1-1	0.7907	0.8921	> 0.9	
NCNB-WP-V-24	GARCIA 60 kV		C	L-1-1	0.7749	0.8912	> 0.9	
NCNB-WP-V-25	COVELO6 60 kV		C	L-1-1	0.7813	0.8537	> 0.9	
NCNB-WP-V-26	HARTLEY 60 kV		C	L-1-1	0.8348	0.8956	> 0.9	
NCNB-WP-V-27	WILLITS 60 kV		C	L-1-1	0.8083	0.8941	> 0.9	
NCNB-WP-V-28	BIG RIVR 60 kV		C	L-1-1	0.7726	0.894	> 0.9	
NCNB-WP-V-29	UKIAH 115 kV		GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TA & Mendocino- Ukiah 115 kV(Mendocino 115kV to CALPELLA 115k	C	L-1-1	0.732	0.7687	
NCNB-WP-V-30	CLOVRDLE 115 kV	C		L-1-1	0.7593	0.7931	> 0.9	
NCNB-WP-V-31	HPLND JT 115 kV	C		L-1-1	0.7627	0.7965	> 0.9	

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
NCNB-WP-V-32	ALTO 60 kV	Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A 60.00 t & Ignacio - Alto - Sausalito # 1 60 kV (IGNACO A 60.00 t	C	L-1-1	0.7838	> 0.9	> 0.9	Ignacio - Alto Voltage conversion project
NCNB-WP-V-33	Greenbrae 115 kV	Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A 60.00 t & San Rafael-Green Bay 115kV(New)	C	L-1-1	> 0.9	0.8995	0.896	Ignacio - Alto Voltage conversion project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single contingency resulted in total load drop of more than 250 MW.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay - Summer Peak**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-1	30110 GLENN 230 31722 GLENN 60.0 2		A	Base Case	99.4	<100	<100	Reconductoring or transfer Anita load
nyvl-SP-T-2	31480 WYANDTTE 115 31518 WYANDJT1 115 1		A	Base Case	95.5	95.3	103.3	Reconductoring or transfer Anita load
nyvl-SP-T-3	31722 GLENN 60.0 31733 CAPYSWCH 60.0 3		A	Base Case	120.8	122.7	132.6	Reconductoring or transfer Anita load
nyvl-SP-T-4	31722 GLENN 60.0 31734 HAMILTON 60.0 2		A	Base Case	95.3	97.2	104.1	Reconductoring or transfer Anita load
nyvl-SP-T-5	31731 CAPAYJCT 60.0 31736 HEADGATE 60.0 3		A	Base Case	97.4	98.7	106.9	Reconductoring or transfer Anita load
nyvl-SP-T-6	31733 CAPYSWCH 60.0 31731 CAPAYJCT 60.0 3		A	Base Case	120.8	122.8	132.6	Reconductoring or transfer Anita load
nyvl-SP-T-7	31735 CHICO JT 60.0 31738 ANITA 60.0 3		A	Base Case	122.4	124.3	135.8	Reconductoring or transfer Anita load
nyvl-SP-T-8	30110 GLENN 230 31722 GLENN 60.0 2	B1_58_BLCKBUTT 9.11 Unit ID 1 & B3_65_Glenn 230/60 kV Transformer No. 1	B	L-1/G-1	<100	106.6	117.4	Explore potential mitigation
nyvl-SP-T-9	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus	106.3	104.8	102.1	Caribou Thermal SPS
nyvl-SP-T-10	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus	129.2	127.5	124.8	Caribou Thermal SPS
nyvl-SP-T-11	31516 WYANDJT2 115 31512 BIG BEND 115 2	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus	137.8	136.0	133.1	Caribou Thermal SPS
nyvl-SP-T-12	31482 PALERMO 115 31506 HONC JT1 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	diverge	diverge	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-13	31482 PALERMO 115 31516 WYANDJT2 115 2	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-14	31486 CARIBOU 115 30255 CARBOU M 230 11	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-15	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-16	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-17	31516 WYANDJT2 115 31512 BIG BEND 115 2	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-18	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	C1_34_Cottonwood 115 kV Bus Section 2	C1	Bus	137.5	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-19	31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	C1_34_Cottonwood 115 kV Bus Section 2	C1	Bus	125.9	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-20	31504 TBLE MTN 115 31497 NDAME J 115 1	C1_42A_BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	110.3	112.2	<100	Short Term: Interim NVLY Area Summer Action Plan, Long Term: New Table Mt - Sycamore 115 kV Project
nyvl-SP-T-21	31514 PARADSE 115 31494 BIGBENTP 115 1	C1_42A_BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	110.3	111.8	<100	Short Term: Interim NVLY Area Summer Action Plan, Long Term: New Table Mt - Sycamore 115 kV Project
nyvl-SP-T-22	31501 CHICOTP1 115 31504 TBLE MTN 115 1	C1_42A_BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	110.1	111.5	<100	Short Term: Interim NVLY Area Summer Action Plan, Long Term: New Table Mt - Sycamore 115 kV Project
nyvl-SP-T-23	31604 COTTONWD 60.0 31607 RED B JT 60.0 1	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	155.1	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-24	31607 RED B JT 60.0 31608 BLFF 60.0 1	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	155.1	<100	<100	Short Term: Interim NVLY Area Summer Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-25	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	232.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-26	31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	218.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-27	31583 Q720TP 60.0 31596 SOUTH 60.0 1	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	116.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-28	31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	155.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-29	31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	112.9	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-30	31486 CARIBOU 115 30255 CARBOU M 230 11	C1-36_BUS FAULT AT 31482 PALERMO 115.00	C1	Bus	103.6	103.6	103.6	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-31	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	C2_1_COTTONWOOD CB 462 OR 482 STUCK	C2	CB	102.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-32	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-33	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-34	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-35	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-36	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-37	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-38	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-39	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-40	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-41	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-42	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-43	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-44	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-45	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-46	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-47	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	CB	159.9	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-48	31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	CB	148.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-49	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	C2_2_COTTONWOOD CB 462 OR 482 STUCK W/SPS	C2	CB	103.1	<100	<100	Cascade SPS
nyvl-SP-T-50	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-51	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-52	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-53	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-54	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	diverge	diverge	diverge	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-55	30105 COTWD_E 230 30245 ROUND MT 230 3	B2_2_Cottonwood - Round Mountain #2 230 kV Line & B3_1_Round Mountain No.1 500/230 kV Transformer	C3	N-1-1	100.8	100.8	100.9	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-56	31482 PALERMO 115 31516 WYANDJT2 115 2	B2_24_Caribou-Table Mountain 230 kV Line & B2_44_Palermo-Wyandotte 115 kV Line	C3	N-1-1	113.4	118.2	129.5	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-57	31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	103.2	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-58	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	103.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-59	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	101.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-60	31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1	B2_40_Cascade-Cottonwood 115 kV Line & B2_62_Cascade-Benton-Deschutes 60 kV Line	C3	N-1-1	146.1	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-61	31566 KESWICK 60.0 31582 STLLWATR 60.0 1	B2_40_Cascade-Cottonwood 115 kV Line & B2_62_Cascade-Benton-Deschutes 60 kV Line	C3	N-1-1	186.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-62	31580 CASCADE 60.0 31582 STLLWATR 60.0 1	B2_40_Cascade-Cottonwood 115 kV Line & B2_62_Cascade-Benton-Deschutes 60 kV Line	C3	N-1-1	180.6	<100	<100	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-63	32290 OLIVH J1 115 32214 RIO OSO 115 1	B2_45_Palermo-Pease 115 kV Line & B3_28_Table Mountain No.2 230/115/60 kV Transformer	C3	N-1-1	119.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-64	31482 PALERMO 115 31506 HONC JT1 115 1	B2_48_Palermo-Nicolaus 115 kV Line & B3_28_Table Mountain No.2 230/115/60 kV Transformer	C3	N-1-1	101.4	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-65	32200 PEASE 115 31506 HONC JT1 115 1	B2_48_Palermo-Nicolaus 115 kV Line & B3_28_Table Mountain No.2 230/115/60 kV Transformer	C3	N-1-1	101.4	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-66	31500 BUTTE 115 31504 TBLE MTN 115 2	B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line & B2_53_Table Mountain-Butte No.1 115 kV Line	C3	N-1-1	149.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-67	31500 BUTTE 115 31501 CHICOTP1 115 1	B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line & B2_53_Table Mountain-Butte No.1 115 kV Line	C3	N-1-1	130.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-68	31501 CHICOTP1 115 31504 TBLE MTN 115 1	B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line & B2_53_Table Mountain-Butte No.1 115 kV Line	C3	N-1-1	149.8	<100	103.6	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-69	31500 BUTTE 115 31504 TBLE MTN 115 2	B2_53_Table Mountain-Butte No.1 115 kV Line & B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	C3	N-1-1	149.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-70	31503 CHICOTP2 115 31500 BUTTE 115 1	B2_53_Table Mountain-Butte No.1 115 kV Line & B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	C3	N-1-1	<100	<100	<100	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-71	31504 TBLE MTN 115 31497 NDAME J 115 1	B2_53_Table Mountain-Butte No.1 115 kV Line & B2_54_Table Mountain-Butte No.2 115 kV Line	C3	N-1-1	110.6	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-72	31514 PARADSE 115 31494 BIGBENTP 115 1	B2_53_Table Mountain-Butte No.1 115 kV Line & B2_54_Table Mountain-Butte No.2 115 kV Line	C3	N-1-1	110.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-73	31500 BUTTE 115 31501 CHICOTP1 115 1	B2_54_Table Mountain-Butte No.2 115 kV Line & B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	C3	N-1-1	130.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-74	31501 CHICOTP1 115 31504 TBLE MTN 115 1	B2_54_Table Mountain-Butte No.2 115 kV Line & B2_51_Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	C3	N-1-1	149.8	98.8	103.6	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-75	31504 TBLE MTN 115 31497 NDAME J 115 1	B2_54_Table Mountain-Butte No.2 115 kV Line & B2_53_Table Mountain-Butte No.1 115 kV Line	C3	N-1-1	110.6	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-76	31514 PARADSE 115 31494 BIGBENTP 115 1	B2_54_Table Mountain-Butte No.2 115 kV Line & B2_53_Table Mountain-Butte No.1 115 kV Line	C3	N-1-1	110.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-77	31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1	B2_62_Cascade-Benton-Deschutes 60 kV Line & B2_40_Cascade-Cottonwood 115 kV Line	C3	N-1-1	146.1	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-78	31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1	B2_62_Cascade-Benton-Deschutes 60 kV Line & B2_40_Cascade-Cottonwood 115 kV Line	C3	N-1-1	150.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-79	31566 KESWICK 60.0 31582 STLLWATR 60.0 1	B2_62_Cascade-Benton-Deschutes 60 kV Line & B2_40_Cascade-Cottonwood 115 kV Line	C3	N-1-1	186.0	<100	<100	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-80	31580 CASCADE 60.0 31582 STLLWATR 60.0 1	B2_62_Cascade-Benton-Deschutes 60 kV Line & B2_40_Cascade-Cottonwood 115 kV Line	C3	N-1-1	180.6	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-81	31604 COTTONWD 60.0 31607 RED B JT 60.0 1	B2_70_Coleman-Cottonwood 60 kV Line & B2_62_Cascade-Benton-Deschutes 60 kV Line	C3	N-1-1	119.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-82	31607 RED B JT 60.0 31608 RED BLFF 60.0 1	B2_70_Coleman-Cottonwood 60 kV Line & B2_62_Cascade-Benton-Deschutes 60 kV Line	C3	N-1-1	119.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-83	31583 Q720TP 60.0 31596 SOUTH 60.0 1	B2_70_Coleman-Cottonwood 60 kV Line & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	116.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-84	31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1	B2_70_Coleman-Cottonwood 60 kV Line & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	171.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-85	31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1	B2_70_Coleman-Cottonwood 60 kV Line & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	124.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-86	31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1	B2_70_Coleman-Cottonwood 60 kV Line & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	124.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-87	30110 GLENN 230 31722 GLENN 60.0 2	B2_93_Glenn No.1 60 kV Line & B3_65_Glenn 230/60 kV Transformer No. 1	C3	N-1-1	<100	<100	104.1	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-88	30105 COTWD_E 230 30245 ROUND MT 230 3	B3_1_Round Mountain No.1 500/230 kV Transformer & B2_2_Cottonwood - Round Mountain #2 230 kV Line	C3	N-1-1	100.8	100.8	100.9	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-89	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_69_GRIZZLYG 6.90 Unit ID 1	C3	N-1-1	107.4	107.3	107.4	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-90	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_69_GRIZZLYG 6.90 Unit ID 1	C3	N-1-1	114.5	114.4	114.5	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-91	32326 ENCL TAP 60.0 32332 PEASE 60.0 1	B3_28_Table Mountain No.2 230/115/60 kV Transformer & B1_68_DE SABLA 6.90 Unit ID 1	C3	N-1-1	107.7	107.8	114.7	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-92	32326 ENCL TAP 60.0 32334 LIVE OAK 60.0 1	B3_28_Table Mountain No.2 230/115/60 kV Transformer & B1_68_DE SABLA 6.90 Unit ID 1	C3	N-1-1	106.5	106.6	113.6	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-93	31482 PALERMO 115 31506 HONC JT1 115 1	B3_28_Table Mountain No.2 230/115/60 kV Transformer & B1_68_DE SABLA 6.90 Unit ID 1	C3	N-1-1	101.4	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-94	31570 BENTON 60.0 31572 GIRVAN 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	150.3	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-95	31576 WNTU PMS 60.0 31570 BENTON 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	242.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-96	31576 WNTU PMS 60.0 31578 LOMS JCT 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	118.1	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-97	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	373.8	<100	<100	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-98	31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	358.2	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-99	31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	103.2	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-100	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	101.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-101	31574 ANDERSON 60.0 31604 COTTONWD 60.0 1	B3_34_Cascade No.1 115/60/13.8 kV Transformer & B2_61_Cottonwood-Benton No.2 60 kV Line	C3	N-1-1	134.0	137.8	145.2	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-102	31572 GIRVAN 60.0 31574 ANDERSON 60.0 1	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	105.5	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-103	31576 WNTU PMS 60.0 31570 BENTON 60.0 1	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	242.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-104	31576 WNTU PMS 60.0 31578 LOMS JCT 60.0 1	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	118.1	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-105	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	373.7	<100	<100	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-106	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_62_Grizzly PH No.1 115/6.9 kV Transformer & B3_19_Caribou No.11 230/115/60 kV Transformer	C3	N-1-1	107.4	107.3	107.4	Short Term: Interim NVLY Area Summer Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
nyvl-SP-T-107	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_62_Grizzly PH No.1 115/6.9 kV Transformer & B3_19_Caribou No.11 230/115/60 kV Transformer	C3	N-1-1	114.5	114.4	114.5	Short Term: Interim NVLY Area Summer Action Plan
nyvl-SP-T-108	31640 TRES VIS 60.0 31644 BIGGSJCT 60.0 1	C5_15_Palermo-Pease	C5	DCTL	117.5	126.7	153.0	Rerate or Reconductor
nyvl-SP-T-109	31640 TRES VIS 60.0 31718 TBLE MTN 60.0 1	C5_15_Palermo-Pease	C5	DCTL	120.4	129.3	154.9	Rerate or Reconductor
nyvl-SP-T-110	31642 PEACHTON 60.0 31644 BIGGSJCT 60.0 1	C5_15_Palermo-Pease	C5	DCTL	109.6	118.2	142.6	Rerate or Reconductor
nyvl-SP-T-111	31642 PEACHTON 60.0 38054 GRIDLEY 60.0 1	C5_15_Palermo-Pease	C5	DCTL	<100	<100	119.6	Rerate or Reconductor
nyvl-SP-T-112	31718 TBLE MTN 60.0 30301 TBL MT2M 230 2	C5_15_Palermo-Pease	C5	DCTL	<100	<100	114.9	Rerate or Reconductor
nyvl-SP-T-113	38054 GRIDLEY 60.0 32334 LIVE OAK 60.0 1	C5_15_Palermo-Pease	C5	DCTL	<100	<100	120.1	Rerate or Reconductor
nyvl-SP-T-114	31500 BUTTE 115 31501 CHICOTP1 115 1	C5_4_Sycamore	C5	DCTL	130.8	133.0	<100	Short Term: Interim NVLY Area Summer Action Plan, Long Term: New Table Mt - Sycamore 115 kV Project
nyvl-SP-T-115	31501 CHICOTP1 115 31504 TBLE MTN 115 1	C5_4_Sycamore	C5	DCTL	149.8	152.1	103.6	Short Term: Interim NVLY Area Summer Action Plan, Long Term: New Table Mt - Sycamore 115 kV Project

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Study Area: **PG&E North Valley - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-1	31482 PALERMO 115 31516 WYANDJT2 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer	B	T-1		diverge		Caribou Thermal SPS
NV-SpP-T-2	31486 CARIBOU 115 31488 GRIZ JCT 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer	B	T-1		diverge		Caribou Thermal SPS
NV-SpP-T-3	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer	B	T-1		diverge		Caribou Thermal SPS
NV-SpP-T-4	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer	B	T-1		diverge		Caribou Thermal SPS
NV-SpP-T-5	32394 PLACER 60.0 32228 PLACER 115 1	B2_31_Table Mountain 230 kV No.1 500/230 KV Transformer & B1_84_RIO OSO 230.00 Unit ID 1	B	L-1/G-1		138.4		Explore potential mitigation
NV-SpP-T-6	31482 PALERMO 115 31516 WYANDJT2 115 2	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus		159.9		Caribou Thermal SPS
NV-SpP-T-7	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus		127.5		Caribou Thermal SPS
NV-SpP-T-8	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus		150.2		Caribou Thermal SPS
NV-SpP-T-9	31516 WYANDJT2 115 31512 BIG BEND 115 2	C1_19_Caribou 230 kV Bus w/o CB112 Trip	C1	Bus		160.3		Caribou Thermal SPS
NV-SpP-T-10	31482 PALERMO 115 31516 WYANDJT2 115 2	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus		diverge		Caribou Thermal SPS
NV-SpP-T-11	31486 CARIBOU 115 30255 CARBOU M 230 11	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus		diverge		Caribou Thermal SPS
NV-SpP-T-12	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus		diverge		Caribou Thermal SPS
NV-SpP-T-13	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus		diverge		Caribou Thermal SPS

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Study Area: **PG&E North Valley - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-14	31516 WYANDJT2 115 31512 BIG BEND 115 2	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus		diverge		Caribou Thermal SPS
NV-SpP-T-15	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-16	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-17	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-18	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-19	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-20	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-21	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-22	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-23	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-24	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-25	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-26	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-27	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS

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Study Area: **PG&E North Valley - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-28	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-29	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-30	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-31	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-32	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-33	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-34	31486 CARIBOU 115 30255 CARBOU M 230 11	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-35	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-36	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-37	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-38	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB		diverge		Caribou Thermal SPS
NV-SpP-T-39	30114 DELEVN 230 30450 CORTINA 230 1	B2_13_Delevan-Vaca Dixon No.2 230 kV Line & B2_14_Delevan-Vaca Dixon No.3 230 kV Line	C3	N-1-1		103.1		Rerate or reconductor
NV-SpP-T-40	30114 DELEVN 230 30450 CORTINA 230 1	B2_14_Delevan-Vaca Dixon No.3 230 kV Line & B2_13_Delevan-Vaca Dixon No.2 230 kV Line	C3	N-1-1		103.1		Rerate or reconductor

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Study Area: **PG&E North Valley - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-41	30114 DELEVN 230 30450 CORTINA 230 1	B2_14_Delevan-Vaca Dixon No.3 230 kV Line & B2_15_Delevan-Vaca Dixon No.4 230 kV Line	C3	N-1-1		103.1		Rerate or reconductor
NV-SpP-T-42	30114 DELEVN 230 30450 CORTINA 230 1	B2_15_Delevan-Vaca Dixon No.4 230 kV Line & B2_14_Delevan-Vaca Dixon No.3 230 kV Line	C3	N-1-1		103.1		Rerate or reconductor
NV-SpP-T-43	30105 COTWD_E 230 30245 ROUND MT 230 3	B2_2_Cottonwood - Round Mountain #2 230 kV Line & B3_1_Round Mountain No.1 500/230 kV Transformer	C3	N-1-1		106.0		Rerate or reconductor
NV-SpP-T-44	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	B2_31_Table Mountain 230 kV No.1 500/230 KV Transformer & B2_30_Table Mountain(D)-Rio Oso 230 kV Line	C3	N-1-1		104.3		Explore potential mitigation
NV-SpP-T-45	31110 BRDGVLE 60.0 31120 FRUTLDJT 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1		101.7		Explore potential mitigation
NV-SpP-T-46	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1		102.4		Explore potential mitigation
NV-SpP-T-47	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1		100.5		Explore potential mitigation
NV-SpP-T-48	31594 VOLTA 60.0 31583 Q720TP 60.0 1	B2_71_Coleman-Red Bluff 60 kV Line & B2_70_Coleman-Cottonwood 60 kV Line	C3	N-1-1		111.1		Explore potential mitigation
NV-SpP-T-49	31482 PALERMO 115 31516 WYANDJT2 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_37_CRBOU2-3 11.50 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS

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Study Area: **PG&E North Valley - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-50	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_37_CRBOU2-3 11.50 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-51	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_37_CRBOU2-3 11.50 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-52	31482 PALERMO 115 31516 WYANDJT2 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_38_CRBOU2-3 11.50 Unit ID 2	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-53	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_38_CRBOU2-3 11.50 Unit ID 2	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-54	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_38_CRBOU2-3 11.50 Unit ID 2	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-55	38135 SIERVLTP 69.0 38136 MARBLE 69.0 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_53_HAMIL.BR 2.40 Unit ID 2	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-56	38135 SIERVLTP 69.0 38136 MARBLE 69.0 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_66_COLLINS 13.00 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-57	31482 PALERMO 115 31516 WYANDJT2 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_69_GRIZZLYG 6.90 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-58	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_69_GRIZZLYG 6.90 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS

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Study Area: **PG&E North Valley - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-59	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B1_69_GRIZZLYG 6.90 Unit ID 1	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-60	38135 SIERVLTP 69.0 38136 MARBLE 69.0 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B3_48_Hamilton Branch PH No.1 60/9.11 kV Transformer	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-61	31482 PALERMO 115 31516 WYANDJT2 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B3_62_Grizzly PH No.1 115/6.9 kV Transformer	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-62	31488 GRIZ JCT 115 31512 BIG BEND 115 1	B3_19_Caribou No.11 230/115/60 kV Transformer & B3_62_Grizzly PH No.1 115/6.9 kV Transformer	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-63	31516 WYANDJT2 115 31512 BIG BEND 115 2	B3_19_Caribou No.11 230/115/60 kV Transformer & B3_62_Grizzly PH No.1 115/6.9 kV Transformer	C3	N-1-1		diverge		Caribou Thermal SPS
NV-SpP-T-64	31570 BENTON 60.0 31572 GIRVAN 60.0 1	B3_2_Cottonwood #1 230/115 kV Transformer & B3_5_Cottonwood #4 230/115 kV Transformer	C3	N-1-1		121.7		Explore potential mitigation
NV-SpP-T-65	31572 GIRVAN 60.0 31574 ANDERSON 60.0 1	B3_2_Cottonwood #1 230/115 kV Transformer & B3_5_Cottonwood #4 230/115 kV Transformer	C3	N-1-1		109.7		Explore potential mitigation
NV-SpP-T-66	31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1		101.7		Explore potential mitigation
NV-SpP-T-67	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1		102.4		Explore potential mitigation

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Study Area: **PG&E North Valley - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
NV-SpP-T-68	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1		100.5		Explore potential mitigation
NV-SpP-T-69	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C5_13_Colgate	C5	DCTL		118.2		Explore potential mitigation
NV-SpP-T-70	30114 DELEVN 230 30450 CORTINA 230 1	C5_22_Delevan-Vaca	C5	DCTL		103.1		Rerate or reconductor

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-T-1	38135 SIERVLTP 69.0 38136 MARBLE 69.0 1	B3_19_Caribou No.11 230/115/60 kV Transformer	B	T-1	<100.0	diverge		Explore potential mitigation
NV-NP-T-2	31482 PALERMO 115 31516 WYANDJT2 115 2	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	125.2	<100.0		Short term: Action Plan
NV-NP-T-3	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	105.7	<100.0		Short term: Action Plan
NV-NP-T-4	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	117.7	<100.0		Short term: Action Plan
NV-NP-T-5	31516 WYANDJT2 115 31512 BIG BEND 115 2	C1_25_Table Mountain 230 kV Bus Section 1D	C1	Bus	125.5	<100.0		Short term: Action Plan
NV-NP-T-6	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	125.4	<100.0		Short term: Action Plan
NV-NP-T-7	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	105.7	<100.0		Short term: Action Plan
NV-NP-T-8	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	117.8	<100.0		Short term: Action Plan
NV-NP-T-9	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_11_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	125.7	<100.0		Short term: Action Plan
NV-NP-T-10	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	125.6	<100.0		Short term: Action Plan
NV-NP-T-11	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	105.9	<100.0		Short term: Action Plan
NV-NP-T-12	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	118.0	<100.0		Short term: Action Plan
NV-NP-T-13	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_12_TABLE MOUNTAIN CB 203 BUS PARALLEL STUCK	C2	CB	125.9	<100.0		Short term: Action Plan
NV-NP-T-14	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	125.6	<100.0		Short term: Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-T-15	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	105.9	<100.0		Short term: Action Plan
NV-NP-T-16	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	118.1	<100.0		Short term: Action Plan
NV-NP-T-17	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_14_TABLE MOUNTAIN CB 412 BUS PARALLEL STUCK	C2	CB	125.9	<100.0		Short term: Action Plan
NV-NP-T-18	31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	CB	117.4	<100.0		Short term: Action Plan
NV-NP-T-19	31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	CB	119.2	<100.0		Short term: Action Plan
NV-NP-T-20	31566 KESWICK 60.0 31582 STLLWATR 60.0 1	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	CB	142.5	<100.0		Short term: Action Plan
NV-NP-T-21	31580 CASCADE 60.0 31582 STLLWATR 60.0 1	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	CB	129.7	<100.0		Short term: Action Plan
NV-NP-T-22	31482 PALERMO 115 31516 WYANDJT2 115 2	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	125.6	<100.0		Short term: Action Plan
NV-NP-T-23	31486 CARIBOU 115 31488 GRIZ JCT 115 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	105.9	<100.0		Short term: Action Plan
NV-NP-T-24	31488 GRIZ JCT 115 31512 BIG BEND 115 1	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	118.1	<100.0		Short term: Action Plan
NV-NP-T-25	31516 WYANDJT2 115 31512 BIG BEND 115 2	C2_9_TABLE MOUNTAIN CB 412 STUCK	C2	CB	125.9	<100.0		Short term: Action Plan
NV-NP-T-26	31091 RDGE CBN 60.0 31093 HYMPOMJT 60.0 1	B2_35_Humboldt-Trinity 115 kV Line & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	106.0	<100.0		Short term: Action Plan
NV-NP-T-27	31092 MPLE CRK 60.0 31091 RDGE CBN 60.0 1	B2_35_Humboldt-Trinity 115 kV Line & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	105.7	<100.0		Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-T-28	31553 BIG BAR 60.0 31093 HYMPOMJT 60.0 1	B2_35_Humboldt-Trinity 115 kV Line & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	107.0	<100.0		Short term: Action Plan
NV-NP-T-29	31555 TAP 65 60.0 31553 BIG BAR 60.0 1	B2_35_Humboldt-Trinity 115 kV Line & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	107.5	<100.0		Short term: Action Plan
NV-NP-T-30	31556 TRINITY 60.0 31555 TAP 65 60.0 1	B2_35_Humboldt-Trinity 115 kV Line & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	107.5	<100.0		Short term: Action Plan
NV-NP-T-31	31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B2_38_Trinity-Cottonwood 115 kV Line	C3	N-1-1	110.9	<100.0		Short term: Action Plan
NV-NP-T-32	31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B2_38_Trinity-Cottonwood 115 kV Line	C3	N-1-1	112.7	<100.0		Short term: Action Plan
NV-NP-T-33	31566 KESWICK 60.0 31582 STLLWATR 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B2_38_Trinity-Cottonwood 115 kV Line	C3	N-1-1	135.0	<100.0		Short term: Action Plan
NV-NP-T-34	31580 CASCADE 60.0 31582 STLLWATR 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B2_38_Trinity-Cottonwood 115 kV Line	C3	N-1-1	123.1	<100.0		Short term: Action Plan
NV-NP-T-35	31116 GRBRVLE 60.0 31118 KEKAWAKA 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-36	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-T-37	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-38	31306 WILLITS 60.0 31308 LYTNVLE 60.0 1	B2_36_Bridgeville-Cottonwood 115 kV Line & B3_32_Trinity No.1 115/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-39	31576 WNTU PMS 60.0 31570 BENTON 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-40	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-41	31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-42	31116 GRBRVLE 60.0 31118 KEKAWAKA 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-43	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-44	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	diverge	<100.0		Short term: Action Plan
NV-NP-T-45	31306 WILLITS 60.0 31308 LYTNVLE 60.0 1	B3_32_Trinity No.1 115/60 kV Transformer & B2_36_Bridgeville-Cottonwood 115 kV Line	C3	N-1-1	diverge	<100.0		Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-T-46	31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	144.0	<100.0		Short term: Action Plan
NV-NP-T-47	31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	139.8	<100.0		Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-1	VINA 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	9.127	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-2	GERBER 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.226	Explore potential mitigation
NV-SP-VD-3	CARIBOU 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.024	6.388	Explore potential mitigation
NV-SP-VD-4	CARIBOU 115kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	<5.0	6.019	Explore potential mitigation
NV-SP-VD-5	CARIBOU 230kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	<5.0	5.199	Explore potential mitigation
NV-SP-VD-6	CHESTER 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	6.941	8.812	10.722	Explore potential mitigation
NV-SP-VD-7	GANSNER 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.112	6.498	Explore potential mitigation
NV-SP-VD-8	HOWELLS 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.083	6.462	Explore potential mitigation
NV-SP-VD-9	RWSN J2 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.104	Explore potential mitigation
NV-SP-VD-10	TYLERJT 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.122	Explore potential mitigation
NV-SP-VD-11	BIG BEND 115kV	B3_19_Caribou No.11 230/115/60 kV Transformer	B	T-1	<5.0	<5.0	5.061	Explore potential mitigation
NV-SP-VD-12	BIG MDWS 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.328	6.957	Explore potential mitigation
NV-SP-VD-13	CARBOU M 230kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	<5.0	5.982	Explore potential mitigation
NV-SP-VD-14	CLMN JCT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	8.761	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-15	DIRYVLE 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	8.981	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-16	ELIZ JT1 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.097	6.48	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-17	ELIZ JT2 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.102	6.485	Explore potential mitigation
NV-SP-VD-18	GRS F JT 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	<5.0	5.237	Explore potential mitigation
NV-SP-VD-19	HMLTN BR 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.539	7.39	Explore potential mitigation
NV-SP-VD-20	LP FB SP 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.132	Explore potential mitigation
NV-SP-VD-21	LS ML JT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	9.086	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-22	LS MLNSJ 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	9.099	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-23	RED B JT 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.076	Explore potential mitigation
NV-SP-VD-24	RED BLFF 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	12.608	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-25	SPANSHCK 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	5.101	6.485	Explore potential mitigation
NV-SP-VD-26	ULTR WSD 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	<5.0	6.988	Explore potential mitigation
NV-SP-VD-27	WESTWOOD 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	<5.0	6.909	Explore potential mitigation
NV-SP-VD-28	SPI 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	7.906	9.542	Explore potential mitigation
NV-SP-VD-29	VINA 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	10.179	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-30	VOLTA 60kV	B2_101_Volta-South 60 kV Line (between Q720 New Lassen Lodge an	B	L-1/G-1	5.151	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-31	EST Q1 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	7.923	9.562	Explore potential mitigation
NV-SP-VD-32	GERBER 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.441	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-33	KILARC 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.306	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-34	CARIBOU 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.054	13.911	Explore potential mitigation
NV-SP-VD-35	CHESTER 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	8.651	16.848	19.398	Explore potential mitigation
NV-SP-VD-36	GANSNER 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.28	14.175	Explore potential mitigation
NV-SP-VD-37	HOWELLS 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.204	14.086	Explore potential mitigation
NV-SP-VD-38	RWSN J2 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.313	Explore potential mitigation
NV-SP-VD-39	TKO TAP 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.339	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-40	TYLERJT 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.331	Explore potential mitigation
NV-SP-VD-41	AMERESCO 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	L-1	7.232	5.423	7.305	Explore potential mitigation
NV-SP-VD-42	BIG BEND 115kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	6.888	8.247	Explore potential mitigation
NV-SP-VD-43	BIG MDWS 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	5.138	12.768	14.953	Explore potential mitigation
NV-SP-VD-44	BIGGSJCT 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	5.528	<5.0	5.28	Explore potential mitigation
NV-SP-VD-45	BTTE CRK 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	7.378	5.555	7.47	Explore potential mitigation
NV-SP-VD-46	CARBOU M 230kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	11.923	13.695	Explore potential mitigation
NV-SP-VD-47	CEDR CRK 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.331	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-48	CLARK RD 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	7.412	5.596	7.469	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-49	CLMN JCT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	9.757	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-50	CLOV TAP 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.312	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-51	CNTRVLE 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	7.333	5.519	7.413	Explore potential mitigation
NV-SP-VD-52	COWCK TP 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.339	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-53	DE SABLA 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	L-1	7.378	5.555	7.47	Explore potential mitigation
NV-SP-VD-54	DESCHUTS 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.407	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-55	DIRYVLE 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	10.01	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-56	DRHM JCA 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	L-1	7.291	5.484	7.355	Explore potential mitigation
NV-SP-VD-57	DRHMSW45 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	L-1	7.296	5.489	7.359	Explore potential mitigation
NV-SP-VD-58	ELIZ JT1 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.241	14.129	Explore potential mitigation
NV-SP-VD-59	ELIZ JT2 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.253	14.143	Explore potential mitigation
NV-SP-VD-60	ELIZ TWN 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	8.515	10.193	Explore potential mitigation
NV-SP-VD-61	EST Q JT 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	7.923	9.562	Explore potential mitigation
NV-SP-VD-62	EST QNCY 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	7.923	9.563	Explore potential mitigation
NV-SP-VD-63	GRBR JCT 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.335	Explore potential mitigation
NV-SP-VD-64	GRIZ JCT 115kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	10.49	12.182	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-65	GRIZZLY1 115kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	10.49	12.183	Explore potential mitigation
NV-SP-VD-66	GRS F JT 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	10.32	12.096	Explore potential mitigation
NV-SP-VD-67	GRYS FLT 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.205	14.087	Explore potential mitigation
NV-SP-VD-68	HMLTN BR 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	5.367	13.304	15.751	Explore potential mitigation
NV-SP-VD-69	LP FB SP 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.342	Explore potential mitigation
NV-SP-VD-70	LS ML JT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	10.131	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-71	LS MLNSJ 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	10.146	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-72	MCNE JCT 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	7.486	5.693	7.502	Explore potential mitigation
NV-SP-VD-73	OLSEN JT 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.323	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-74	PEACHTON 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	L-1	5.151	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-75	PLMS JCT 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	7.923	9.562	Explore potential mitigation
NV-SP-VD-76	RED B JT 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00	B	L-1	<5.0	<5.0	5.284	Explore potential mitigation
NV-SP-VD-77	RED BLFF 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	13.827	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-78	SPANSHCK 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.252	14.142	Explore potential mitigation
NV-SP-VD-79	TBLE MTN 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	7.491	5.703	7.499	Explore potential mitigation
NV-SP-VD-80	TRES VIS 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	6.256	<5.0	6.165	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-81	ULTR WSD 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.948	15.565	Explore potential mitigation
NV-SP-VD-82	WESTWOOD 60kV	B2_24_Caribou-Table Mountain 230 kV Line	B	L-1	<5.0	12.878	15.525	Explore potential mitigation
NV-SP-VD-83	WHITMORE 60kV	B2_62_Cascade-Benton-Deschutes 60 kV Line	B	L-1	5.331	<5.0	<5.0	Short term: Action Plan
NV-SP-VD-84	AMERESCOTAP 60kV	B3_28_Table Mountain No.2 230/115/60 kV Transformer	B	T-1	7.239	5.43	7.311	Explore potential mitigation
NV-SP-VD-85	Q720 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	32.924	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-86	VINA 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	58.878	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-87	SOUTH 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	36.564	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-88	VOLTA 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	32.179	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-89	BENTON 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	17.049	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-90	GIRVAN 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	18.385	<10.0	5.333	Explore potential mitigation
NV-SP-VD-91	INSKIP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	40.054	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-92	KILARC 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.557	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-93	Q720TP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	34.019	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-94	CHICO B 115kV	C1_42A_BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	11.054	6.309	7.069	Explore potential mitigation
NV-SP-VD-95	COLEMAN 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	46.503	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-96	TKO TAP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.678	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-97	ANDERSON 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	21.045	6.922	8.231	Explore potential mitigation
NV-SP-VD-98	CEDR CRK 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.646	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-99	CHICOTP1 115kV	C1_42A_BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	11.016	6.288	7.045	Explore potential mitigation
NV-SP-VD-100	CLMN FSH 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	46.649	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-101	CLMN JCT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	57.355	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-102	CLMN TAP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	46.605	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-103	CLOV TAP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.576	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-104	COWCK TP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.679	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-105	DESCHUTS 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.924	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-106	DIRYVLE 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	58.333	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-107	LOMS JCT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	13.993	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-108	LS ML JT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	58.733	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-109	LS MLNSJ 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	58.779	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-110	OLSEN JT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.617	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-111	OREGNTRL 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	11.267	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-112	RED B JT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	62.456	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-VD-113	RED BLFF 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	62.328	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-114	WHITMORE 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	16.648	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-115	WNTU PMS 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	15.177	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-199	CHESTER 60kV	C5_6_Table	C5	DCTL	6.95	8.822	10.749	Explore potential mitigation
NV-SP-VD-200	BIGGSJCT 60kV	C5_15_Palermo-Pease	C5	DCTL	12.22	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-201	PEACHTON 60kV	C5_15_Palermo-Pease	C5	DCTL	13.433	<10.0	<10.0	Short term: Action Plan
NV-SP-VD-202	TRES VIS 60kV	C5_15_Palermo-Pease	C5	DCTL	9.419	<10.0	<10.0	Short term: Action Plan



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	

No voltage deviation concerns were identified.

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Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-VD-1	TAP 65 60kV	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Bus	11	<10.0		Short term: Action Plan
NV-NP-VD-2	JESSTAP 115kV	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Bus	10	<10.0		Short term: Action Plan
NV-NP-VD-3	TRINITY 60kV	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Bus	11	<10.0		Short term: Action Plan
NV-NP-VD-4	FRNCHGLH 60kV	C2_15_COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Bus	12	<10.0		Short term: Action Plan
NV-NP-VD-10	BIGGSJCT 60kV	C5_15_Palermo-Pease	C5	DCTL	11.818	<10.0		Short term: Action Plan
NV-NP-VD-11	PEACHTON 60kV	C5_15_Palermo-Pease	C5	DCTL	13.35	<10.0		Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-1	VINA 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	T-1	0.8641	>0.9	>0.9	Short term: Action Plan
NV-SP-V-2	TYLER 60kV	B3_3_Cottonwood #2 230/60 kV Transformer	B	T-1	0.8994	>0.9	>0.9	Short term: Action Plan
NV-SP-V-3	CANAL TP 60kV	B3_3_Cottonwood #2 230/60 kV Transformer	B	T-1	0.8996	>0.9	>0.9	Short term: Action Plan
NV-SP-V-4	CR CANAL 60kV	B3_3_Cottonwood #2 230/60 kV Transformer	B	T-1	0.8986	>0.9	>0.9	Short term: Action Plan
NV-SP-V-5	DIRYVLE 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	0.8788	>0.9	>0.9	Short term: Action Plan
NV-SP-V-6	LS ML JT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	0.8683	>0.9	>0.9	Short term: Action Plan
NV-SP-V-7	LS MLNSJ 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	0.8669	>0.9	>0.9	Short term: Action Plan
NV-SP-V-8	RED BLFF 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line	B	L-1	0.8495	>0.9	>0.9	Short term: Action Plan
NV-SP-V-9	SPI 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8749	0.8643	Explore potential mitigation
NV-SP-V-10	VINA 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line & B1_47_VOLTA1-2 9.11 Unit ID 1	B	L-1/G-1	0.8603	>0.9	>0.9	Short term: Action Plan
NV-SP-V-11	TYLER 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B1_10_MALCHA 13.80 Unit ID 1	B	L-1/G-1	0.8987	>0.9	>0.9	Short term: Action Plan
NV-SP-V-12	EST Q1 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8749	0.8642	Explore potential mitigation
NV-SP-V-13	CARIBOU 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8925	0.8749	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-14	CARIBOU 115kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	>0.9	0.8945	Explore potential mitigation
NV-SP-V-15	CARIBOU 230kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	>0.9	0.8944	Explore potential mitigation
NV-SP-V-16	CHESTER 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8481	0.8212	Explore potential mitigation
NV-SP-V-17	GANSNER 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8795	0.8618	Explore potential mitigation
NV-SP-V-18	HOWELLS 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8853	0.8676	Explore potential mitigation
NV-SP-V-19	BIG MDWS 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	0.9601	0.8826	0.8603	Explore potential mitigation
NV-SP-V-20	CANAL TP 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B1_10_MALCHA 13.80 Unit ID 1	B	L-1/G-1	0.8989	>0.9	>0.9	Short term: Action Plan
NV-SP-V-21	CARBOU M 230kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	>0.9	0.8956	Explore potential mitigation
NV-SP-V-22	CLMN JCT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line & B1_73_INSKIP 4.16 Unit ID 1	B	L-1/G-1	0.8979	>0.9	>0.9	Short term: Action Plan
NV-SP-V-23	CR CANAL 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B1_10_MALCHA 13.80 Unit ID 1	B	L-1/G-1	0.898	>0.9	>0.9	Short term: Action Plan
NV-SP-V-24	DIRYVILLE 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line & B1_73_INSKIP 4.16 Unit ID 1	B	L-1/G-1	0.8766	>0.9	>0.9	Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-25	ELIZ JT1 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8827	0.865	Explore potential mitigation
NV-SP-V-26	ELIZ JT2 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8821	0.8644	Explore potential mitigation
NV-SP-V-27	EST Q JT 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8749	0.8641	Explore potential mitigation
NV-SP-V-28	GRS F JT 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8857	0.8709	Explore potential mitigation
NV-SP-V-29	GRYS FLT 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8853	0.8676	Explore potential mitigation
NV-SP-V-30	HMLTN BR 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	0.958	0.877	0.8509	Explore potential mitigation
NV-SP-V-31	LS ML JT 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line & B1_73_INSKIP 4.16 Unit ID 1	B	L-1/G-1	0.8661	>0.9	>0.9	Short term: Action Plan
NV-SP-V-32	PLMS JCT 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8749	0.8641	Explore potential mitigation
NV-SP-V-33	RED BLFF 60kV	B2_73_Cottonwood-Red Bluff 60 kV Line & B1_73_INSKIP 4.16 Unit ID 1	B	L-1/G-1	0.8472	>0.9	>0.9	Short term: Action Plan
NV-SP-V-34	SPANSHCK 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.882	0.8643	Explore potential mitigation
NV-SP-V-35	ULTR WSD 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8757	0.8472	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-36	WESTWOOD 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	B	L-1/G-1	>0.9	0.8756	0.8466	Explore potential mitigation
NV-SP-V-37	Q720 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.7084	>0.9	>0.9	Explore potential mitigation
NV-SP-V-38	VINA 60kV	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	0.8469	>0.9	>0.9	Explore potential mitigation
NV-SP-V-39	SOUTH 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.6694	>0.9	>0.9	Explore potential mitigation
NV-SP-V-40	TYLER 60kV	C1_16_Round Mountain 230 kV Bus Section 2E w/ Hatchet Ridge SPS	C1	Bus	0.8989	>0.9	>0.9	Explore potential mitigation
NV-SP-V-41	VOLTA 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.7123	>0.9	>0.9	Explore potential mitigation
NV-SP-V-42	BENTON 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8479	>0.9	>0.9	Explore potential mitigation
NV-SP-V-43	GIRVAN 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8316	>0.9	>0.9	Explore potential mitigation
NV-SP-V-44	INSKIP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.6338	>0.9	>0.9	Explore potential mitigation
NV-SP-V-45	KILARC 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8707	>0.9	>0.9	Explore potential mitigation
NV-SP-V-46	Q720TP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.6951	>0.9	>0.9	Explore potential mitigation
NV-SP-V-47	COLEMAN 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.5655	>0.9	>0.9	Explore potential mitigation
NV-SP-V-48	TKO TAP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8614	>0.9	>0.9	Explore potential mitigation
NV-SP-V-49	ANDERSON 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8098	>0.9	>0.9	Explore potential mitigation
NV-SP-V-50	CANAL TP 60kV	C1_16_Round Mountain 230 kV Bus Section 2E w/ Hatchet Ridge SPS	C1	Bus	0.8991	>0.9	>0.9	Explore potential mitigation
NV-SP-V-51	CEDR CRK 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8659	>0.9	>0.9	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-52	CLMN FSH 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.5638	>0.9	>0.9	Explore potential mitigation
NV-SP-V-53	CLMN JCT 60kV	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	0.8838	>0.9	>0.9	Explore potential mitigation
NV-SP-V-54	CLMN TAP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.5647	>0.9	>0.9	Explore potential mitigation
NV-SP-V-55	CLOV TAP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.87	>0.9	>0.9	Explore potential mitigation
NV-SP-V-56	COWCK TP 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8614	>0.9	>0.9	Explore potential mitigation
NV-SP-V-57	CR CANAL 60kV	C1_16_Round Mountain 230 kV Bus Section 2E w/ Hatchet Ridge SPS	C1	Bus	0.8982	>0.9	>0.9	Explore potential mitigation
NV-SP-V-58	DESCHUTS 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8432	>0.9	>0.9	Explore potential mitigation
NV-SP-V-59	DIRYVILLE 60kV	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	0.862	>0.9	>0.9	Explore potential mitigation
NV-SP-V-60	LOMS JCT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.876	>0.9	>0.9	Explore potential mitigation
NV-SP-V-61	LS ML JT 60kV	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	0.8512	>0.9	>0.9	Explore potential mitigation
NV-SP-V-62	LS MLNSJ 60kV	C1_52_BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	0.8498	>0.9	>0.9	Explore potential mitigation
NV-SP-V-63	OLSEN JT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8666	>0.9	>0.9	Explore potential mitigation
NV-SP-V-64	RED B JT 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.3523	>0.9	>0.9	Explore potential mitigation
NV-SP-V-65	RED BLFF 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.3523	>0.9	>0.9	Explore potential mitigation
NV-SP-V-66	WHITMORE 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8645	>0.9	>0.9	Explore potential mitigation
NV-SP-V-67	WNTU PMS 60kV	C1_53_BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	0.8655	>0.9	>0.9	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-68	TYLER 60kV	C2_5_COTTONWOOD CB 412 STUCK W SPS	C2	CB	0.8989	>0.9	>0.9	Explore potential mitigation
NV-SP-V-69	CANAL TP 60kV	C2_5_COTTONWOOD CB 412 STUCK W SPS	C2	CB	0.8991	>0.9	>0.9	Explore potential mitigation
NV-SP-V-70	CR CANAL 60kV	C2_5_COTTONWOOD CB 412 STUCK W SPS	C2	CB	0.8981	>0.9	>0.9	Explore potential mitigation
NV-SP-V-71	PPL 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.7609	>0.9	>0.9	Explore potential mitigation
NV-SP-V-72	SPI 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8749	0.8643	Explore potential mitigation
NV-SP-V-73	Q720 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.534	>0.9	>0.9	Explore potential mitigation
NV-SP-V-74	VINA 60kV	B1_47_VOLTA1-2 9.11 Unit ID 1 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.8603	>0.9	>0.9	Explore potential mitigation
NV-SP-V-75	SOUTH 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.4969	>0.9	>0.9	Explore potential mitigation
NV-SP-V-76	TYLER 60kV	B1_10_MALCHA 13.80 Unit ID 1 & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8987	>0.9	>0.9	Explore potential mitigation
NV-SP-V-77	VOLTA 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.5306	>0.9	>0.9	Explore potential mitigation
NV-SP-V-78	ANTLER 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.7609	>0.9	>0.9	Explore potential mitigation
NV-SP-V-79	BENTON 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.5196	>0.9	>0.9	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-80	EST Q1 60kV	B3_49_SPI Quincy PH No.1 60/9.11 kV Transformer & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	>0.9	>0.9	Explore potential mitigation
NV-SP-V-81	GERBER 60kV	B2_109_NewBus 60.00 to RED BLFF 60.00 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	>0.9	>0.9	>0.9	Explore potential mitigation
NV-SP-V-82	GIRVAN 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.4754	>0.9	>0.9	Explore potential mitigation
NV-SP-V-83	INSKIP 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.4637	>0.9	>0.9	Explore potential mitigation
NV-SP-V-84	KILARC 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.6544	>0.9	>0.9	Explore potential mitigation
NV-SP-V-85	Q720TP 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.5201	>0.9	>0.9	Explore potential mitigation
NV-SP-V-86	CARIBOU 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	>0.9	>0.9	Explore potential mitigation
NV-SP-V-87	CASCADE 115kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.8959	>0.9	>0.9	Explore potential mitigation
NV-SP-V-88	CHESTER 60kV	B3_49_SPI Quincy PH No.1 60/9.11 kV Transformer & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	>0.9	>0.9	Explore potential mitigation
NV-SP-V-89	COLEMAN 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.4034	>0.9	>0.9	Explore potential mitigation
NV-SP-V-90	GANSNER 60kV	B3_49_SPI Quincy PH No.1 60/9.11 kV Transformer & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8973	0.88	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-91	HOWELLS 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8853	0.8676	Explore potential mitigation
NV-SP-V-92	KESWICK 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.8309	>0.9	>0.9	Explore potential mitigation
NV-SP-V-93	PALERMO 230kV	B2_29_Table Mountain(D)-Palermo 230 kV Line & B2_34_Palermo-Colgate 230 kV Line	C3	N-1-1	0.8877	>0.9	>0.9	Explore potential mitigation
NV-SP-V-94	RWSN J2 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.3303	>0.9	>0.9	Explore potential mitigation
NV-SP-V-95	TKO TAP 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.6428	>0.9	>0.9	Explore potential mitigation
NV-SP-V-96	TYLERJT 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.3259	>0.9	>0.9	Explore potential mitigation
NV-SP-V-97	ANDERSON 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.4121	>0.9	>0.9	Explore potential mitigation
NV-SP-V-98	BIG MDWS 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8826	0.8603	Explore potential mitigation
NV-SP-V-99	CANAL TP 60kV	B1_10_MALCHA 13.80 Unit ID 1 & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8989	>0.9	>0.9	Explore potential mitigation
NV-SP-V-100	CARBOU M 230kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.9125	0.8956	Explore potential mitigation
NV-SP-V-101	CEDR CRK 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.6494	>0.9	>0.9	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-102	CLMN FSH 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.4001	>0.9	>0.9	Explore potential mitigation
NV-SP-V-103	CLMN JCT 60kV	B1_47_VOLTA1-2 9.11 Unit ID 1 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.8965	>0.9	>0.9	Explore potential mitigation
NV-SP-V-104	CLMN TAP 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.4009	>0.9	>0.9	Explore potential mitigation
NV-SP-V-105	CLOV TAP 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.6549	>0.9	>0.9	Explore potential mitigation
NV-SP-V-106	COTTONWD 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.3902	>0.9	>0.9	Explore potential mitigation
NV-SP-V-107	COWCK TP 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.6443	>0.9	>0.9	Explore potential mitigation
NV-SP-V-108	CR CANAL 60kV	B1_10_MALCHA 13.80 Unit ID 1 & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.898	>0.9	>0.9	Explore potential mitigation
NV-SP-V-109	DESCHUTS 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.6213	>0.9	>0.9	Explore potential mitigation
NV-SP-V-110	DIRYVLE 60kV	B1_47_VOLTA1-2 9.11 Unit ID 1 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.8751	>0.9	>0.9	Explore potential mitigation
NV-SP-V-111	ELIZ JT1 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8827	0.865	Explore potential mitigation
NV-SP-V-112	ELIZ JT2 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8821	0.8644	Explore potential mitigation

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-113	ELIZ TWN 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8777	0.8659	Explore potential mitigation
NV-SP-V-114	EST Q JT 60kV	B3_49_SPI Quincy PH No.1 60/9.11 kV Transformer & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8961	0.8849	Explore potential mitigation
NV-SP-V-115	EST QNCY 60kV	B3_49_SPI Quincy PH No.1 60/9.11 kV Transformer & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8961	0.8848	Explore potential mitigation
NV-SP-V-116	GRBR JCT 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.3264	>0.9	>0.9	Explore potential mitigation
NV-SP-V-117	GRS F JT 60kV	B2_24_Caribou-Table Mountain 230 kV Line & B1_67_SPI-QUCY 13.80 Unit ID 1	C3	N-1-1	>0.9	0.8868	0.8735	Explore potential mitigation
NV-SP-V-118	GRYS FLT 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8853	0.8676	Explore potential mitigation
NV-SP-V-119	HMLTN BR 60kV	B3_49_SPI Quincy PH No.1 60/9.11 kV Transformer & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8956	0.8705	Explore potential mitigation
NV-SP-V-120	LOMS JCT 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.6508	>0.9	>0.9	Short term: Action Plan
NV-SP-V-121	LP FB SP 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.3232	>0.9	>0.9	Short term: Action Plan
NV-SP-V-122	LS ML JT 60kV	B1_47_VOLTA1-2 9.11 Unit ID 1 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.8645	>0.9	>0.9	Short term: Action Plan
NV-SP-V-123	LS MLNSJ 60kV	B1_47_VOLTA1-2 9.11 Unit ID 1 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.8631	>0.9	>0.9	Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-124	MTN GATE 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.7685	>0.9	>0.9	Short term: Action Plan
NV-SP-V-125	NEO REDT 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.2527	>0.9	>0.9	Short term: Action Plan
NV-SP-V-126	OLSEN JT 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.6507	>0.9	>0.9	Short term: Action Plan
NV-SP-V-127	OREGNTRL 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.7154	>0.9	>0.9	Short term: Action Plan
NV-SP-V-128	PALRMO M 230kV	B2_29_Table Mountain(D)-Palermo 230 kV Line & B2_34_Palermo-Colgate 230 kV Line	C3	N-1-1	0.8894	>0.9	>0.9	Short term: Action Plan
NV-SP-V-129	PLMS JCT 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8749	0.8641	Explore potential mitigation
NV-SP-V-130	RASN JNT 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.2503	>0.9	>0.9	Short term: Action Plan
NV-SP-V-131	RED B JT 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.317	>0.9	>0.9	Short term: Action Plan
NV-SP-V-132	RED BLFF 60kV	B1_47_VOLTA1-2 9.11 Unit ID 1 & B2_73_Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.8456	>0.9	>0.9	Short term: Action Plan
NV-SP-V-133	SPANSHCK 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.882	0.8643	Explore potential mitigation
NV-SP-V-134	STLLWATR 60kV	B3_4_Cottonwood No.3 230/60 kV Transformer & B3_3_Cottonwood #2 230/60 kV Transformer	C3	N-1-1	0.8009	>0.9	>0.9	Short term: Action Plan

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Study Area: **PG&E North Valley - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
NV-SP-V-135	ULTR WSD 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8757	0.8472	Explore potential mitigation
NV-SP-V-136	WESTWOOD 60kV	B1_67_SPI-QUCY 13.80 Unit ID 1 & B2_24_Caribou-Table Mountain 230 kV Line	C3	N-1-1	>0.9	0.8756	0.8466	Explore potential mitigation
NV-SP-V-137	WHITMORE 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.6464	>0.9	>0.9	Short term: Action Plan
NV-SP-V-138	WNTU PMS 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.5924	>0.9	>0.9	Short term: Action Plan
NV-SP-V-139	TYLER 60kV	C5_11_Pit	C5	DCTL	0.8996	>0.9	>0.9	Short term: Action Plan
NV-SP-V-140	BIGGSJCT 60kV	C5_15_Palermo-Pease	C5	DCTL	0.8568	>0.9	>0.9	Short term: Action Plan
NV-SP-V-141	CANAL TP 60kV	C5_11_Pit	C5	DCTL	0.8998	>0.9	>0.9	Short term: Action Plan
NV-SP-V-142	CR CANAL 60kV	C5_24_Cottonwood(E)-Delevan	C5	DCTL	0.8989	>0.9	>0.9	Short term: Action Plan
NV-SP-V-143	PEACHTON 60kV	C5_15_Palermo-Pease	C5	DCTL	0.8457	>0.9	>0.9	Short term: Action Plan
NV-SP-V-144	TRES VIS 60kV	C5_15_Palermo-Pease	C5	DCTL	0.8897	>0.9	>0.9	Short term: Action Plan



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	

No high/low voltage concerns identified.

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Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
NV-NP-V-1	TYLER 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8969	>0.9		Short term: Action Plan
NV-NP-V-2	CANAL TP 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8969	>0.9		Short term: Action Plan
NV-NP-V-3	CR CANAL 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8962	>0.9		Short term: Action Plan
NV-NP-V-4	NEO REDT 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8974	>0.9		Short term: Action Plan
NV-NP-V-5	RASN JNT 60kV	B3_3_Cottonwood #2 230/60 kV Transformer & B3_4_Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	0.8975	>0.9		Short term: Action Plan
NV-NP-V-6	PEACHTON 60kV	C5_15_Palermo-Pease	C5	DCTL	0.888	>0.9		Short term: Action Plan



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

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Study Area: **PG&E North Valley - Spring Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				N/A	2019 Spring Peak	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Spring Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		N/A	2019 Spring Peak	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E North Valley - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-1	Lockeford #1 60 kV Line (Harney Lane Jct and Waterloo Jct Section)	B2_74_Hammer - Country Club 60 kV	B	L-1	169.8	<100	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-2	Lockeford #1 60 kV Line (Waterloo Jct and Mosher Section)	B2_74_Hammer - Country Club 60 kV	B	L-1	109.0	<100	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-3	Lockeford 60 kV Line No. 1	B2_74_Hammer - Country Club 60 kV	B	L-1	160.3	<100	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-4	Valley Springs No. 1 60 kV Line	B2_64_Weber - Mormon Jct 60 kV Line	B	L-1	117.1	120.9	128.8	Short Term: Disable Linden Automatics Long Term: Reconductor Valley Springs No. 1 60 kV Line
STOC-SP-T-5	Stockton 'A' - Weber 60 kV Line No. 1 (Weber-Santa Fe Section)	B1_16_COG.NTNL 12.00 Unit ID 1 & B2_67_Stockton 'A' - Weber 60 kV Line No. 2	B	L-1/G-1	103.3	<100	<100	Short term: Action Plan
STOC-SP-T-6	Valley Springs - Martell 60 kV Line No. 2	B1_15_Q481 13.80 Unit ID 1 & B2_60_Valley Springs - Martell 60 kV Line No. 1	B	L-1/G-1	98.9	99.3	102.0	Explore potential mitigation

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-7	Hammer-Country Club 60 kV Line (Hammer-Hammer Jct Section)	C1-39_BUS FAULT AT 33704 STAGG 60.00 Section E	C1	Bus	107.3	<100	105.4	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-8	Kasson-Louise 60 kV Line (Kasson-Calvo Tap Section)	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	105.4	<100	138.4	Short Term: Stockton Action Plan Long Term: Kasson SPS
STOC-SP-T-9	Kasson-Louise 60 kV Line (Mossdale Switches-Calvo Tap Section)	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	110.3	<100	143.3	Short Term: Stockton Action Plan Long Term: Kasson SPS
STOC-SP-T-10	Manteca 115/60 kV Transformer No. 3	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	192.3	<100	238.1	Short Term: Stockton Action Plan Long Term: Kasson SPS
STOC-SP-T-11	Manteca-Louise 60 kV Line (Manteca-Louise Jct Section)	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	147.3	162.6	186.1	Short Term: Stockton Action Plan Long Term: Kasson SPS
STOC-SP-T-12	New Stagg - Hammer 60 kV Line No. 2	C1-39_BUS FAULT AT 33704 STAGG 60.00 Section E	C1	Bus	156.8	115.2	153.0	Explore potential mitigation
STOC-SP-T-13	Hammer-Country Club 60 kV Line (Hammer Jct-Morada Jct Section)	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<100	105.6	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-14	Hammer-Country Club 60 kV Line (Morada Jct-Mosher Section)	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<100	151.9	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-15	Lockeford #1 60 kV Line (Harney Lane Jct and Waterloo Jct Section)	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<100	119.7	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-16	Lockeford #1 60 kV Line (Waterloo Jct and Mosher Section)	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<100	119.8	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-17	Lockeford 60 kV Line No. 1	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<100	119.7	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-18	Riverbank Jct - Manteca 115 kV Line	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	109.4	112.6	113.5	Explore potential mitigation
STOC-SP-T-19	Riverbank Jct SW STA - Manteca 115 kV Line (Valley Home Tap-Ripon Jct)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	121.0	<100	<100	Short term: Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-20	Stanislaus-Melones-Manteca 115 kV Line No. 1 (Avena Tap-Manteca Section)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	109.5	<100	<100	Short term: Action Plan
STOC-SP-T-21	Stanislaus-Melones-Manteca 115 kV Line No. 1 (Melones Jct-Avena Tap Section)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	130.3	<100	<100	Short term: Action Plan
STOC-SP-T-22	Hammer - Country Club 60 kV (UOP-West Lane Switches Section)	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-23	Hammer - Country Club 60 kV (UOP-West Lane Switches Section)	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-24	Hammer - Country Club 60 kV (-West Lane Switches-Hammer JCT Section)	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-25	Hammer - Country Club 60 kV (-West Lane Switches-Hammer JCT Section)	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-26	Hammer-Country Club 60 kV Line (Hammer Jct-Morada Jct Section)	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	234.6	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-27	Hammer-Country Club 60 kV Line (Hammer Jct-Morada Jct Section)	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	234.6	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-28	Hammer-Country Club 60 kV Line (Hammer-Hammer Jct Section)	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	152.8	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-29	Hammer-Country Club 60 kV Line (Hammer-Hammer Jct Section)	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	152.8	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-30	Hammer-Country Club 60 kV Line (Morada Jct-Mosher Section)	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	298.3	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-31	Hammer-Country Club 60 kV Line (Morada Jct-Mosher Section)	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	298.3	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-32	Hammer-Country Club 60 kV Line (Country Club and UOP Section)	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-33	Industrial 60 kV Tap	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	139.2	138.7	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-34	Kasson 115/60 kV Transformer No. 1	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_40_Vierra - Tracy - Kasson 115 kV Line	C3	N-1-1	97.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-35	Kasson 115/60 kV Transformer No. 1	B2_40_Vierra - Tracy - Kasson 115 kV Line & B2_36_Tesla - Kasson - Manteca 115 kV Line	C3	N-1-1	97.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-36	Kasson-Louise 60 kV Line (Kasson-Calvo Tap Section)	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_40_Vierra - Tracy - Kasson 115 kV Line	C3	N-1-1	114.5	<100	<100	Short Term: Stockton Action Plan Long Term: Kasson SPS
STOC-SP-T-37	Kasson-Louise 60 kV Line (Kasson-Calvo Tap Section)	B2_40_Vierra - Tracy - Kasson 115 kV Line & B2_36_Tesla - Kasson - Manteca 115 kV Line	C3	N-1-1	114.5	<100	<100	Short Term: Stockton Action Plan Long Term: Kasson SPS
STOC-SP-T-38	Kasson-Louise 60 kV Line (Mossdale Switches-Calvo Tap Section)	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_40_Vierra - Tracy - Kasson 115 kV Line	C3	N-1-1	110.2	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-39	Lammers-Kasson 115 kV Line (Kasson-Owens Tap Section)	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_44_Tesla - Tracy 115 kV Line	C3	N-1-1	102.7	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-40	Lammers-Kasson 115 kV Line (Kasson Owens Tap Section)	B2_44_Tesla - Tracy 115 kV Line & B2_36_Tesla - Kasson - Manteca 115 kV Line	C3	N-1-1	102.7	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-41	Lockeford - Lodi 60 kV Line No. 2 (Lockeforde-Victor Section)	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	150.9	150.9	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-42	Lockeford - Lodi 60 kV Line No. 3 (Lockeforde-Lodi JCT Section)	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	161.6	167.6	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-43	Lockeford #1 60 kV Line	B2_4_Lockeford - Bellota 230 kV Line & B2_74_Hammer - Country Club 60 kV	C3	N-1-1	180.9	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays
STOC-SP-T-44	Lockeford #1 60 kV Line (Harney Lane Jct and Waterloo Jct Section)	B2_4_Lockeford - Bellota 230 kV Line & B2_74_Hammer - Country Club 60 kV	C3	N-1-1	191.6	<100	<100	Short Term: Stockton Action Plan Long Term: Reconductor Lockeford No. 1 60 kV Line & Loop Mosher with Overcurrent Relays

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-45	Lockeford #1 60 kV Line (Waterloo Jct and Mosher Section)	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1	<100	141.2	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-46	Lockeford 230/60 kV Transformer No. 2	B2_74_Hammer - Country Club 60 kV & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	106.6	106.1	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-47	Lockeford 230/60 kV Transformer No. 2	B3_5_Lockeford 230/60 kV Transformer No. 3 & B2_74_Hammer - Country Club 60 kV	C3	N-1-1	106.6	106.1	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-48	Lockeford-Industrial 60 kV Line	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_91_Lodi - Industrial 60 kV Line	C3	N-1-1	138.4	138.0	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-49	Lockeford-Industrial 60 kV Line	B2_91_Lodi - Industrial 60 kV Line & B2_75_Lockeford - Lodi 60 kV Line No. 2	C3	N-1-1	138.4	138.0	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-50	Lockeford-Lodi #1 60 kV Line (Colony Tap-Colony JCT Section)	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	120.5	125.1	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-51	Lockeford-Lodi #1 60 kV Line (Lockeford-Colony Section)	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	130.5	135.3	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-52	Lockeford-Lodi #1 60 kV Line (Lodi-Colony JCT Section)	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	129.5	134.4	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-53	Lockeford-Lodi #2 60 kV Line (Victor-Woodbridge JCT Section)	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	139.2	138.7	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-54	Lockeford-Lodi #2 60 kV Line (Woodbridge JCT-Industrial JCT Section)	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	139.2	138.7	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-55	Lockeford-Lodi #3 60 kV Line (Lodi Aux-Lodi JCT Section)	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	130.7	135.6	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-56	Lockeford No. 3 230/60 kV Transformer	B2_74_Hammer - Country Club 60 kV & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	106.5	105.9	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-57	Lockeford No. 3 230/60 kV Transformer B3_4_Lockeford 230/60 kV Transformer No. 2 & C3			N-1-1	106.5	105.9	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-58	Lodi-Industrial 60 kV Line	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1	172.1	173.1	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-59	Lodi-Industrial 60 kV Line	B2_78_Lockeford - Industrial 60 kV Line & B2_75_Lockeford - Lodi 60 kV Line No. 2	C3	N-1-1	172.1	171.9	<100	Short Term: Stockton Action Plan Long Term: New Eight Mile Lodi Industrial - Lockeford 230 kV DCTL
STOC-SP-T-60	Manteca-Louise 60 kV Line (Manteca-Louise Jct Section)	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_40_Vierra - Tracy - Kasson 115 kV Line	C3	N-1-1	113.1	<100	<100	Short Term: Stockton Action Plan Long Term: Kasson SPS

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-61	New Stagg - Hammer 60 kV Line No. 2	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	117.2	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-62	New Stagg - Hammer 60 kV Line No. 2	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	117.2	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-63	New Stagg - Hammer 60 kV Line No. 2	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	<100	98.1	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-64	New Stagg - Hammer 60 kV Line No. 2	B3_5_Lockeford 230/60 kV Transformer No. 3 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1	<100	98.1	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-65	Owens Illinois 115 kV Tap Line (Normally Open Switch 155)	B2_44_Tesla - Tracy 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	128.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-66	Owens Illinois 115 kV Tap Line (Normally Open Switch 155)	B2_49_Schulte - Lammers 115 kV Line & B2_44_Tesla - Tracy 115 kV Line	C3	N-1-1	128.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-67	Riverbank Jct SW STA - Manteca 115 kV Line (Manteca-Ripon JCT Section)	B3_11_Bellota 230/115 kV Transformer No. 1 & B3_12_Belltoa 230/115 kV Transformer No. 2	C3	N-1-1	109.5	112.6	113.6	Explore potential mitigation

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-68	Riverbank Jct SW STA - Manteca 115 kV Line (Manteca-Ripon JCT Section)	B3_12_Belltoa 230/115 kV Transformer No. 2 & B3_11_Bellota 230/115 kV Transformer No. 1	C3	N-1-1	109.5	112.6	113.6	Explore potential mitigation
STOC-SP-T-69	Schulte - Lammers 115 kV Line	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_44_Tesla - Tracy 115 kV Line	C3	N-1-1	99.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-70	Schulte - Lammers 115 kV Line	B2_44_Tesla - Tracy 115 kV Line & B2_36_Tesla - Kasson - Manteca 115 kV Line	C3	N-1-1	99.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-71	Schulte SW STA - Kasson - Manteca 115 kV Line (Schulte-Owens Tap Section)	B2_44_Tesla - Tracy 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	128.2	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-72	Schulte SW STA - Kasson - Manteca 115 kV Line (Schulte-Owens Tap Section)	B2_49_Schulte - Lammers 115 kV Line & B2_44_Tesla - Tracy 115 kV Line	C3	N-1-1	128.2	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-73	Schulte Sw Sta - Kasson 115 kV Line	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_44_Tesla - Tracy 115 kV Line	C3	N-1-1	108.1	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-74	Schulte Sw Sta - Kasson 115 kV Line	B2_44_Tesla - Tracy 115 kV Line & B2_36_Tesla - Kasson - Manteca 115 kV Line	C3	N-1-1	108.1	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-75	Stagg - Country Club 60 kV Line No. 1	B2_72_Stagg - Country Club 60 kV Line No. 2 & B2_73_Stagg - Hammer 60 kV Line No. 1	C3	N-1-1	157.5	<100	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-76	Stagg - Country Club 60 kV Line No. 1	B2_73_Stagg - Hammer 60 kV Line No. 1 & B2_72_Stagg - Country Club 60 kV Line No. 2	C3	N-1-1	157.5	<100	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-77	Stagg - Country Club 60 kV Line No. 1	B2_71_Stagg - Country Club 60 kV Line No. 1 & B2_73_Stagg - Hammer 60 kV Line No. 1	C3	N-1-1	157.5	<100	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-78	Stagg - Country Club 60 kV Line No. 1	B2_73_Stagg - Hammer 60 kV Line No. 1 & B2_71_Stagg - Country Club 60 kV Line No. 1	C3	N-1-1	157.5	<100	<100	Short Term: Stockton Action Plan Long Term: New Stagg - Hammer 60 kV Line
STOC-SP-T-79	Stanislaus - Manteca 115 kV Line No. 2	B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_3_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	111.0	112.0	112.3	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-80	Stanislaus - Manteca 115 kV Line No. 2	B2_3_Stanislaus - Melones Sw 115 kV Line & B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	111.0	112.0	112.3	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-81	Stanislaus - Manteca 115 kV Line No. 2	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_34_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	111.0	112.0	112.3	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-82	Stanislaus - Manteca 115 kV Line No. 2	B2_34_Stanislaus - Melones Sw 115 kV Line & B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	111.0	112.0	112.3	Stanislaus – Manteca 115 kV Line Load Limit Scheme

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-83	Stanislaus_Melones SW STA-Manteca #1 115 kV Line (Melones-Melones Jct Section)	B3_11_Bellota 230/115 kV Transformer No. 1 & B3_12_Bellota 230/115 kV Transformer No. 2	C3	N-1-1	95.8	100.2	99.3	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-84	Stanislaus-Manteca #2 115 kV Line (Riverbank JCT-Valley Home Tap Section)	B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_3_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	105.0	105.8	106.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-85	Stanislaus-Manteca #2 115 kV Line (Riverbank JCT-Valley Home Tap Section)	B2_3_Stanislaus - Melones Sw 115 kV Line & B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	105.0	105.8	106.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-86	Stanislaus-Manteca #2 115 kV Line (Riverbank JCT-Valley Home Tap Section)	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_34_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	105.0	105.8	106.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-87	Stanislaus-Manteca #2 115 kV Line (Riverbank JCT-Valley Home Tap Section)	B2_34_Stanislaus - Melones Sw 115 kV Line & B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	105.0	105.8	106.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-88	Stanislaus-Manteca #2 115 kV Line (Valley Home Tap-Avena Tap Section)	B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_3_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	105.0	105.7	106.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-89	Stanislaus-Manteca #2 115 kV Line (Valley Home Tap-Avena Tap Section)	B2_3_Stanislaus - Melones Sw 115 kV Line & B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	105.0	105.7	106.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-90	Stanislaus-Manteca #2 115 kV Line (Valley Home Tap-Avena Tap Section)	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_34_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	105.0	105.7	106.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-91	Stanislaus-Manteca #2 115 kV Line (Valley Home Tap-Avena Tap Section)	B2_34_Stanislaus - Melones Sw 115 kV Line & B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	105.0	105.7	106.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-92	Stanislaus-Melones SW STA Riververbank JCT SW STA 115 kV (Stanislaus-Cataract Section)	B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_4_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	110.4	110.7	111.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-93	Stanislaus-Melones SW STA Riververbank JCT SW STA 115 kV (Stanislaus-Cataract Section)	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_35_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	110.4	110.7	111.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-94	Stanislaus-Melones SW STA-Manteca #1 115 kV Line (Stanislaus-Frogstown Jct Section)	B2_3_Stanislaus - Melones Sw 115 kV Line & B2_4_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	110.6	111.0	111.4	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-95	Stanislaus-Melones SW STA-Manteca #1 115 kV Line (Stanislaus-Frogstown Jct Section)	B2_34_Stanislaus - Melones Sw 115 kV Line & B2_35_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	110.6	111.0	111.4	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-96	Stanislaus-Melones SW STA-Manteca #1 115 kV Line (Stanislaus-Frogstown Jct Section)	B2_35_Stanislaus - Manteca 115 kV Line No. 2 & B2_34_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	110.6	111.0	111.4	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-97	Stanislaus-Melones SW STA-Manteca #1 115 kV Line (Stanislaus-Frogstown Jct Section)	B2_4_Stanislaus - Manteca 115 kV Line No. 2 & B2_3_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1	110.6	111.0	111.4	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-98	Stanislaus-Melones SW STA-Manteca #1 115 kV Line Cataract-Frogstown Tap Section)	B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_4_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	110.3	110.6	111.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-99	Stanislaus-Melones SW STA-Manteca #1 115 kV Line Cataract-Frogstown Tap Section)	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_35_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	110.3	110.6	111.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-100	Stanislaus-Melones SW STA-Manteca #1 115 kV Line Cataract-Frogstown Tap Section)	B2_35_Stanislaus - Manteca 115 kV Line No. 2 & B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	110.3	110.6	111.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme

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Study Area: **PG&E Central Valley Stockton - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-101	Stanislaus-Melones SW STA-Manteca #1 115 kV Line Cataract-Frogtown Tap Section)	B2_4_Stanislaus - Manteca 115 kV Line No. 2 & B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1	C3	N-1-1	110.3	110.6	111.0	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-102	Tesla - Kasson - Manteca 115 kV Line	B2_44_Tesla - Tracy 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	147.2	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-103	Tesla - Kasson - Manteca 115 kV Line	B2_49_Schulte - Lammers 115 kV Line & B2_44_Tesla - Tracy 115 kV Line	C3	N-1-1	147.2	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-104	Tesla - Tracy 115 kV Line	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	138.4	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-105	Tesla - Tracy 115 kV Line	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	118.3	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-106	Tesla-Schulte SW STA #2 115 kV (Tesla-AEC Tap Section)	B2_42_Tesla - Schulte 115 kV Line No. 2 & B2_50_GWF Tracy - Schulte 115 kV Line	C3	N-1-1	104.4	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-107	Vierra - Tracy - Kasson 115 kV Line	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	137.7	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project

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Study Area: **PG&E Central Valley Stockton - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-T-108	Vierra - Tracy - Kasson 115 kV Line	B2_36_Tesla - Kasson - Manteca 115 kV Line & B2_49_Schulte - Lammers 115 kV Line	C3	N-1-1	135.4	<100	<100	Short Term: Stockton Action Plan Long Term: Vierra Looping Project
STOC-SP-T-109	Weber No. 2a 230/60 kV Transformer	B1_16_COG.NTNL 12.00 Unit ID 1 & B3_13_Weber 230/60 kV Transformer No. 1	C3	N-1-1	<100	<100	<100	Replace Weber 230/60 kV Transformer Nos. 2 & 2A
STOC-SP-T-110	Stanislaus-Melones SW STA Rilverbank JCT SW STA 115 kV (Stanislaus-Cataract Section)	C5_17_Stanislaus-Melones-Manteca No.1 115 kV & Stanislaus-Mante	C5	DCTL	110.4	110.7	111.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-111	Stanislaus-Melones SW STA-Manteca #1 115 kV Line (Stanislaus-Frog town Jct Section)	C5_14_Stanislaus-Manteca No.2 115 kV & Stanislaus-Melones-River	C5	DCTL	110.6	111.0	111.4	Stanislaus – Manteca 115 kV Line Load Limit Scheme
STOC-SP-T-112	Stanislaus-Melones SW STA-Manteca #1 115 kV Line Cataract-Frog town Tap Section)	C5_17_Stanislaus-Melones-Manteca No.1 115 kV & Stanislaus-Mante	C5	DCTL	110.4	110.7	111.1	Stanislaus – Manteca 115 kV Line Load Limit Scheme

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-T-1	33610 VLLY SPS 60.0 33634 PRDESWS 60.0 1	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		102.1		Rerate or reconductor
STOC-SpP-T-2	33742 MANTECA 60.0 33514 MANTECA 115 3	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus		163.6		Explore potential mitigation
STOC-SpP-T-3	33850 CAMANCHE 4.16 33566 CAMANCHE 115 1	C1-28_BUS FAULT AT 33562 BELLOTA 115.00 Bus 1	C1	Bus		101.9		Explore potential mitigation
STOC-SpP-T-4	33850 CAMANCHE 4.16 33566 CAMANCHE 115 1	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB		101.7		Explore potential mitigation
STOC-SpP-T-5	33932 MELONES 115 33934 TULLOCH 115 1	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB		134.5		Explore potential mitigation
STOC-SpP-T-6	33950 RVRBK TP 115 33934 TULLOCH 115 1	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB		157.4		Explore potential mitigation
STOC-SpP-T-7	C1_33_BUS FAULT AT 33704 STAGG 60.00	B2_4_Lockeford - Bellota 230 kV Line & C1_33_BUS FAULT AT 33704 STAGG 60.00	C3	N-1-1		116.9		Explore potential mitigation
STOC-SpP-T-8	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		171.6		Explore potential mitigation
STOC-SpP-T-9	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		112.1		Explore potential mitigation
STOC-SpP-T-10	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		156.7		Explore potential mitigation
STOC-SpP-T-11	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		110.5		Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-T-12	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		137.7		Explore potential mitigation
STOC-SpP-T-13	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		106.1		Explore potential mitigation
STOC-SpP-T-14	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_49_Schulte - Lammers 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		100.1		Explore potential mitigation
STOC-SpP-T-15	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_36_Tesla - Kasson - Manteca 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		100.0		Explore potential mitigation
STOC-SpP-T-16	C1_19_BUS FAULT AT 33529 LAMMERS 115.00	B2_42_Tesla - Schulte 115 kV Line No. 2 & C1_19_BUS FAULT AT 33529 LAMMERS 115.00	C3	N-1-1		100.0		Explore potential mitigation
STOC-SpP-T-17	B2_43_Tesla - Schulte 115 kV Line No. 1	C1_18_BUS FAULT AT 33528 KASSON 115.00 & B2_43_Tesla - Schulte 115 kV Line No. 1	C3	N-1-1		100.0		Explore potential mitigation
STOC-SpP-T-18	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_19_BUS FAULT AT 33529 LAMMERS 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		100.1		Explore potential mitigation
STOC-SpP-T-19	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		130.3		Explore potential mitigation
STOC-SpP-T-20	B2_60_Valley Springs - Martell 60 kV Line No. 1	B1_15_Q481 13.80 Unit ID 1 & B2_60_Valley Springs - Martell 60 kV Line No. 1	C3	N-1-1		102.1		Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-T-21	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		130.1		Explore potential mitigation
STOC-SpP-T-22	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		130.1		Explore potential mitigation
STOC-SpP-T-23	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	B2_99_New Stagg - Hammer 60 kV Line No. 2 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		144.6		Explore potential mitigation
STOC-SpP-T-24	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	B2_73_Stagg - Hammer 60 kV Line No. 1 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		144.8		Explore potential mitigation
STOC-SpP-T-25	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		153.8		Explore potential mitigation
STOC-SpP-T-26	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		148.7		Explore potential mitigation
STOC-SpP-T-27	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1		148.7		Explore potential mitigation
STOC-SpP-T-28	B2_8_Stagg - Tesla 230 kV Line	C1_11_BUS FAULT AT 30622 EIGHT MI 230.00 & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1		119.3		Explore potential mitigation
STOC-SpP-T-29	B2_4_Lockeford - Bellota 230 kV Line	B2_1_Rio Oso - Lockeford 230 kV Line & B2_4_Lockeford - Bellota 230 kV Line	C3	N-1-1		173.0		Explore potential mitigation
STOC-SpP-T-30	B2_4_Lockeford - Bellota 230 kV Line	B2_1_Rio Oso - Lockeford 230 kV Line & B2_4_Lockeford - Bellota 230 kV Line	C3	N-1-1		226.9		Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-T-31	C1_33_BUS FAULT AT 33704 STAGG 60.00	B3_5_Lockeford 230/60 kV Transformer No. 3 & C1_33_BUS FAULT AT 33704 STAGG 60.00	C3	N-1-1		126.5		Explore potential mitigation
STOC-SpP-T-32	B3_4_Lockeford 230/60 kV Transformer No. 2	C1_33_BUS FAULT AT 33704 STAGG 60.00 & B3_4_Lockeford 230/60 kV Transformer No. 2	C3	N-1-1		126.7		Explore potential mitigation
STOC-SpP-T-33	B2_78_Lockeford - Industrial 60 kV Line	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		115.1		Explore potential mitigation
STOC-SpP-T-34	B2_75_Lockeford - Lodi 60 kV Line No. 2	B2_78_Lockeford - Industrial 60 kV Line & B2_75_Lockeford - Lodi 60 kV Line No. 2	C3	N-1-1		132.0		Explore potential mitigation
STOC-SpP-T-35	B2_8_Stagg - Tesla 230 kV Line	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1		156.1		Explore potential mitigation
STOC-SpP-T-36	B2_75_Lockeford - Lodi 60 kV Line No. 2	B2_91_Lodi - Industrial 60 kV Line & B2_75_Lockeford - Lodi 60 kV Line No. 2	C3	N-1-1		126.1		Explore potential mitigation
STOC-SpP-T-37	B2_78_Lockeford - Industrial 60 kV Line	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		125.4		Explore potential mitigation
STOC-SpP-T-38	B2_78_Lockeford - Industrial 60 kV Line	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		105.7		Explore potential mitigation
STOC-SpP-T-39	B2_78_Lockeford - Industrial 60 kV Line	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		122.5		Explore potential mitigation
STOC-SpP-T-40	B2_78_Lockeford - Industrial 60 kV Line	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		105.7		Explore potential mitigation
STOC-SpP-T-41	B2_78_Lockeford - Industrial 60 kV Line	B2_75_Lockeford - Lodi 60 kV Line No. 2 & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		116.1		Explore potential mitigation
STOC-SpP-T-42	B2_78_Lockeford - Industrial 60 kV Line	B2_91_Lodi - Industrial 60 kV Line & B2_78_Lockeford - Industrial 60 kV Line	C3	N-1-1		105.7		Explore potential mitigation
STOC-SpP-T-43	B2_8_Stagg - Tesla 230 kV Line	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1		156.2		Explore potential mitigation

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-T-44	B2_8_Stagg - Tesla 230 kV Line	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1		156.1		Explore potential mitigation
STOC-SpP-T-45	B2_85_Kasson - Carbona 60 kV Line	C1_18_BUS FAULT AT 33528 KASSON 115.00 & B2_85_Kasson - Carbona 60 kV Line	C3	N-1-1		153.1		Explore potential mitigation
STOC-SpP-T-46	C1_18_BUS FAULT AT 33528 KASSON 115.00	C1_20_BUS FAULT AT 33540 TESLA 115.00 & C1_18_BUS FAULT AT 33528 KASSON 115.00	C3	N-1-1		129.0		Explore potential mitigation
STOC-SpP-T-47	B1_11_GWFTRCY3 13.80 Unit ID 1	C1_13_BUS FAULT AT 30625 TESLA D 230.00 & B1_11_GWFTRCY3 13.80 Unit ID 1	C3	N-1-1		100.5		Explore potential mitigation
STOC-SpP-T-48	C1_13_BUS FAULT AT 30625 TESLA D 230.00	B1_11_GWFTRCY3 13.80 Unit ID 1 & C1_13_BUS FAULT AT 30625 TESLA D 230.00	C3	N-1-1		100.4		Explore potential mitigation
STOC-SpP-T-49	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		185.5		Explore potential mitigation
STOC-SpP-T-50	C1_7_BUS FAULT AT 30500 BELLOTA 230.00	B1_24_CAMANCHE 4.16 Unit ID 1 & C1_7_BUS FAULT AT 30500 BELLOTA 230.00	C3	N-1-1		101.7		Explore potential mitigation
STOC-SpP-T-51	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		184.4		Explore potential mitigation
STOC-SpP-T-52	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		181.8		Explore potential mitigation

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-T-53	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		103.6		Explore potential mitigation
STOC-SpP-T-54	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		181.5		Explore potential mitigation
STOC-SpP-T-55	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		105.9		Explore potential mitigation
STOC-SpP-T-56	C1_7_BUS FAULT AT 30500 BELLOTA 230.00	B1_26_CAMANCHE 4.16 Unit ID 3 & C1_7_BUS FAULT AT 30500 BELLOTA 230.00	C3	N-1-1		128.0		Explore potential mitigation
STOC-SpP-T-57	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		159.3		Explore potential mitigation
STOC-SpP-T-58	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1		105.9		Explore potential mitigation
STOC-SpP-T-59	33530 KSSN-JC2 115 33550 HJ HEINZ 115 1	C5_18_Tesla-Schulte 115 kV Line No. 1 & Tesla-Schulte 115 kV Li	C5	DCTL		109.6		Explore potential mitigation
STOC-SpP-T-60	33850 CAMANCHE 4.16 33566 CAMANCHE 115 1	C5_10_Rancho Seco-Bellota No. 1 230 kV Line & Rancho Seco-Bello	C5	DCTL		101.9		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
STOC-NP-T-1	33836 USWP_#4 9.11 30570 USWP-RLF 230 1	B1_21_USWP_#4 9.11 Unit ID 3	B	G-1	<100	129.2		Explore potential mitigation
STOC-NP-T-2	33840 FLOWD3-6 9.11 30595 FLOWIND2 230 1	B1_22_FLOWD3-6 9.11 Unit ID 1	B	G-1	<100	113.5		Explore potential mitigation
STOC-NP-T-3	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_34_Stanislaus - Melones Sw 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	250.7	165.4		Explore potential mitigation
STOC-NP-T-4	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	124.5	100.1		Explore potential mitigation
STOC-NP-T-5	B2_35_Stanislaus - Manteca 115 kV Line No. 2	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_35_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	99.9	100.0		Explore potential mitigation
STOC-NP-T-6	B2_35_Stanislaus - Manteca 115 kV Line No. 2	B2_34_Stanislaus - Melones Sw 115 kV Line & B2_35_Stanislaus - Manteca 115 kV Line No. 2	C3	N-1-1	98.8	100.0		Explore potential mitigation
STOC-NP-T-7	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_34_Stanislaus - Melones Sw 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	155.1	103.7		Explore potential mitigation
STOC-NP-T-8	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_34_Stanislaus - Melones Sw 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	236.8	157.9		Explore potential mitigation
STOC-NP-T-9	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	115.9	91.7		Explore potential mitigation
STOC-NP-T-10	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_42_BUS FAULT AT 33520 RIPON 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	131.6	102.2		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
STOC-NP-T-11	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_35_Stanislaus - Manteca 115 kV Line No. 2 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	196.4	111.3		Explore potential mitigation
STOC-NP-T-12	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	106.0	<100		Short term: Action Plan
STOC-NP-T-13	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	136.3	<100		Short term: Action Plan
STOC-NP-T-14	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	156.5	100.9		Explore potential mitigation
STOC-NP-T-15	C1_13_BUS FAULT AT 30625 TESLA D 230.00	C1_7_BUS FAULT AT 30500 BELLOTA 230.00 & C1_13_BUS FAULT AT 30625 TESLA D 230.00	C3	N-1-1	<100	100.1		Explore potential mitigation
STOC-NP-T-16	C1_20_BUS FAULT AT 33540 TESLA 115.00	B1_27_STANISLS 13.80 Unit ID 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	100.7	113.3		Explore potential mitigation
STOC-NP-T-17	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1	<100	108.8		Explore potential mitigation
STOC-NP-T-18	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1	<100	104.6		Explore potential mitigation
STOC-NP-T-19	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C1_35_BUS FAULT AT 33714 HAMMER 60.00 & C1_1_BUS FAULT AT 30482 LOCKFORD 230.00	C3	N-1-1	<100	104.6		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
STOC-NP-T-20	C1_34_BUS FAULT AT 33706 CNTRY CB 60.00	C1_1_BUS FAULT AT 30482 LOCKFORD 230.00 & C1_34_BUS FAULT AT 33706 CNTRY CB 60.00	C3	N-1-1	<100	135.5		Explore potential mitigation
STOC-NP-T-21	B2_4_Lockeford - Bellota 230 kV Line	B2_1_Rio Oso - Lockeford 230 kV Line & B2_4_Lockeford - Bellota 230 kV Line	C3	N-1-1	<100	114.3		Explore potential mitigation
STOC-NP-T-22	B2_4_Lockeford - Bellota 230 kV Line	B2_1_Rio Oso - Lockeford 230 kV Line & B2_4_Lockeford - Bellota 230 kV Line	C3	N-1-1	<100	146.9		Explore potential mitigation
STOC-NP-T-23	B2_75_Lockeford - Lodi 60 kV Line No. 2	B2_78_Lockeford - Industrial 60 kV Line & B2_75_Lockeford - Lodi 60 kV Line No. 2	C3	N-1-1	90.4	<100		Short term: Action Plan
STOC-NP-T-24	B2_75_Lockeford - Lodi 60 kV Line No. 2	B2_91_Lodi - Industrial 60 kV Line & B2_75_Lockeford - Lodi 60 kV Line No. 2	C3	N-1-1	96.7	<100		Short term: Action Plan
STOC-NP-T-25	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_42_BUS FAULT AT 33520 RIPON 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	<100	100.0		Explore potential mitigation
STOC-NP-T-26	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_42_BUS FAULT AT 33520 RIPON 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	<100	100.0		Explore potential mitigation
STOC-NP-T-27	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_34_Stanislaus - Melones Sw 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	294.4	182.3		Explore potential mitigation
STOC-NP-T-28	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	116.2	<100		Short term: Action Plan
STOC-NP-T-29	C1_20_BUS FAULT AT 33540 TESLA 115.00	B1_1_0227-WD 230.00 Unit ID FW & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	100.0	126.5		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
STOC-NP-T-30	C1_20_BUS FAULT AT 33540 TESLA 115.00	B1_10_SP CMPNY 13.80 Unit ID 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	179.9	<100		Short term: Action Plan
STOC-NP-T-31	C1_20_BUS FAULT AT 33540 TESLA 115.00	B1_27_STANISLS 13.80 Unit ID 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	186.0	142.1		Explore potential mitigation
STOC-NP-T-32	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	115.1	<100		Short term: Action Plan
STOC-NP-T-33	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_15_Bellota - Tesla 230 kV Line No. 2 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	209.0	116.3		Explore potential mitigation
STOC-NP-T-34	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	129.4	107.2		Explore potential mitigation
STOC-NP-T-35	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_15_Bellota - Tesla 230 kV Line No. 2 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	209.1	116.2		Explore potential mitigation
STOC-NP-T-36	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_50_GWF Tracy - Schulte 115 kV Line & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	128.6	107.0		Explore potential mitigation
STOC-NP-T-37	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_94_Riverbank Jct-Ripon 115 kV Line from RPNJN2 to BRKR RIPON & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	166.0	105.0		Explore potential mitigation
STOC-NP-T-38	C1_20_BUS FAULT AT 33540 TESLA 115.00	B1_27_STANISLS 13.80 Unit ID 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	137.2	158.2		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
STOC-NP-T-39	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_15_Bellota - Tesla 230 kV Line No. 2 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	184.4	103.5		Explore potential mitigation
STOC-NP-T-40	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_33_Stanislaus-Melones-Manteca 115 kV Line No. 1 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	235.2	151.4		Explore potential mitigation
STOC-NP-T-41	C1_20_BUS FAULT AT 33540 TESLA 115.00	C1_23_BUS FAULT AT 33551 GWFTRACY 115.00 & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	115.4	<100		Short term: Action Plan
STOC-NP-T-42	C1_20_BUS FAULT AT 33540 TESLA 115.00	B2_94_Riverbank Jct-Ripon 115 kV Line from RPNJN2 to BRKR RIPON & C1_20_BUS FAULT AT 33540 TESLA 115.00	C3	N-1-1	165.9	105.0		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-1	LODI 60kV	B2_76_Lockeford - Lodi 60 kV Line No. 3	B	L-1	<5.0	<5.0	5.741	Explore potential mitigation
STOC-SP-VD-2	LINDEN 60kV	B2_64_Weber - Mormon Jct 60 kV Line	B	L-1	<5.0	<5.0	5.531	Explore potential mitigation
STOC-SP-VD-3	MARTELL 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1	B	L-1	<5.0	5.093	5.386	Explore potential mitigation
STOC-SP-VD-4	MONDAVI 60kV	B2_76_Lockeford - Lodi 60 kV Line No. 3	B	L-1	<5.0	<5.0	5.745	Explore potential mitigation
STOC-SP-VD-5	WESTLEY 60kV	B3_17_Manteca 115/60 kV Transformer No. 3	B	T-1	<5.0	<5.0	5.415	Explore potential mitigation
STOC-SP-VD-6	BNTA CRB 60kV	B3_17_Manteca 115/60 kV Transformer No. 3	B	T-1	<5.0	<5.0	5.154	Explore potential mitigation
STOC-SP-VD-7	LODI AUX 60kV	B2_76_Lockeford - Lodi 60 kV Line No. 3	B	L-1	<5.0	<5.0	5.753	Explore potential mitigation
STOC-SP-VD-8	MARTELTP 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1	B	L-1	<5.0	5.082	5.375	Explore potential mitigation
STOC-SP-VD-9	MNTCA JT 60kV	B3_17_Manteca 115/60 kV Transformer No. 3	B	T-1	<5.0	<5.0	5.125	Explore potential mitigation
STOC-SP-VD-10	MSHR 60V 60kV	B2_74_Hammer - Country Club 60 kV	B	L-1	6.867	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-11	P.GRVEJ. 60kV	B1_17_WEST PNT 11.50 Unit ID 1	B	G-1	5.506	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-12	PNE GRVE 60kV	B1_17_WEST PNT 11.50 Unit ID 1	B	G-1	5.537	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-13	WATRLJCT 60kV	B2_74_Hammer - Country Club 60 kV	B	L-1	7.077	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-14	WEST PNT 60kV	B1_17_WEST PNT 11.50 Unit ID 1	B	G-1	6.789	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-15	WINERY J 60kV	B2_76_Lockeford - Lodi 60 kV Line No. 3	B	L-1	<5.0	<5.0	5.741	Explore potential mitigation
STOC-SP-VD-16	CLAY 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	6.122	<5.0	<5.0	Short term: Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-17	Q481 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	5.726	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-18	INE_TP 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	6.504	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-19	LINDEN 60kV	B2_64_Weber - Mormon Jct 60 kV Line & B1_17_WEST PNT 11.50 Unit ID 1	B	L-1/G-1	5.12	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-20	MARTELL 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	9.541	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-21	Q481JCT 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	5.726	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-22	INE PRSN 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	6.53	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-23	MARTELT 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1	9.526	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-24	MSHR 60V 60kV	B2_74_Hammer - Country Club 60 kV & B1_1_0227-WD 230.00 Unit ID FW	B	L-1/G-1	7.002	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-25	WATRLJCT 60kV	B2_74_Hammer - Country Club 60 kV & B1_9_SJ COGEN 13.80 Unit ID 1	B	L-1/G-1	7.111	<5.0	<5.0	Short term: Action Plan
STOC-SP-VD-26	BANTA 60kV	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	<10.0	<10.0	10.8	Explore potential mitigation
STOC-SP-VD-27	KASSON 60kV	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	<10.0	<10.0	10.787	Explore potential mitigation
STOC-SP-VD-28	CARBONA 60kV	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	<10.0	<10.0	11.039	Explore potential mitigation
STOC-SP-VD-29	BNTA JCT 60kV	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	<10.0	<10.0	10.791	Explore potential mitigation
STOC-SP-VD-30	CRBNA JC 60kV	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	<10.0	<10.0	10.8	Explore potential mitigation
STOC-SP-VD-31	LYOTH-SP 60kV	C1-21_BUS FAULT AT 33528 KASSON 115.00	C1	Bus	<10.0	<10.0	10.8	Explore potential mitigation
STOC-SP-VD-32	UOP 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	62.313	<10.0	Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-33	AVENA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	13.581	11.183	11.858	Explore potential mitigation
STOC-SP-VD-34	RIPON 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	12.302	<10.0	10.478	Explore potential mitigation
STOC-SP-VD-35	STAGG 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	62.235	<10.0	Explore potential mitigation
STOC-SP-VD-36	CH.STN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	29.141	27.14	28.445	Explore potential mitigation
STOC-SP-VD-37	HAMMER 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	61.385	<10.0	Explore potential mitigation
STOC-SP-VD-38	MILLER 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.123	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-39	MI-WUK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	24.329	22.053	23.465	Explore potential mitigation
STOC-SP-VD-40	PEORIA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	29.435	27.444	28.744	Explore potential mitigation
STOC-SP-VD-41	RPNJN2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	13.99	11.562	12.258	Explore potential mitigation
STOC-SP-VD-42	BELLOTA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	59.926	59.366	61.175	Explore potential mitigation
STOC-SP-VD-43	CDCRSTN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	61.823	61.382	63.049	Explore potential mitigation
STOC-SP-VD-44	CURTISS 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	27.011	24.833	26.215	Explore potential mitigation
STOC-SP-VD-45	GRANITE 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.96	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-46	GUSTINE 60kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.114	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-47	MELONES 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	30.334	28.425	29.684	Explore potential mitigation
STOC-SP-VD-48	METTLER 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	59.671	<10.0	Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-49	R.TRACK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	30.417	28.501	29.767	Explore potential mitigation
STOC-SP-VD-50	RVRBANK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	56.502	55.869	57.581	Explore potential mitigation
STOC-SP-VD-51	SANDBAR 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	20.804	18.486	19.895	Explore potential mitigation
STOC-SP-VD-52	TULLOCH 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	39.224	37.762	39.176	Explore potential mitigation
STOC-SP-VD-53	AVENATP1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	13.58	11.182	11.857	Explore potential mitigation
STOC-SP-VD-54	AVENATP2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	10.975	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-55	BEARDSLY 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	20.3	17.977	19.386	Explore potential mitigation
STOC-SP-VD-56	BLLTAJCT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.5	59.968	61.842	Explore potential mitigation
STOC-SP-VD-57	BRDSLY J 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	20.32	17.994	19.405	Explore potential mitigation
STOC-SP-VD-58	CAMANCHE 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.359	59.803	61.776	Explore potential mitigation
STOC-SP-VD-59	CATARACT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	23.16	20.859	21.944	Explore potential mitigation
STOC-SP-VD-60	CDCRSTNT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	61.714	61.267	62.947	Explore potential mitigation
STOC-SP-VD-61	CH.STNJT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	29.213	27.205	28.513	Explore potential mitigation
STOC-SP-VD-62	CMNCHETP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.508	59.967	61.874	Explore potential mitigation
STOC-SP-VD-63	CNTRY CB 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	62.427	<10.0	Explore potential mitigation
STOC-SP-VD-64	CPC STCN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	61.933	61.503	63.167	Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-65	DONNELLS 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	18.78	16.449	17.853	Explore potential mitigation
STOC-SP-VD-66	FRGTNTP1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	24.573	22.353	23.467	Explore potential mitigation
STOC-SP-VD-67	FRGTNTP2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	24.414	22.206	23.31	Explore potential mitigation
STOC-SP-VD-68	FROGTOWN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	24.577	22.356	23.47	Explore potential mitigation
STOC-SP-VD-69	HMMR JCT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	60.425	<10.0	Explore potential mitigation
STOC-SP-VD-70	KYOHOTAP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.714	60.188	61.976	Explore potential mitigation
STOC-SP-VD-71	LCKFRDJA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	61.296	60.821	62.533	Explore potential mitigation
STOC-SP-VD-72	LCKFRDJB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.575	60.044	61.842	Explore potential mitigation
STOC-SP-VD-73	LOCKFORD 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.585	60.062	61.928	Explore potential mitigation
STOC-SP-VD-74	MDSTO CN 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.751	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-75	MELNS JA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	25.728	23.621	24.744	Explore potential mitigation
STOC-SP-VD-76	MELNS JB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	25.659	23.547	24.669	Explore potential mitigation
STOC-SP-VD-77	MILER TP 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.122	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-78	MORADAJT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	59.029	<10.0	Explore potential mitigation
STOC-SP-VD-79	MSHR 60V 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	48.095	<10.0	Explore potential mitigation
STOC-SP-VD-80	RCTRK J. 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	28.118	26.023	27.369	Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-81	RIVRBKJT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	17.605	15.263	16.096	Explore potential mitigation
STOC-SP-VD-82	RPN JNCN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	10.551	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-83	RVRBK J1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	58.12	57.523	59.296	Explore potential mitigation
STOC-SP-VD-84	RVRBK J2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	13.246	10.797	11.479	Explore potential mitigation
STOC-SP-VD-85	RVRBK TP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	54.47	53.731	55.421	Explore potential mitigation
STOC-SP-VD-86	SALDO TP 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.096	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-87	SNDBR JT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	20.949	18.628	20.04	Explore potential mitigation
STOC-SP-VD-88	SPRNG GJ 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	21.013	18.692	20.105	Explore potential mitigation
STOC-SP-VD-89	SPRNG GP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	20.946	18.626	20.038	Explore potential mitigation
STOC-SP-VD-90	STANISLS 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	22.621	20.281	21.358	Explore potential mitigation
STOC-SP-VD-91	STCKTNJB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	60.994	60.482	62.244	Explore potential mitigation
STOC-SP-VD-92	STKTON A 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	62.162	61.75	63.393	Explore potential mitigation
STOC-SP-VD-93	STKTON B 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	61.036	60.526	62.285	Explore potential mitigation
STOC-SP-VD-94	STN COGN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	61.933	61.503	63.167	Explore potential mitigation
STOC-SP-VD-95	TCHRT_T1 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.94	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-96	TCHRTJCT 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.945	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-VD-97	TEICHERT 115kV	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	10.964	<10.0	<10.0	Short term: Action Plan
STOC-SP-VD-98	VALLY HM 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	16.707	14.341	15.141	Explore potential mitigation
STOC-SP-VD-99	VLYHMTP1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	16.706	14.34	15.14	Explore potential mitigation
STOC-SP-VD-100	VLYHMTP2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	12.73	10.275	10.934	Explore potential mitigation
STOC-SP-VD-101	WATRLJCT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	30.522	<10.0	Explore potential mitigation
STOC-SP-VD-102	WSTLNESW 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	<10.0	61.398	<10.0	Explore potential mitigation
STOC-SP-VD-103	LOCKFORD 230kV	C5_11_Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV L	C5	DCTL	9.82	8.383	<10.0	Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-VD-1	OLETA 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1	B	L-1		6.059		Explore potential mitigation
STOC-SpP-VD-2	MARTELL 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1	B	L-1		5.994		Explore potential mitigation
STOC-SpP-VD-3	LOCKFORD 230kV	B2_4_Lockeford - Bellota 230 kV Line	B	L-1		5.015		Explore potential mitigation
STOC-SpP-VD-4	MARTELTP 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1	B	L-1		5.982		Explore potential mitigation
STOC-SpP-VD-5	CLAY 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		6.88		Explore potential mitigation
STOC-SpP-VD-6	Q481 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		6.426		Explore potential mitigation
STOC-SpP-VD-7	OLETA 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		10.819		Explore potential mitigation
STOC-SpP-VD-8	INE_TP 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		7.308		Explore potential mitigation
STOC-SpP-VD-9	MARTELL 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		10.69		Explore potential mitigation
STOC-SpP-VD-10	PRDESWS 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		5.076		Explore potential mitigation
STOC-SpP-VD-11	Q481JCT 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		6.426		Explore potential mitigation
STOC-SpP-VD-12	INE PRSN 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		7.331		Explore potential mitigation
STOC-SpP-VD-13	MARTELTP 60kV	B2_60_Valley Springs - Martell 60 kV Line No. 1 & B1_15_Q481 13.80 Unit ID 1	B	L-1/G-1		10.675		Explore potential mitigation
STOC-SpP-VD-14	UOP 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		22.182		Explore potential mitigation
STOC-SpP-VD-15	STAGG 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		22.251		Explore potential mitigation
STOC-SpP-VD-16	HAMMER 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		21.651		Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-VD-17	CDCRSTN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.939		Explore potential mitigation
STOC-SpP-VD-18	RVRBANK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		14.914		Explore potential mitigation
STOC-SpP-VD-19	CDCRSTNT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.91		Explore potential mitigation
STOC-SpP-VD-20	CNTRY CB 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		22.255		Explore potential mitigation
STOC-SpP-VD-21	CPC STCN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.959		Explore potential mitigation
STOC-SpP-VD-22	HMMR JCT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		21.133		Explore potential mitigation
STOC-SpP-VD-23	KYOHOTAP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.611		Explore potential mitigation
STOC-SpP-VD-24	LCKFRDJA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.819		Explore potential mitigation
STOC-SpP-VD-25	MORADAJT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		20.42		Explore potential mitigation
STOC-SpP-VD-26	MSHR 60V 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		15.756		Explore potential mitigation
STOC-SpP-VD-27	RVRBK J1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		15.734		Explore potential mitigation
STOC-SpP-VD-28	RVRBK TP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		14.232		Explore potential mitigation
STOC-SpP-VD-29	STCKTNJB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.663		Explore potential mitigation
STOC-SpP-VD-30	STKTON A 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		17.016		Explore potential mitigation
STOC-SpP-VD-31	STKTON B 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.671		Explore potential mitigation
STOC-SpP-VD-32	STN COGN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		16.959		Explore potential mitigation

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Study Area: **PG&E Central Valley Stockton - Spring Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STOC-SpP-VD-33	WSTLNESW 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		21.656		Explore potential mitigation



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-V-1	WESTLEY 60kV	B3_17_Manteca 115/60 kV Transformer No. 3 & B1_11_GWFRYC3 13.80 Unit ID 1	B	L-1/G-1	0.8988	>0.95	>0.95	Dispatch local generation or voltage support
STOC-SP-V-2	LOCKFORD 230kV	B2_4_Lockeford - Bellota 230 kV Line & B1_1_0227-WD 230.00 Unit ID FW	B	L-1/G-1	0.8962	>0.95	>0.95	Dispatch local generation or voltage support
STOC-SP-V-3	LOCKFORD 230kV	C1-8_BUS FAULT AT 30500 BELLOTA 230.00 Bus 2	C1	Bus	0.8982	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-4	AVENA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8661	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-5	RIPON 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8709	>0.90	0.8967	Dispatch local generation or voltage support
STOC-SP-V-6	CH.STN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7257	0.7501	0.736	Dispatch local generation or voltage support
STOC-SP-V-7	MI-WUK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7738	0.7993	0.7845	Dispatch local generation or voltage support
STOC-SP-V-8	PEORIA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.721	0.7454	0.7314	Dispatch local generation or voltage support
STOC-SP-V-9	RPNJN2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.855	0.8897	0.8794	Dispatch local generation or voltage support
STOC-SP-V-10	BELLOTA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4421	0.4504	0.4304	Dispatch local generation or voltage support
STOC-SP-V-11	CDCRSTN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.401	0.4078	0.3884	Dispatch local generation or voltage support
STOC-SP-V-12	CURTISS 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7405	0.7658	0.7511	Dispatch local generation or voltage support
STOC-SP-V-13	MELONES 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7143	0.7383	0.7247	Dispatch local generation or voltage support
STOC-SP-V-14	R.TRACK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.712	0.736	0.7223	Dispatch local generation or voltage support
STOC-SP-V-15	RVRBANK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4663	0.4753	0.4557	Dispatch local generation or voltage support

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-V-16	SANDBAR 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8239	0.8488	0.8342	Dispatch local generation or voltage support
STOC-SP-V-17	TULLOCH 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.6304	0.649	0.6342	Dispatch local generation or voltage support
STOC-SP-V-18	AVENATP1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8662	>0.90	0.8911	Dispatch local generation or voltage support
STOC-SP-V-19	AVENATP2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8988	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-20	BEARDSLY 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8289	0.8538	0.8393	Dispatch local generation or voltage support
STOC-SP-V-21	BLLTAJCT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4322	0.44	0.4187	Dispatch local generation or voltage support
STOC-SP-V-22	BRDSLY J 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8275	0.8524	0.8379	Dispatch local generation or voltage support
STOC-SP-V-23	CAMANCHE 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4356	0.4437	0.4215	Dispatch local generation or voltage support
STOC-SP-V-24	CATARACT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7956	0.8237	0.8115	Dispatch local generation or voltage support
STOC-SP-V-25	CDCRSTNT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4038	0.4106	0.3912	Dispatch local generation or voltage support
STOC-SP-V-26	CH.STNJT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7231	0.7476	0.7335	Dispatch local generation or voltage support
STOC-SP-V-27	CMNCHETP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4326	0.4405	0.4189	Dispatch local generation or voltage support
STOC-SP-V-28	CPC STCN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.3987	0.4053	0.3859	Dispatch local generation or voltage support
STOC-SP-V-29	DONNELLS 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8454	0.8699	0.8556	Dispatch local generation or voltage support
STOC-SP-V-30	FRGTNTP1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7724	0.8	0.7875	Dispatch local generation or voltage support
STOC-SP-V-31	FRGTNTP2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7777	0.8052	0.7928	Dispatch local generation or voltage support

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-V-32	FROGTOWN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7722	0.7999	0.7873	Dispatch local generation or voltage support
STOC-SP-V-33	KYOHOTAP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4273	0.4352	0.4151	Dispatch local generation or voltage support
STOC-SP-V-34	LCKFRDJA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.413	0.4202	0.4006	Dispatch local generation or voltage support
STOC-SP-V-35	LCKFRDJB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4301	0.438	0.4178	Dispatch local generation or voltage support
STOC-SP-V-36	LOCKFORD 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4302	0.4379	0.4167	Dispatch local generation or voltage support
STOC-SP-V-37	LOCKFORD 230kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8869	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-38	MELNS JA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.759	0.7859	0.7732	Dispatch local generation or voltage support
STOC-SP-V-39	MELNS JB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7597	0.7867	0.7739	Dispatch local generation or voltage support
STOC-SP-V-40	RCTRK J. 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.7317	0.7567	0.7422	Dispatch local generation or voltage support
STOC-SP-V-41	RIVRBKJT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8233	0.8557	0.8445	Dispatch local generation or voltage support
STOC-SP-V-42	RPN JNCN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8914	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-43	RVRBK J1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4545	0.4632	0.4435	Dispatch local generation or voltage support
STOC-SP-V-44	RVRBK J2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8811	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-45	RVRBK TP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4905	0.5009	0.4819	Dispatch local generation or voltage support
STOC-SP-V-46	SNDBR JT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8205	0.8455	0.8309	Dispatch local generation or voltage support
STOC-SP-V-47	SPRNG GJ 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.819	0.844	0.8294	Dispatch local generation or voltage support

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Study Area: **PG&E Central Valley Stockton - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-V-48	SPRNG GP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8206	0.8456	0.831	Dispatch local generation or voltage support
STOC-SP-V-49	STANISLS 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8032	0.8315	0.8195	Dispatch local generation or voltage support
STOC-SP-V-50	STCKTNJB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4213	0.4291	0.4092	Dispatch local generation or voltage support
STOC-SP-V-51	STKTON A 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.3929	0.3992	0.3798	Dispatch local generation or voltage support
STOC-SP-V-52	STKTON B 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.4203	0.4281	0.4082	Dispatch local generation or voltage support
STOC-SP-V-53	STN COGN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.3987	0.4053	0.3859	Dispatch local generation or voltage support
STOC-SP-V-54	VALLY HM 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8303	0.8632	0.8522	Dispatch local generation or voltage support
STOC-SP-V-55	VLYHMTP1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8304	0.8633	0.8523	Dispatch local generation or voltage support
STOC-SP-V-56	VLYHMTP2 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB	0.8851	>0.90	>0.90	Dispatch local generation or voltage support
STOC-SP-V-57	WATRLJCT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	CB	>0.90	0.7281	>0.90	Dispatch local generation or voltage support
STOC-SP-V-58	SHW 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2133	>0.90	Dispatch local generation or voltage support
STOC-SP-V-59	UOP 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2467	>0.90	Dispatch local generation or voltage support
STOC-SP-V-60	SHWSS 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2133	>0.90	Dispatch local generation or voltage support
STOC-SP-V-61	STAGG 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2404	>0.90	Dispatch local generation or voltage support

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-V-62	HAMMER 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2541	>0.90	Dispatch local generation or voltage support
STOC-SP-V-63	METTLER 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2816	>0.90	Dispatch local generation or voltage support
STOC-SP-V-64	METTLER 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B3_9_Stagg 230/60 kV Transformer No. 1	C3	N-1-1	>0.90	0.3369	>0.90	Dispatch local generation or voltage support
STOC-SP-V-65	METTLER 60kV	B3_9_Stagg 230/60 kV Transformer No. 1 & B3_10_Stagg 230/60 kV Transformer No. 4	C3	N-1-1	>0.90	0.3368	>0.90	Dispatch local generation or voltage support
STOC-SP-V-66	STAGG-D 230kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.1998	>0.90	Dispatch local generation or voltage support
STOC-SP-V-67	STAGG-E 230kV	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1	>0.90	0.2041	>0.90	Dispatch local generation or voltage support
STOC-SP-V-68	STAGG-F 230kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.1993	>0.90	Dispatch local generation or voltage support
STOC-SP-V-69	STAGG-H 230kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.199	>0.90	Dispatch local generation or voltage support
STOC-SP-V-70	WESTLEY 60kV	B2_49_Schulte - Lammers 115 kV Line & B3_17_Manteca 115/60 kV Transformer No. 3	C3	N-1-1	0.8964	0.8997	0.8817	Dispatch local generation or voltage support
STOC-SP-V-71	CNTRY CB 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2454	>0.90	Dispatch local generation or voltage support
STOC-SP-V-72	HMMR JCT 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.27	>0.90	Dispatch local generation or voltage support

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STOC-SP-V-73	MORADAJT 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2912	>0.90	Explore potential mitigation
STOC-SP-V-74	MSHR 60V 60kV	B2_4_Lockeford - Bellota 230 kV Line & B2_74_Hammer - Country Club 60 kV	C3	N-1-1	0.8282	>0.90	>0.90	Short term: Action Plan
STOC-SP-V-75	NEW HOPE 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.204	>0.90	Explore potential mitigation
STOC-SP-V-76	SEBASTIA 60kV	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1	>0.90	0.2137	>0.90	Explore potential mitigation
STOC-SP-V-77	STAGG JT 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2402	>0.90	Explore potential mitigation
STOC-SP-V-78	TERMNOUS 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.219	>0.90	Explore potential mitigation
STOC-SP-V-79	TERMNS J 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2222	>0.90	Explore potential mitigation
STOC-SP-V-80	WSTLNE SW 60kV	B3_10_Stagg 230/60 kV Transformer No. 4 & B2_10_Eight Mile - Stagg 230 kV Line	C3	N-1-1	>0.90	0.2579	>0.90	Explore potential mitigation
STOC-SP-V-81	LOCKFORD 230kV	C5_11_Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV L	C5	DCTL	0.89	>0.90	>0.90	Short term: Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Spring Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
STOC-SpP-V-1	UOP 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8267		Explore potential mitigation
STOC-SpP-V-2	STAGG 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8305		Explore potential mitigation
STOC-SpP-V-3	HAMMER 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8305		Explore potential mitigation
STOC-SpP-V-4	CDCRSTN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8635		Explore potential mitigation
STOC-SpP-V-5	RVRBANK 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8932		Explore potential mitigation
STOC-SpP-V-6	CDCRSTNT 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8653		Explore potential mitigation
STOC-SpP-V-7	CNTRY CB 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8264		Explore potential mitigation
STOC-SpP-V-8	CPC STCN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8626		Explore potential mitigation
STOC-SpP-V-9	HMMR JCT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8347		Explore potential mitigation
STOC-SpP-V-10	KYOHOTAP 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8792		Explore potential mitigation
STOC-SpP-V-11	LCKFRDJA 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8701		Explore potential mitigation
STOC-SpP-V-12	MORADAJT 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8403		Explore potential mitigation
STOC-SpP-V-13	MSHR 60V 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.878		Explore potential mitigation
STOC-SpP-V-14	RVRBK J1 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8885		Explore potential mitigation
STOC-SpP-V-15	STCKTNJB 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8763		Explore potential mitigation
STOC-SpP-V-16	STKTON A 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8593		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Spring Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
STOC-SpP-V-17	STKTON B 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8757		Explore potential mitigation
STOC-SpP-V-18	STN COGN 115kV	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	Bus		0.8626		Explore potential mitigation
STOC-SpP-V-19	WSTLNESW 60kV	C2-8_STAGG 60 kV Bus Sections D and E - CB 2 Failure	C2	Bus		0.8307		Explore potential mitigation
STOC-SpP-V-20	STAGG-H 230kV	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1		0.271		Explore potential mitigation
STOC-SpP-V-21	NW HPE J 60kV	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1		0.2844		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
STOC-NP-V-1	LODI 60kV	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	>0.90	0.8712		Explore potential mitigation
STOC-NP-V-2	MONDAVI 60kV	B2_1_Rio Oso - Lockeford 230 kV Line & B2_4_Lockeford - Bellota 230 kV Line	C3	N-1-1	>0.90	0.8583		Explore potential mitigation
STOC-NP-V-3	STAGG-H 230kV	B2_10_Eight Mile - Stagg 230 kV Line & B2_8_Stagg - Tesla 230 kV Line	C3	N-1-1	>0.90	0.809		Explore potential mitigation
STOC-NP-V-4	HNYLNJCT 60kV	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	>0.90	0.8859		Explore potential mitigation
STOC-NP-V-5	INDSTR J 60kV	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	>0.90	0.8723		Explore potential mitigation
STOC-NP-V-6	LOCKEFRD 60kV	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	>0.90	0.8814		Explore potential mitigation
STOC-NP-V-7	LODI AUX 60kV	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	>0.90	0.8712		Explore potential mitigation
STOC-NP-V-8	LODI JCT 60kV	B3_4_Lockeford 230/60 kV Transformer No. 2 & B3_5_Lockeford 230/60 kV Transformer No. 3	C3	N-1-1	>0.90	0.8733		Explore potential mitigation



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

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Study Area: **PG&E Central Valley Stockton - Spring Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				N/A	2019 Spring Peak	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Spring Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		N/A	2019 Spring Peak	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stockton - Summer Off-Peak & Summer Light Load**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-1	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_31_West Sacramento - Brighton 115 kV Line & B1_3_WOODLAND 9.11 Unit ID 1	B	L-1/G-1	109.8	<100	<100	Short term: Action Plan
SAC-SP-T-2	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_31_West Sacramento - Brighton 115 kV Line & B1_3_WOODLAND 9.11 Unit ID 1	B	L-1/G-1	108.6	<100	<100	Short term: Action Plan
SAC-SP-T-3	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_31_West Sacramento - Brighton 115 kV Line & B1_3_WOODLAND 9.11 Unit ID 1	B	L-1/G-1	108.1	<100	<100	Short term: Action Plan
SAC-SP-T-4	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_31_West Sacramento - Brighton 115 kV Line	B	L-1	102.2	<100	<100	Short Term: Sacramento Action Plan
SAC-SP-T-5	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_31_West Sacramento - Brighton 115 kV Line	B	L-1	101.0	<100	<100	Short Term: Sacramento Action Plan
SAC-SP-T-6	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_31_West Sacramento - Brighton 115 kV Line	B	L-1	100.6	<100	<100	Short Term: Sacramento Action Plan
SAC-SP-T-7	32088 VACA-DXN 60.0 31998 VACA-DIX 115 5	B3_10_Vaca Dixon 115/60 kV Transformer No. 9	B	T-1	119.2	124.9	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-8	32056 CORTINA 60.0 30451 CRTNA M 230 1	B3_12_Cortina #5 115/60 kV Transformer	B	T-1	<100	<100	102.5	Explore potential mitigation
SAC-SP-T-9	32056 CORTINA 60.0 30451 CRTNA M 230 1	B3_5_Cortina 230/115 kV Transformer No. 4	B	T-1	136.1	135.7	134.7	Explore potential mitigation
SAC-SP-T-10	30544 ROSSTAP2 230 30550 MORAGA 230 2	C1_3_BUS FAULT AT 30460 VACA-DIX 230.00 Sec 1F	C1	Bus	106.3	<100	<100	Short term: Action Plan
SAC-SP-T-11	31960 MOBILCHE 115 31966 WODLNDJ1 115 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	98.7	<100	<100	Short term: Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-12	31962 WDLND_BM 115 31970 WOODLD 115 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	148.2	128.9	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-13	31962 WDLND_BM 115 31990 DAVIS 115 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	171.1	149.2	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-14	31964 KNIGHT2 115 31968 WODLNDJ2 115 2	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	104.3	<100	<100	Short term: Action Plan
SAC-SP-T-15	31965 KNIGHT1 115 31966 WODLNDJ1 115 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	98.5	<100	<100	Short term: Action Plan
SAC-SP-T-16	32214 RIO OSO 115 30330 RIO OSO 230 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	110.7	<100	<100	Short term: Action Plan
SAC-SP-T-17	32214 RIO OSO 115 30330 RIO OSO 230 2	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	106.8	<100	<100	Short term: Action Plan
SAC-SP-T-18	32214 RIO OSO 115 31964 KNIGHT2 115 2	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	104.3	<100	<100	Short term: Action Plan
SAC-SP-T-19	32214 RIO OSO 115 31965 KNIGHT1 115 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	102.2	<100	<100	Short term: Action Plan
SAC-SP-T-20	32214 RIO OSO 115 31986 W.SCRMNO 115 1	C1-8_BUS FAULT AT 31984 BRIGHTN 115.00	C1	Bus	144.2	126.7	<100	Investigate: Short Term: Sacramento Action Plan Long term: Rio-Oso Transformer upgrade, Rio Oso 115 kV Bus BAAH Conversion
SAC-SP-T-21	31998 VACA-DIX 115 30460 VACA-DIX 230 4	C2-1_VACA-DIX E 230 kV Bus 1 and Bus 2 - CB 202 Failure	C2	CB	<100	<100	116.5	Future Sacramento Action Plan
SAC-SP-T-22	30544 ROSSTAP2 230 30550 MORAGA 230 2	C2-2_VACA-DIX E 230 kV Bus 1 and VACA- DIX F 230 kV Bus 1 - CB 6	C2	CB	104.6	<100	<100	Short term: Action Plan

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Study Area: **PG&E Central Valley Sacramento - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-23	31998 VACA-DIX 115 30460 VACA-DIX 230 3	C2-3_VACA-DIX E 230 kV Bus 2 and VACA-DIX F 230 kV Bus 2 - CB 6	C2	CB	<100	<100	117.4	Future Sacramento Action Plan
SAC-SP-T-24	30544 ROSSTAP2 230 30550 MORAGA 230 2	C2-4_VACA-DIX F 230 kV Bus 1 and Bus 2 - No CB between Bus 1F a	C2	CB	105.6	<100	<100	Short term: Action Plan
SAC-SP-T-25	31378 FULTON 60.0 31382 FTCHMTNP 60.0 1	B2_1_Delevan-Cortina 230 kV Line & B2_9_Cortina - Vaca 230 kV Line	C3	N-1-1	104.3	<100	<100	Short term: Action Plan
SAC-SP-T-26	31980 DPWTR_TP 115 31986 W.SCRMNO 115 1	B2_28_Woodland - Davis 115 kV Line & B2_32_Brighton - Davis 115 kV Line	C3	N-1-1	111.9	113.8	<100	Explore potential mitigation
SAC-SP-T-27	31980 DPWTR_TP 115 31990 DAVIS 115 1	B2_28_Woodland - Davis 115 kV Line & B2_32_Brighton - Davis 115 kV Line	C3	N-1-1	110.1	112.0	<100	Explore potential mitigation
SAC-SP-T-28	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_31_West Sacramento - Brighton 115 kV Line & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1	157.7	150.7	<100	Explore potential mitigation
SAC-SP-T-29	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_31_West Sacramento - Brighton 115 kV Line & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1	156.4	149.4	<100	Explore potential mitigation
SAC-SP-T-30	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_31_West Sacramento - Brighton 115 kV Line & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1	155.8	148.8	<100	Explore potential mitigation
SAC-SP-T-31	31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1	B2_9_Cortina - Vaca 230 kV Line & B2_1_Delevan-Cortina 230 kV Line	C3	N-1-1	103.2	98.2	<100	Explore potential mitigation
SAC-SP-T-32	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	B2_9_Cortina - Vaca 230 kV Line & B2_1_Delevan-Cortina 230 kV Line	C3	N-1-1	103.8	97.9	<100	Explore potential mitigation
SAC-SP-T-33	31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1	B2_9_Cortina - Vaca 230 kV Line & B2_1_Delevan-Cortina 230 kV Line	C3	N-1-1	101.8	95.9	<100	Explore potential mitigation
SAC-SP-T-34	31998 VACA-DIX 115 30460 VACA-DIX 230 4	B3_13_Vaca Dixon 230/115 kV Transformer No. 2 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1	<100	<100	119.1	Explore potential mitigation

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-35	31998 VACA-DIX 115 30460 VACA-DIX 230 3	B3_13_Vaca Dixon 230/115 kV Transformer No. 2 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1	<100	<100	119.0	Explore potential mitigation
SAC-SP-T-36	31984 BRIGHTN 115 30348 BRIGHTON 230 9	B3_3_Brighton 230/115 kV Transformer No. 10 & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1	103.0	99.9	<100	Explore potential mitigation
SAC-SP-T-37	31960 MOBILCHE 115 31966 WODLNDJ1 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	114.8	96.3	<100	Explore potential mitigation
SAC-SP-T-38	31960 MOBILCHE 115 31970 WOODLD 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	114.7	96.3	<100	Explore potential mitigation
SAC-SP-T-39	31962 WDLND_BM 115 31970 WOODLD 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	182.1	151.6	<100	Explore potential mitigation
SAC-SP-T-40	31962 WDLND_BM 115 31990 DAVIS 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	206.9	172.2	<100	Explore potential mitigation
SAC-SP-T-41	31964 KNIGHT2 115 31968 WODLNDJ2 115 2	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	120.6	101.4	<100	Explore potential mitigation
SAC-SP-T-42	31965 KNIGHT1 115 31966 WODLNDJ1 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	114.5	96.1	<100	Explore potential mitigation
SAC-SP-T-43	31968 WODLNDJ2 115 31970 WOODLD 115 2	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	111.1	<100	<100	Short term: Action Plan

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-44	32214 RIO OSO 115 30330 RIO OSO 230 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	123.3	<100	<100	Short term: Action Plan
SAC-SP-T-45	32214 RIO OSO 115 30330 RIO OSO 230 2	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	119.4	<100	<100	Short term: Action Plan
SAC-SP-T-46	32214 RIO OSO 115 31964 KNIGHT2 115 2	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	120.6	101.4	<100	Explore potential mitigation
SAC-SP-T-47	32214 RIO OSO 115 31965 KNIGHT1 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	118.4	99.5	<100	Explore potential mitigation
SAC-SP-T-48	32214 RIO OSO 115 31986 W.SCRMNO 115 1	B3_3_Brighton 230/115 kV Transformer No. 10 & B3_4_Brighton 230/115 kV Transformer No. 9	C3	N-1-1	171.5	143.6	<100	Explore potential mitigation
SAC-SP-T-49	31960 MOBILCHE 115 31966 WODLNDJ1 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	114.8	96.3	<100	Explore potential mitigation
SAC-SP-T-50	31960 MOBILCHE 115 31970 WOODLD 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	114.7	96.3	<100	Explore potential mitigation
SAC-SP-T-51	31962 WDLND_BM 115 31970 WOODLD 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	182.1	151.6	<100	Explore potential mitigation
SAC-SP-T-52	31962 WDLND_BM 115 31990 DAVIS 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	206.9	172.2	<100	Explore potential mitigation

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-53	31964 KNIGHT2 115 31968 WODLNDJ2 115 2	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	120.6	101.4	<100	Explore potential mitigation
SAC-SP-T-54	31965 KNIGHT1 115 31966 WODLNDJ1 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	114.5	96.1	<100	Explore potential mitigation
SAC-SP-T-55	31968 WODLNDJ2 115 31970 WOODLD 115 2	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	111.1	<100	<100	Short term: Action Plan
SAC-SP-T-56	32214 RIO OSO 115 30330 RIO OSO 230 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	123.3	<100	<100	Short term: Action Plan
SAC-SP-T-57	32214 RIO OSO 115 30330 RIO OSO 230 2	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	119.4	<100	<100	Short term: Action Plan
SAC-SP-T-58	32214 RIO OSO 115 31964 KNIGHT2 115 2	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	120.6	101.4	<100	Explore potential mitigation
SAC-SP-T-59	32214 RIO OSO 115 31965 KNIGHT1 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	118.4	99.5	<100	Explore potential mitigation
SAC-SP-T-60	32214 RIO OSO 115 31986 W.SCRMNO 115 1	B3_4_Brighton 230/115 kV Transformer No. 9 & B3_3_Brighton 230/115 kV Transformer No. 10	C3	N-1-1	171.5	143.6	<100	Explore potential mitigation
SAC-SP-T-61	32056 CORTINA 60.0 30451 CRTNA M 230 1	B3_5_Cortina 230/115 kV Transformer No. 4 & B1_2_WADHAM 9.11 Unit ID 1	C3	N-1-1	159.2	158.3	158.0	Explore potential mitigation

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-62	31998 VACA-DIX 115 30460 VACA-DIX 230 4	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_13_Vaca Dixon 230/115 kV Transformer No. 2	C3	N-1-1	<100	<100	119.1	Explore potential mitigation
SAC-SP-T-63	31998 VACA-DIX 115 30460 VACA-DIX 230 2	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1	<100	<100	115.4	Explore potential mitigation
SAC-SP-T-64	31999 VACA-CB 115 30460 VACA-DIX 230 2	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1	140.2	145.7	<100	Explore potential mitigation
SAC-SP-T-65	31999 VACA-CB 115 30460 VACA-DIX 230 2A	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1	164.2	170.7	<100	Explore potential mitigation
SAC-SP-T-66	31999 VACA-CB 115 31998 VACA-DIX 115 1	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1	165.3	171.4	<100	Explore potential mitigation
SAC-SP-T-67	31998 VACA-DIX 115 30460 VACA-DIX 230 3	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_13_Vaca Dixon 230/115 kV Transformer No. 2	C3	N-1-1	<100	<100	119.0	Explore potential mitigation
SAC-SP-T-68	31998 VACA-DIX 115 30460 VACA-DIX 230 2	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1	<100	<100	115.4	Explore potential mitigation
SAC-SP-T-69	31999 VACA-CB 115 30460 VACA-DIX 230 2	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1	140.2	145.7	<100	Explore potential mitigation
SAC-SP-T-70	31999 VACA-CB 115 30460 VACA-DIX 230 2A	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1	164.2	170.7	<100	Explore potential mitigation

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-71	31999 VACA-CB 115 31998 VACA-DIX 115 1	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1	165.3	171.4	<100	Explore potential mitigation
SAC-SP-T-72	31962 WDLND_BM 115 31990 DAVIS 115 1	C5_10_Rio Oso-Brighton 230 kV Line & Rio Oso-Lockeford 230 kV L	C5	DCTL	101.0	106.5	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-73	31962 WDLND_BM 115 31970 WOODLD 115 1	C5_16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115	C5	DCTL	103.5	105.7	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-74	31984 BRIGHTN 115 31993 BRKRJCT 115 1	C5_16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115	C5	DCTL	108.9	109.7	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-75	31993 BRKRJCT 115 32001 UCD_TP2 115 1	C5_16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115	C5	DCTL	107.6	108.3	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-76	32001 UCD_TP2 115 31990 DAVIS 115 1	C5_16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115	C5	DCTL	107.1	107.8	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-77	31962 WDLND_BM 115 31970 WOODLD 115 1	C5_17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Bri	C5	DCTL	97.7	107.6	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-78	31962 WDLND_BM 115 31990 DAVIS 115 1	C5_17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Bri	C5	DCTL	118.1	127.3	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-79	31984 BRIGHTN 115 31993 BRKRJCT 115 1	C5_17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Bri	C5	DCTL	137.1	124.0	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion

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Study Area: **PG&E Central Valley Sacramento - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-T-80	31993 BRKRJCT 115 32001 UCD_TP2 115 1	C5_17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Bri	C5	DCTL	135.8	122.7	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SAC-SP-T-81	32001 UCD_TP2 115 31990 DAVIS 115 1	C5_17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Bri	C5	DCTL	135.3	122.2	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion

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Study Area: **PG&E Central Valley Sacramento - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SAC-SpP-T-1	30525 C.COSTA 230 30479 BDLSWSTA 230 1	B2_20_Birds Landing - Contra Costa Sub 230 kV Line	B	L-1		105.3		Explore potential mitigation
SAC-SpP-T-2	30479 BDLSWSTA 230 30523 CC SUB 230 1	B2_21_Birds Landing - Contra Costa PP 230 kV Line	B	L-1		102.9		Explore potential mitigation
SAC-SpP-T-3	30525 C.COSTA 230 30479 BDLSWSTA 230 1	B2_20_Birds Landing - Contra Costa Sub 230 kV Line & B1_7_HIGHWND3 34.50 Unit ID 1	B	L-1/G-1		103.6		Explore potential mitigation
SAC-SpP-T-4	30479 BDLSWSTA 230 30523 CC SUB 230 1	B2_21_Birds Landing - Contra Costa PP 230 kV Line & B1_7_HIGHWND3 34.50 Unit ID 1	B	L-1/G-1		101.2		Explore potential mitigation
SAC-SpP-T-5	30114 DELEVN 230 30450 CORTINA 230 1	C2-1_VACA-DIX E 230 kV Bus 1 and Bus 2 - CB 202 Failure	C2	CB		102.1		Explore potential mitigation
SAC-SpP-T-6	30114 DELEVN 230 30450 CORTINA 230 1	C2-3_VACA-DIX E 230 kV Bus 2 and VACA-DIX F 230 kV Bus 2 - CB 6	C2	CB		102.8		Explore potential mitigation
SAC-SpP-T-7	30525 C.COSTA 230 30479 BDLSWSTA 230 1	B2_11_Vaca - Parkway 230 kV Line & B2_20_Birds Landing - Contra Costa Sub 230 kV Line	C3	N-1-1		113.4		Explore potential mitigation
SAC-SpP-T-8	30479 BDLSWSTA 230 30523 CC SUB 230 1	B2_11_Vaca - Parkway 230 kV Line & B2_21_Birds Landing - Contra Costa PP 230 kV Line	C3	N-1-1		110.9		Explore potential mitigation
SAC-SpP-T-9	30114 DELEVN 230 30450 CORTINA 230 1	B2_2_Delevan-Vaca Dixon No.2 230 kV Line & B2_3_Delevan-Vaca Dixon No.3 230 kV Line	C3	N-1-1		103.1		Explore potential mitigation
SAC-SpP-T-10	30525 C.COSTA 230 30479 BDLSWSTA 230 1	B2_20_Birds Landing - Contra Costa Sub 230 kV Line & B2_11_Vaca - Parkway 230 kV Line	C3	N-1-1		113.4		Explore potential mitigation

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Study Area: **PG&E Central Valley Sacramento - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SAC-SpP-T-11	30479 BDLSWSTA 230 30523 CC SUB 230 1	B2_21_Birds Landing - Contra Costa PP 230 kV Line & B2_11_Vaca - Parkway 230 kV Line	C3	N-1-1		110.9		Explore potential mitigation
SAC-SpP-T-12	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_28_Woodland - Davis 115 kV Line & B2_30_West Sacramento - Davis 115 kV Line	C3	N-1-1		104.9		Explore potential mitigation
SAC-SpP-T-13	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_28_Woodland - Davis 115 kV Line & B2_30_West Sacramento - Davis 115 kV Line	C3	N-1-1		103.9		Explore potential mitigation
SAC-SpP-T-14	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_28_Woodland - Davis 115 kV Line & B2_30_West Sacramento - Davis 115 kV Line	C3	N-1-1		103.5		Explore potential mitigation
SAC-SpP-T-15	30114 DELEVN 230 30450 CORTINA 230 1	B2_3_Delevan-Vaca Dixon No.3 230 kV Line & B2_2_Delevan-Vaca Dixon No.2 230 kV Line	C3	N-1-1		103.1		Explore potential mitigation
SAC-SpP-T-16	30114 DELEVN 230 30450 CORTINA 230 1	B2_3_Delevan-Vaca Dixon No.3 230 kV Line & B2_4_Delevan-Vaca Dixon No.4 230 kV Line	C3	N-1-1		103.1		Explore potential mitigation
SAC-SpP-T-17	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_30_West Sacramento - Davis 115 kV Line & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1		104.9		Explore potential mitigation
SAC-SpP-T-18	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_30_West Sacramento - Davis 115 kV Line & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1		103.9		Explore potential mitigation
SAC-SpP-T-19	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_30_West Sacramento - Davis 115 kV Line & B2_28_Woodland - Davis 115 kV Line	C3	N-1-1		103.5		Explore potential mitigation

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Study Area: **PG&E Central Valley Sacramento - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SAC-SpP-T-20	30114 DELEVN 230 30450 CORTINA 230 1	B2_4_Delevan-Vaca Dixon No.4 230 kV Line & B2_3_Delevan-Vaca Dixon No.3 230 kV Line	C3	N-1-1		103.1		Explore potential mitigation
SAC-SpP-T-21	31962 WDLND_BM 115 31990 DAVIS 115 1	B2_52_Rio Oso - West Sacramento 115 kV Line & B2_5_Rio Oso - Brighton 230 kV Line	C3	N-1-1		111.4		Explore potential mitigation
SAC-SpP-T-22	32056 CORTINA 60.0 30451 CRTNA M 230 1	B3_5_Cortina 230/115 kV Transformer No. 4 & B1_2_WADHAM 9.11 Unit ID 1	C3	N-1-1		108.9		Explore potential mitigation
SAC-SpP-T-23	31999 VACA-CB 115 30460 VACA-DIX 230 2	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1		107.6		Explore potential mitigation
SAC-SpP-T-24	31999 VACA-CB 115 30460 VACA-DIX 230 2A	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1		125.4		Explore potential mitigation
SAC-SpP-T-25	31999 VACA-CB 115 31998 VACA-DIX 115 1	B3_7_Vaca Dixon 230/115 kV Transformer No. 3 & B3_8_Vaca Dixon 230/115 kV Transformer No. 4	C3	N-1-1		128.4		Explore potential mitigation
SAC-SpP-T-26	31999 VACA-CB 115 30460 VACA-DIX 230 2	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1		107.6		Explore potential mitigation
SAC-SpP-T-27	31999 VACA-CB 115 30460 VACA-DIX 230 2A	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1		125.4		Explore potential mitigation
SAC-SpP-T-28	31999 VACA-CB 115 31998 VACA-DIX 115 1	B3_8_Vaca Dixon 230/115 kV Transformer No. 4 & B3_7_Vaca Dixon 230/115 kV Transformer No. 3	C3	N-1-1		128.4		Explore potential mitigation

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SAC-SpP-T-29	30114 DELEVN 230 30450 CORTINA 230 1	C5_8_Delevan-Vaca Dixon No.2 230 kV Line & Delevan-Vaca Dixon N	C5	DCTL		103.1		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SAC-NP-T-1	32394 PLACER 60.0 32228 PLACER 115 1	Base Case & B1_19_RIO OSO 230.00 Unit ID 1	B	G-1	<100	146.5		Explore potential mitigation
SAC-NP-T-2	30523 CC SUB 230 30525 C.COSTA 230 1	B2_18_Lambie - Birds Landing 230 kV Line & B2_21_Birds Landing - Contra Costa PP 230 kV Line	C3	N-1-1	106.9	<100		Short term: Action Plan
SAC-NP-T-3	30523 CC SUB 230 30525 C.COSTA 230 1	B2_21_Birds Landing - Contra Costa PP 230 kV Line & B2_18_Lambie - Birds Landing 230 kV Line	C3	N-1-1	106.9	<100		Short term: Action Plan

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-VD-1	CRTNA M 230kV	B2_12_Delevan-Cortina 230 kV Line	B	L-1	4.812	5.353	6.028	Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Spring Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SAC-SpP-VD-1	RICE 60kV	B2_95_Glenn No.2 60 kV Line	B	L-1		-5.493		Explore potential mitigation
SAC-SpP-VD-2	RICE 60kV	B2_95_Glenn No.2 60 kV Line & B1_79_COLUSGT1 18.00 Unit ID 1	B	L-1/G-1		-5.518		Explore potential mitigation



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SAC-SP-V-1	COLUSA 60kV	B2_12_Delevan-Cortina 230 kV Line & B3_63_Cortina #5 115/60 kV Transformer	C3	N-1-1	>0.9	>0.9	0.8871	Explore potential mitigation
SAC-SP-V-2	CLSA CRS 60kV	B2_12_Delevan-Cortina 230 kV Line & B3_63_Cortina #5 115/60 kV Transformer	C3	N-1-1	>0.9	>0.9	0.8916	Explore potential mitigation
SAC-SP-V-3	PLAINFLD 60kV	B2_13_Delevan-Vaca Dixon No.2 230 kV Line & B2_12_Delevan-Cortina 230 kV Line	C3	N-1-1	0.8952	0.8652	>0.9	Explore potential mitigation
SAC-SP-V-4	PLFLDJCT 60kV	B2_13_Delevan-Vaca Dixon No.2 230 kV Line & B2_12_Delevan-Cortina 230 kV Line	C3	N-1-1	>0.9	0.8786	>0.9	Explore potential mitigation
SAC-SP-V-5	WILSONAV 60kV	B2_12_Delevan-Cortina 230 kV Line & B3_63_Cortina #5 115/60 kV Transformer	C3	N-1-1	>0.9	>0.9	0.8872	Explore potential mitigation



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	

No high/low voltage concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Off-Peak & Summer Light Load**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Spring Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				N/A	2019 Spring Peak	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Peak**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Spring Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		N/A	2019 Spring Peak	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sacramento - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STAN-SP-T-1	Bellota-Riverbank-Melones SW STA 115 kV Line (Melones-Tulloch Section)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	Bus	155.2	<100	<100	Short Term: Stockton Area 2013 Summer Action Plan Long Term: Vierra Looping Project
STAN-SP-T-2	Bellota-Riverbank-Melones SW STA 115 kV Line (Riverbank Jct-Tulloch Section)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	Bus	138.7	<100	<100	Short Term: Stockton Area 2013 Summer Action Plan Long Term: Vierra Looping Project
STAN-SP-T-3	Stanislaus-Melones SW STA-Riverbank Jct SW STA 115 kV Line (Melones-Melones Jct Section)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	Bus	140.1	<100	<100	Short Term: Stockton Area 2013 Summer Action Plan Long Term: Vierra Looping Project
STAN-SP-T-4	Stanislaus-Melones SW STA-Riverbank JCT SW STA 115 kV Line (Melones Jct-Riverbank Jct SW STA)	C2-6_TESLA 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	Bus	148.0	<100	<100	Short Term: Stockton Area 2013 Summer Action Plan Long Term: Vierra Looping Project
STAN-SP-T-5	Bellota-Riverbank-Melones SW STA 115 kV Line (Melones-Tulloch Section)	B3_11_Bellota 230/115 kV Transformer No. 1 & B3_12_Belltoa 230/115 kV Transformer No. 2	C3	N-1-1	159.7	169.0	<100	SPS or Add 3rd Bellota 230/115 kV Transformer and Sectionalizing Breakers
STAN-SP-T-6	Bellota-Riverbank-Melones SW STA 115 kV Line (Riverbank Jct-Tulloch Section)	B3_11_Bellota 230/115 kV Transformer No. 1 & B3_12_Belltoa 230/115 kV Transformer No. 2	C3	N-1-1	183.6	192.4	<100	SPS or Add 3rd Bellota 230/115 kV Transformer and Sectionalizing Breakers

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
STAN-SP-T-7	Stanislau-Melones SW STA-Riverbank Jct SW STA 115 kV Line (Melones-Melones Jct Section)	B3_11_Bellota 230/115 kV Transformer No. 1 & B3_12_Belltoa 230/115 kV Transformer No. 2	C3	N-1-1	97.1	100.6	<100	SPS or Add 3rd Bellota 230/115 kV Transformer and Sectionalizing Breakers

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley stanislaus - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
STAN-SpP-T-1	33906 SPRNG GP 115 34078 SPRNG GP 6.00 1	B2_8_Bellota-Riverbank-Melones 115 kV Line & B1_1_SJ COGEN 13.80 Unit ID 1	B	L-1/G-1		106.0		Explore potential mitigation
STAN-SpP-T-2	33900 DONNELLS 115 34058 DONNELLS 13.8 1	C2-1_BELLOTA 230 kV Bus 1 and Bus 2 - CB 200 Failure	C2	CB		100.2		Explore potential mitigation
STAN-SpP-T-3	33906 SPRNG GP 115 34078 SPRNG GP 6.00 1	C2-7_BELLOTA 115 kV Bus 1 and Bus 2 - CB 100 Failure	C2	CB		109.2		Explore potential mitigation
STAN-SpP-T-4	33506 STANISLS 115 33948 RVRBK J2 115 1	B2_13_Stanislaus-Melones-Manteca 115 kV Line No. 1 & B2_3_Stanislaus - Melones Sw 115 kV Line	C3	N-1-1		100.0		Explore potential mitigation
STAN-SpP-T-5	33906 SPRNG GP 115 34078 SPRNG GP 6.00 1	C5_21_Schulte-Kasson-Manteca 115 kV Line & Manteca-Vierra 115 k	C5	DCTL		111.8		Explore potential mitigation



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	

No high/low voltage concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	Select..	

No high/low voltage concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus - Spring Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				N/A	2019 Spring Peak	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus -Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus - Summer Peak**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus - Spring Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		N/A	2019 Spring Peak	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Stanislaus -Summer Off-Peak & Summer Light Load**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-1	32218 DRUM 115 32244 BRNSWCKP 115 2	B2_38_Higgins - Bell 115 kV Line	B	L-1	106.9	106.0	106.4	Reduce Drum Generation
SIERA-SP-T-2	32394 PLACER 60.0 32228 PLACER 115 1	B2_68_Placer - Del Mar 60 kV Line	B	L-1	<100	99.6	103.4	Long Term: Future Action Plan or Placer 2nd 115/60 kV transformer
SIERA-SP-T-3	32218 DRUM 115 32244 BRNSWCKP 115 2	B2_38_Higgins - Bell 115 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	L-1/G-1	99.4	99.0	99.4	Explore potential mitigation
SIERA-SP-T-4	32308 COLGATE 60.0 32313 NRRWS2TP 60.0 2	B2_46_Colgate - Smartville 60 kV Line No. 1 & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1	107.8	<100	<100	Short term: Action Plan
SIERA-SP-T-5	32374 DRUM 60.0 32376 BONNIE N 60.0 1	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	L-1/G-1	103.4	104.7	111.2	Explore potential mitigation
SIERA-SP-T-6	32376 BONNIE N 60.0 32367 CPEHRNTP 60.0 1	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	L-1/G-1	99.7	101.0	107.5	Explore potential mitigation
SIERA-SP-T-7	32394 PLACER 60.0 32228 PLACER 115 1	B2_68_Placer - Del Mar 60 kV Line & B1_4_DRUM 5 13.80 Unit ID 1	B	L-1/G-1	<100	105.6	109.5	Explore potential mitigation
SIERA-SP-T-8	32208 GLEAF TP 115 32214 RIO OSO 115 1	C1-1_BUS FAULT AT 30330 RIO OSO 230.00 Bus 1	C1	Bus	101.1	<100	<100	Short Term: Sierra Action Plan, Long Term: New Rio Oso-Atlantic 230 kV Line
SIERA-SP-T-9	32218 DRUM 115 32244 BRNSWCKP 115 2	C1-13_BUS FAULT AT 32232 HIGGINS 115.00	C1	Bus	129.2	127.2	127.6	Reduce Drum Generation
SIERA-SP-T-10	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	C1-13_BUS FAULT AT 32232 HIGGINS 115.00	C1	Bus	116.5	115.4	115.3	Reduce Drum Generation
SIERA-SP-T-11	32218 DRUM 115 32244 BRNSWCKP 115 2	C1-14_BUS FAULT AT 32238 BELL PGE 115.00	C1	Bus	106.7	105.9	106.3	Reduce Drum Generation
SIERA-SP-T-12	30330 RIO OSO 230 30335 ATLANTC 230 1	C1-4_BUS FAULT AT 30337 GOLDHILL 230.00 Bus 2	C1	Bus	101.4	97.2	<100	Short Term: Sierra Action Plan, Long Term: New Rio Oso-Atlantic 230 kV Line

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-13	32018 GOLDHILL 115 32275 CPM TAP 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	112.2	<100	<100	Short term: Action Plan
SIERA-SP-T-14	32250 ELDORAD 115 32481 APLHTAP2 115 2	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	240.6	254.2	257.4	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-15	32250 ELDORAD 115 32482 APLHTAP1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	184.5	196.7	199.0	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-16	32255 PLCRVLT1 115 32261 MIZOU_T1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	134.1	140.1	141.8	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-17	32261 MIZOU_T1 115 32267 DIMOND_1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	112.5	117.5	118.9	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-18	32262 SHPRING1 115 32264 CLRKSVLT 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	112.4	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-19	32267 DIMOND_1 115 32262 SHPRING1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	112.4	117.5	118.9	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-20	32275 CPM TAP 115 32264 CLRKSVLT 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	112.3	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-21	32481 APLHTAP2 115 32257 PLCRVLT2 115 2	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	240.5	254.1	257.5	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-22	32482 APLHTAP1 115 32255 PLCRVLT1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	222.0	232.0	234.7	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS, Gold Hill - Missouri Flat 115 kV Lines Reconductor
SIERA-SP-T-23	31482 PALERMO 115 31506 HONC JT1 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	115.6	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion
SIERA-SP-T-24	32200 PEASE 115 31506 HONC JT1 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	115.5	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion
SIERA-SP-T-25	32200 PEASE 115 32288 E.MRY J1 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	128.2	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-26	32206 BOGUE 115 32286 OLIVH J3 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	111.0	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion
SIERA-SP-T-27	32208 GLEAF TP 115 32214 RIO OSO 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	131.3	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion
SIERA-SP-T-28	32212 E.NICOLS 115 32214 RIO OSO 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	122.8	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion
SIERA-SP-T-29	32290 OLIVH J1 115 32214 RIO OSO 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	100.1	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion
SIERA-SP-T-30	32290 OLIVH J1 115 32288 E.MRY J1 115 1	C2-1_RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	126.8	<100	<100	Short Term: Sierra Action Plan, Long Term: South of Palermo 115 kV Reinforcement Project and Rio Oso 230 kV BAAH Conversion

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-31	30330 RIO OSO 230 30348 BRIGHTON 230 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	109.1	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion
SIERA-SP-T-32	31962 WDLND_BM 115 31970 WOODLD 115 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	121.3	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion
SIERA-SP-T-33	31962 WDLND_BM 115 31990 DAVIS 115 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	100.7	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion
SIERA-SP-T-34	31978 DPWT_TP2 115 31984 BRIGHTN 115 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	106.3	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion
SIERA-SP-T-35	31984 BRIGHTN 115 31993 BRKRJCT 115 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	133.8	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-36	31993 BRKRJCT 115 32001 UCD_TP2 115 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	132.3	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion
SIERA-SP-T-37	32001 UCD_TP2 115 31990 DAVIS 115 1	C2-2_RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	CB	131.8	<100	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion & Rio Oso 115 kV Bus BAAH Conversion
SIERA-SP-T-38	30330 RIO OSO 230 30335 ATLANTC 230 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<100	100.6	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-39	32214 RIO OSO 115 30330 RIO OSO 230 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-40	32214 RIO OSO 115 30330 RIO OSO 230 2	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-41	32214 RIO OSO 115 32225 BRNSWKTP 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-42	32214 RIO OSO 115 32244 BRNSWCKP 115 2	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-43	32218 DRUM 115 32220 DTCH FL1 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	174.9	166.4	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-44	32218 DRUM 115 32222 DTCH FL2 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-45	32218 DRUM 115 32244 BRNSWCKP 115 2	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-46	32220 DTCH FL1 115 32224 CHCGO PK 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	110.5	105.7	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-47	32224 CHCGO PK 115 32232 HIGGINS 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	134.4	129.4	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-48	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-49	32228 PLACER 115 32238 BELL PGE 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	<100	<100	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-50	32232 HIGGINS 115 32238 BELL PGE 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	diverge	108.9	104.3	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-51	32412 ATLANTIC 115 32228 PLACER 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<100	123.9	131.1	Short Term: Sierra Action Plan, Long Term: Gold Hill SPS and add 3rd Gold Hill 230/115 kV Transformer or Pine Hill Sub
SIERA-SP-T-52	32218 DRUM 115 32220 DTCH FL1 115 1	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	201.1	<100	<100	short Term: Sierra Action Plan, Long Term: new Atlantic - Placer 115 kV Line
SIERA-SP-T-53	32220 DTCH FL1 115 32224 CHCGO PK 115 1	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	125.9	<100	<100	short Term: Sierra Action Plan, Long Term: new Atlantic - Placer 115 kV Line
SIERA-SP-T-54	32224 CHCGO PK 115 32232 HIGGINS 115 1	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	151.7	<100	<100	short Term: Sierra Action Plan, Long Term: new Atlantic - Placer 115 kV Line
SIERA-SP-T-55	32228 PLACER 115 32238 BELL PGE 115 1	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	114.8	<100	<100	short Term: Sierra Action Plan, Long Term: new Atlantic - Placer 115 kV Line
SIERA-SP-T-56	32232 HIGGINS 115 32238 BELL PGE 115 1	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	124.6	<100	<100	short Term: Sierra Action Plan, Long Term: new Atlantic - Placer 115 kV Line

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-57	32214 RIO OSO 115 32356 LINCLN 115 1	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	116.7	<100	<100	Short term: Action Plan
SIERA-SP-T-58	32356 LINCLN 115 32404 SPI JCT 115 1	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	112.5	<100	<100	Short term: Action Plan
SIERA-SP-T-59	32398 ULTRA JT 115 32404 SPI JCT 115 1	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	116.6	<100	<100	Short term: Action Plan
SIERA-SP-T-60	32398 ULTRA JT 115 32408 PLSNT GR 115 1	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	130.7	<100	<100	Short term: Action Plan
SIERA-SP-T-61	32018 GOLDHILL 115 32231 HORSHE2 115 2	B2_19_Placer - Gold Hill 115 kV Line No. 1 & B2_36_Drum - Higgins 115 kV Line	C3	N-1-1	110.2	<100	<100	Short term: Action Plan
SIERA-SP-T-62	32018 GOLDHILL 115 32229 HORSHE1 115 1	B2_20_Placer - Gold Hill 115 kV Line No. 2 & B2_36_Drum - Higgins 115 kV Line	C3	N-1-1	101.5	<100	<100	Short term: Action Plan
SIERA-SP-T-63	32018 GOLDHILL 115 32275 CPM TAP 115 1	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B2_21_Gold Hill - Clarksville 115 kV Line	C3	N-1-1	150.9	<100	<100	Short term: Action Plan
SIERA-SP-T-64	32275 CPM TAP 115 32264 CLRKSVLT 115 1	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B2_21_Gold Hill - Clarksville 115 kV Line	C3	N-1-1	150.9	<100	<100	Short term: Action Plan
SIERA-SP-T-65	32200 PEASE 115 32288 E.MRY J1 115 1	B2_3_Table Mountain(D)-Rio Oso 230 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1	102.8	<100	<100	Short term: Action Plan
SIERA-SP-T-66	32208 GLEAF TP 115 32214 RIO OSO 115 1	B2_3_Table Mountain(D)-Rio Oso 230 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1	104.5	<100	<100	Short term: Action Plan
SIERA-SP-T-67	32290 OLIVH J1 115 32288 E.MRY J1 115 1	B2_3_Table Mountain(D)-Rio Oso 230 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1	101.6	<100	<100	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-68	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_31_Rio Oso - Woodland 115 kV Line No. 1	C3	N-1-1	108.9	109.7	<100	Explore potential mitigation
SIERA-SP-T-69	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_31_Rio Oso - Woodland 115 kV Line No. 1	C3	N-1-1	107.6	108.3	<100	Explore potential mitigation
SIERA-SP-T-70	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_31_Rio Oso - Woodland 115 kV Line No. 1	C3	N-1-1	107.1	107.8	<100	Explore potential mitigation
SIERA-SP-T-71	31960 MOBILCHE 115 31966 WODLNDJ1 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	96.6	100.7	<100	Explore potential mitigation
SIERA-SP-T-72	31960 MOBILCHE 115 31970 WOODLD 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	96.6	100.7	<100	Explore potential mitigation
SIERA-SP-T-73	31965 KNIGHT1 115 31966 WODLNDJ1 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	96.7	100.7	<100	Explore potential mitigation
SIERA-SP-T-74	32214 RIO OSO 115 31965 KNIGHT1 115 1	B2_30_Rio Oso - Woodland #1 115 kV Line & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	100.0	104.0	<100	Explore potential mitigation
SIERA-SP-T-75	31984 BRIGHTN 115 31993 BRKRJCT 115 1	B2_31_Rio Oso - Woodland 115 kV Line No. 1 & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	108.9	109.7	<100	Explore potential mitigation
SIERA-SP-T-76	31993 BRKRJCT 115 32001 UCD_TP2 115 1	B2_31_Rio Oso - Woodland 115 kV Line No. 1 & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	107.6	108.3	<100	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-77	32001 UCD_TP2 115 31990 DAVIS 115 1	B2_31_Rio Oso - Woodland 115 kV Line No. 1 & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	107.1	107.8	<100	Explore potential mitigation
SIERA-SP-T-78	31964 KNIGHT2 115 31968 WODLNDJ2 115 2	B2_31_Rio Oso - Woodland 115 kV Line No. 1 & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	103.2	107.4	<100	Explore potential mitigation
SIERA-SP-T-79	32214 RIO OSO 115 31964 KNIGHT2 115 2	B2_31_Rio Oso - Woodland 115 kV Line No. 1 & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	103.2	107.4	<100	Explore potential mitigation
SIERA-SP-T-80	32214 RIO OSO 115 31986 W.SCRMNO 115 1	B2_31_Rio Oso - Woodland 115 kV Line No. 1 & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	100.8	105.0	<100	Explore potential mitigation
SIERA-SP-T-81	31962 WDLND_BM 115 31990 DAVIS 115 1	B2_32_Rio Oso - West Sacramento 115 kV Line & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1	122.5	129.1	<100	Explore potential mitigation
SIERA-SP-T-82	32018 GOLDHILL 115 32231 HORSHE2 115 2	B2_36_Drum - Higgins 115 kV Line & B2_19_Placer - Gold Hill 115 kV Line No. 1	C3	N-1-1	110.2	<100	<100	Short term: Action Plan
SIERA-SP-T-83	32018 GOLDHILL 115 32229 HORSHE1 115 1	B2_36_Drum - Higgins 115 kV Line & B2_20_Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	101.5	<100	<100	Short term: Action Plan
SIERA-SP-T-84	32018 GOLDHILL 115 30337 GOLDHILL 230 2	B2_36_Drum - Higgins 115 kV Line & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	107.9	<100	<100	Short term: Action Plan
SIERA-SP-T-85	32018 GOLDHILL 115 30337 GOLDHILL 230 1	B2_36_Drum - Higgins 115 kV Line & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	107.7	<100	<100	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-86	32394 PLACER 60.0 32228 PLACER 115 1	B2_37_Placer - Bell 115 kV Line & B2_68_Placer - Del Mar 60 kV Line	C3	N-1-1	<100	124.1	122.0	Explore potential mitigation
SIERA-SP-T-87	31482 PALERMO 115 31506 HONC JT1 115 1	B2_5_Colgate - Rio Oso 230 kV Line & B2_15_Palermo-Nicolaus 115 kV Line	C3	N-1-1	101.3	<100	<100	Short term: Action Plan
SIERA-SP-T-88	32200 PEASE 115 31506 HONC JT1 115 1	B2_5_Colgate - Rio Oso 230 kV Line & B2_15_Palermo-Nicolaus 115 kV Line	C3	N-1-1	101.3	<100	<100	Short term: Action Plan
SIERA-SP-T-89	32200 PEASE 115 32288 E.MRY J1 115 1	B2_5_Colgate - Rio Oso 230 kV Line & B2_3_Table Mountain(D)-Rio Oso 230 kV Line	C3	N-1-1	102.8	<100	<100	Short term: Action Plan
SIERA-SP-T-90	32208 GLEAF TP 115 32214 RIO OSO 115 1	B2_5_Colgate - Rio Oso 230 kV Line & B2_3_Table Mountain(D)-Rio Oso 230 kV Line	C3	N-1-1	104.5	<100	<100	Short term: Action Plan
SIERA-SP-T-91	32290 OLIVH J1 115 32288 E.MRY J1 115 1	B2_5_Colgate - Rio Oso 230 kV Line & B2_3_Table Mountain(D)-Rio Oso 230 kV Line	C3	N-1-1	101.6	<100	<100	Short term: Action Plan
SIERA-SP-T-92	32214 RIO OSO 115 32356 LINCLN 115 1	B2_6_Rio Oso - Atlantic 230 kV Line & B2_10_Atlantic - Gold Hill 230 kV Line	C3	N-1-1	116.7	<100	<100	Short term: Action Plan
SIERA-SP-T-93	32356 LINCLN 115 32404 SPI JCT 115 1	B2_6_Rio Oso - Atlantic 230 kV Line & B2_10_Atlantic - Gold Hill 230 kV Line	C3	N-1-1	112.5	<100	<100	Short term: Action Plan
SIERA-SP-T-94	32398 ULTRA JT 115 32404 SPI JCT 115 1	B2_6_Rio Oso - Atlantic 230 kV Line & B2_10_Atlantic - Gold Hill 230 kV Line	C3	N-1-1	116.6	<100	<100	Short term: Action Plan
SIERA-SP-T-95	32398 ULTRA JT 115 32408 PLSNT GR 115 1	B2_6_Rio Oso - Atlantic 230 kV Line & B2_10_Atlantic - Gold Hill 230 kV Line	C3	N-1-1	130.7	<100	<100	Short term: Action Plan
SIERA-SP-T-96	32394 PLACER 60.0 32228 PLACER 115 1	B2_68_Placer - Del Mar 60 kV Line & B2_37_Placer - Bell 115 kV Line	C3	N-1-1	<100	124.1	122.0	Explore potential mitigation
SIERA-SP-T-97	31960 MOBILCHE 115 31966 WODLNDJ1 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	96.6	100.7	<100	Explore potential mitigation

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-98	31960 MOBILCHE 115 31970 WOODLD 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	96.6	100.7	<100	Explore potential mitigation
SIERA-SP-T-99	31965 KNIGHT1 115 31966 WODLNDJ1 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	96.7	100.7	<100	Explore potential mitigation
SIERA-SP-T-100	32214 RIO OSO 115 31965 KNIGHT1 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_30_Rio Oso - Woodland #1 115 kV Line	C3	N-1-1	100.0	104.0	<100	Explore potential mitigation
SIERA-SP-T-101	31964 KNIGHT2 115 31968 WODLNDJ2 115 2	B2_8_Rio Oso - Brighton 230 kV Line & B2_31_Rio Oso - Woodland 115 kV Line No. 1	C3	N-1-1	103.2	107.4	<100	Explore potential mitigation
SIERA-SP-T-102	32214 RIO OSO 115 31964 KNIGHT2 115 2	B2_8_Rio Oso - Brighton 230 kV Line & B2_31_Rio Oso - Woodland 115 kV Line No. 1	C3	N-1-1	103.2	107.4	<100	Explore potential mitigation
SIERA-SP-T-103	32214 RIO OSO 115 31986 W.SCRMNO 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_31_Rio Oso - Woodland 115 kV Line No. 1	C3	N-1-1	100.8	105.0	<100	Explore potential mitigation
SIERA-SP-T-104	31962 WDLND_BM 115 31970 WOODLD 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_32_Rio Oso - West Sacramento 115 kV Line	C3	N-1-1	105.4	111.4	<100	Explore potential mitigation
SIERA-SP-T-105	31962 WDLND_BM 115 31990 DAVIS 115 1	B2_8_Rio Oso - Brighton 230 kV Line & B2_32_Rio Oso - West Sacramento 115 kV Line	C3	N-1-1	122.5	129.1	<100	Explore potential mitigation
SIERA-SP-T-106	32018 GOLDHILL 115 30337 GOLDHILL 230 2	B3_7_Goldhill #1 230/115 kV Transformer & B2_36_Drum - Higgins 115 kV Line	C3	N-1-1	107.9	<100	<100	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-107	32214 RIO OSO 115 30330 RIO OSO 230 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-108	32214 RIO OSO 115 30330 RIO OSO 230 2	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-109	32214 RIO OSO 115 32225 BRNSWKTP 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-110	32214 RIO OSO 115 32244 BRNSWCKP 115 2	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-111	32218 DRUM 115 32220 DTCH FL1 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	160.7	160.6	Explore potential mitigation
SIERA-SP-T-112	32218 DRUM 115 32222 DTCH FL2 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-113	32218 DRUM 115 32244 BRNSWCKP 115 2	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-114	32220 DTCH FL1 115 32224 CHCGO PK 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	102.3	102.3	Explore potential mitigation
SIERA-SP-T-115	32224 CHCGO PK 115 32232 HIGGINS 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	125.5	125.5	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-116	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-117	32228 PLACER 115 32238 BELL PGE 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-118	32229 HORSHE1 115 32233 NEWCSTL1 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	<100	100.4	101.7	Explore potential mitigation
SIERA-SP-T-119	32232 HIGGINS 115 32238 BELL PGE 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	diverge	101.2	101.1	Explore potential mitigation
SIERA-SP-T-120	32233 NEWCSTL1 115 32236 FLINT1 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	<100	98.3	99.6	Explore potential mitigation
SIERA-SP-T-121	32236 FLINT1 115 32228 PLACER 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	<100	98.3	99.5	Explore potential mitigation
SIERA-SP-T-122	32412 ATLANTIC 115 32228 PLACER 115 1	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	<100	133.4	136.0	Explore potential mitigation
SIERA-SP-T-123	32018 GOLDHILL 115 30337 GOLDHILL 230 1	B3_8_Goldhill #2 230/115 kV Transformer & B2_36_Drum - Higgins 115 kV Line	C3	N-1-1	107.7	<100	<100	Short term: Action Plan
SIERA-SP-T-124	32214 RIO OSO 115 30330 RIO OSO 230 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-125	32214 RIO OSO 115 30330 RIO OSO 230 2	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-126	32214 RIO OSO 115 32225 BRNSWKTP 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-127	32214 RIO OSO 115 32244 BRNSWCKP 115 2	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-128	32218 DRUM 115 32220 DTCH FL1 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	160.7	160.6	Explore potential mitigation
SIERA-SP-T-129	32218 DRUM 115 32222 DTCH FL2 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-130	32218 DRUM 115 32244 BRNSWCKP 115 2	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-131	32220 DTCH FL1 115 32224 CHCGO PK 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	102.3	102.3	Explore potential mitigation
SIERA-SP-T-132	32224 CHCGO PK 115 32232 HIGGINS 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	125.5	125.5	Explore potential mitigation
SIERA-SP-T-133	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-134	32228 PLACER 115 32238 BELL PGE 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	<100	<100	Short term: Action Plan
SIERA-SP-T-135	32229 HORSHE1 115 32233 NEWCSTL1 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	<100	100.4	101.7	Explore potential mitigation
SIERA-SP-T-136	32232 HIGGINS 115 32238 BELL PGE 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	diverge	101.2	101.1	Explore potential mitigation
SIERA-SP-T-137	32233 NEWCSTL1 115 32236 FLINT1 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	<100	98.3	99.6	Explore potential mitigation
SIERA-SP-T-138	32236 FLINT1 115 32228 PLACER 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	<100	98.3	99.5	Explore potential mitigation
SIERA-SP-T-139	32412 ATLANTIC 115 32228 PLACER 115 1	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	<100	133.4	136.0	Explore potential mitigation
SIERA-SP-T-140	32218 DRUM 115 32220 DTCH FL1 115 1	C5_11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 k	C5	DCTL	109.8	108.3	108.7	Short Term: Reduce Drum Gen, Long Term: New Atlantic-Placer 115 kV Line???
SIERA-SP-T-141	31962 WDLND_BM 115 31970 WOODLD 115 1	C5_15_Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	C5	DCTL	103.5	105.7	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SIERA-SP-T-142	31984 BRIGHTN 115 31993 BRKRJCT 115 1	C5_15_Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	C5	DCTL	108.9	109.7	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-143	31993 BRKRJCT 115 32001 UCD_TP2 115 1	C5_15_Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	C5	DCTL	107.6	108.3	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SIERA-SP-T-144	32001 UCD_TP2 115 31990 DAVIS 115 1	C5_15_Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	C5	DCTL	107.1	107.8	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SIERA-SP-T-145	32218 DRUM 115 32220 DTCH FL1 115 1	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL	127.9	<100	<100	Short Term: Sierra Action Plan, Long Term: New Atlantic - Placer 115 kV Line
SIERA-SP-T-146	32224 CHCGO PK 115 32232 HIGGINS 115 1	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL	106.4	<100	<100	Short Term: Sierra Action Plan, Long Term: New Atlantic - Placer 115 kV Line
SIERA-SP-T-147	32214 RIO OSO 115 30330 RIO OSO 230 1	C5_2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Li	C5	DCTL	101.0	<100	<100	Short Term: Sierra Action Plan, Long Term: New Atlantic - Placer 115 kV Line
SIERA-SP-T-148	32214 RIO OSO 115 30330 RIO OSO 230 2	C5_2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Li	C5	DCTL	100.2	<100	<100	Short Term: Sierra Action Plan, Long Term: New Atlantic - Placer 115 kV Line
SIERA-SP-T-149	31962 WDLND_BM 115 31990 DAVIS 115 1	C5_3_Rio Oso-Brighton 230 kV Line & Rio Oso-Lockeford 230 kV Li	C5	DCTL	101.0	106.5	<100	Short Term: Sacramento Action Plan, Long Term: Vaca-Davis Voltage Conversion
SIERA-SP-T-150	32200 PEASE 115 32288 E.MRY J1 115 1	C5_5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 k	C5	DCTL	102.8	<100	<100	Short Term: Sierra Action Plan, Long term: South of Palermo 115 kV Reinforcement Project
SIERA-SP-T-151	32208 GLEAF TP 115 32214 RIO OSO 115 1	C5_5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 k	C5	DCTL	104.6	<100	<100	Short Term: Sierra Action Plan, Long term: South of Palermo 115 kV Reinforcement Project

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-T-152	32290 OLIVH J1 115 32288 E.MRY J1 115 1	C5_5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 k	C5	DCTL	101.6	<100	<100	Short Term: Sierra Action Plan, Long term: South of Palermo 115 kV Reinforcement Project

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Study Area: **PG&E Central Valley Sierra - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SIERA-SpP-T-1	32394 PLACER 60.0 32228 PLACER 115 1	B2_19_Placer - Gold Hill 115 kV Line No. 1	B	L-1		125.7		Add Placer 2nd XFMR
SIERA-SpP-T-2	32218 DRUM 115 32244 BRNSWCKP 115 2	B2_38_Higgins - Bell 115 kV Line	B	L-1		108.3		Add third Hill 230/115 kV transformer of pine Hill Sub
SIERA-SpP-T-3	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	B2_38_Higgins - Bell 115 kV Line	B	L-1		102.2		Add third Hill 230/115 kV transformer of pine Hill Sub
SIERA-SpP-T-4	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	B2_5_Colgate - Rio Oso 230 kV Line	B	L-1		105.3		Explore potential mitigation
SIERA-SpP-T-5	32394 PLACER 60.0 32228 PLACER 115 1	B2_72_New Atlantic - Placer 115 kV Line	B	L-1		125.7		Add Placer 2nd XFMR
SIERA-SpP-T-6	32218 DRUM 115 32244 BRNSWCKP 115 2	B2_38_Higgins - Bell 115 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	L-1/G-1		101.9		Explore potential mitigation
SIERA-SpP-T-7	32394 PLACER 60.0 32228 PLACER 115 1	B2_19_Placer - Gold Hill 115 kV Line No. 1 & B1_40_RIO OSO 230.00 Unit ID 1	B	L-1/G-1		146.4		Explore potential mitigation
SIERA-SpP-T-8	32218 DRUM 115 32244 BRNSWCKP 115 2	C1-13_BUS FAULT AT 32232 HIGGINS 115.00	C1	Bus		117.8		Add third Hill 230/115 kV transformer of pine Hill Sub
SIERA-SpP-T-9	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	C1-13_BUS FAULT AT 32232 HIGGINS 115.00	C1	Bus		111.9		Add third Hill 230/115 kV transformer of pine Hill Sub
SIERA-SpP-T-10	32218 DRUM 115 32244 BRNSWCKP 115 2	C1-14_BUS FAULT AT 32238 BELL PGE 115.00	C1	Bus		107.6		Explore potential mitigation
SIERA-SpP-T-11	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	C1-4_BUS FAULT AT 30337 GOLDHILL 230.00 Bus 2	C1	Bus		101.5		Add Placer 2nd XFMR
SIERA-SpP-T-12	32394 PLACER 60.0 32228 PLACER 115 1	C1-6_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 1E	C1	Bus		134.2		Add Placer 2nd XFMR
SIERA-SpP-T-13	32394 PLACER 60.0 32228 PLACER 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		134.3		Add Placer 2nd XFMR
SIERA-SpP-T-14	32250 ELDORAD 115 32481 APLHTAP2 115 2	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		132.1		Add Placer 2nd XFMR

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Study Area: **PG&E Central Valley Sierra - Spring Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SIERA-SpP-T-15	32250 ELDORAD 115 32482 APLHTAP1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		119.0		Add Placer 2nd XFMR
SIERA-SpP-T-16	32394 PLACER 60.0 32228 PLACER 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		125.8		Add Placer 2nd XFMR
SIERA-SpP-T-17	32481 APLHTAP2 115 32257 PLCRVLT2 115 2	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		132.2		Add Placer 2nd XFMR
SIERA-SpP-T-18	32482 APLHTAP1 115 32255 PLCRVLT1 115 1	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		143.5		Add Placer 2nd XFMR
SIERA-SpP-T-19	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C1-19_BUS FAULT AT 32320 MRYSVLE 60.00	C1	Bus		101.0		Sierra Action Plan
SIERA-SpP-T-20	32218 DRUM 115 32220 DTCH FL1 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB		106.6		Add third Hill 230/115 kV transformer of pine Hill Sub
SIERA-SpP-T-21	32224 CHCGO PK 115 32232 HIGGINS 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB		108.2		Add third Hill 230/115 kV transformer of pine Hill Sub
SIERA-SpP-T-22	32394 PLACER 60.0 32228 PLACER 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB		109.0		Add Placer 2nd XFMR
SIERA-SpP-T-23	32394 PLACER 60.0 32228 PLACER 115 1	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB		135.9		Add Placer 2nd XFMR
SIERA-SpP-T-24	31962 WDLND_BM 115 31990 DAVIS 115 1	B2_32_Rio Oso - West Sacramento 115 kV Line & B2_8_Rio Oso - Brighton 230 kV Line	C3	N-1-1		111.4		Explore potential mitigation
SIERA-SpP-T-25	32214 RIO OSO 115 32225 BRNSWKTP 115 1	B2_34_Drum - Rio Oso 115 kV No. 2 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1		174.5		Explore potential mitigation
SIERA-SpP-T-26	32214 RIO OSO 115 32244 BRNSWCKP 115 2	B2_33_Drum - Rio Oso 115 kV No. 1 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1		144.8		Explore potential mitigation
SIERA-SpP-T-27	32218 DRUM 115 32220 DTCH FL1 115 1	B2_33_Drum - Rio Oso 115 kV No. 1 Line & B2_34_Drum - Rio Oso 115 kV No. 2 Line	C3	N-1-1		113.2		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SIERA-SpP-T-28	32218 DRUM 115 32222 DTCH FL2 115 1	B2_34_Drum - Rio Oso 115 kV No. 2 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1		155.2		Explore potential mitigation
SIERA-SpP-T-29	32218 DRUM 115 32244 BRNSWCKP 115 2	B2_33_Drum - Rio Oso 115 kV No. 1 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1		175.4		Explore potential mitigation
SIERA-SpP-T-30	32224 CHCGO PK 115 32232 HIGGINS 115 1	B2_33_Drum - Rio Oso 115 kV No. 1 Line & B2_34_Drum - Rio Oso 115 kV No. 2 Line	C3	N-1-1		112.8		Explore potential mitigation
SIERA-SpP-T-31	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	B2_34_Drum - Rio Oso 115 kV No. 2 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1		188.9		Explore potential mitigation
SIERA-SpP-T-32	32314 SMRTSVLE 60.0 32316 YUBAGOLD 60.0 1	B2_53_Smartville - Nicolaus #2 60 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1		117.1		Explore potential mitigation
SIERA-SpP-T-33	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	B2_51_Smartville - Marysville 60 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1		121.6		Explore potential mitigation
SIERA-SpP-T-34	32316 YUBAGOLD 60.0 32318 BRWNS VY 60.0 1	B2_53_Smartville - Nicolaus #2 60 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1		114.8		Explore potential mitigation
SIERA-SpP-T-35	32318 BRWNS VY 60.0 32320 MRYSVLE 60.0 1	B2_53_Smartville - Nicolaus #2 60 kV Line & B2_5_Colgate - Rio Oso 230 kV Line	C3	N-1-1		111.1		Explore potential mitigation
SIERA-SpP-T-36	32394 PLACER 60.0 32228 PLACER 115 1	B2_20_Placer - Gold Hill 115 kV Line No. 2 & B2_72_New Atlantic - Placer 115 kV Line	C3	N-1-1		150.4		Explore potential mitigation
SIERA-SpP-T-37	32218 DRUM 115 32220 DTCH FL1 115 1	C5_11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 k	C5	DCTL		100.8		Sierra Action Plan
SIERA-SpP-T-38	32224 CHCGO PK 115 32232 HIGGINS 115 1	C5_11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 k	C5	DCTL		104.8		Sierra Action Plan

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Study Area: **PG&E Central Valley Sierra - Spring Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SIERA-SpP-T-39	32394 PLACER 60.0 32228 PLACER 115 1	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL		131.8		Add Placer 2nd XFMR
SIERA-SpP-T-40	32224 CHCGO PK 115 32232 HIGGINS 115 1	C5_2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Li	C5	DCTL		101.2		Sierra Action Plan
SIERA-SpP-T-41	32314 SMRTSVLE 60.0 32349 BEALE2J1 60.0 1	C5_5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 k	C5	DCTL		118.2		Sierra Action Plan
SIERA-SpP-T-42	32394 PLACER 60.0 32228 PLACER 115 1	C5_8_Middle Fork-Gold Hill 230 kV Line & Placer-Gold Hill No. 1	C5	DCTL		129.6		Add Placer 2nd XFMR

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Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SIERA-NP-T-1	32394 PLACER 60.0 32228 PLACER 115 1	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<100	101.1		Explore potential mitigation
SIERA-NP-T-2	32214 RIO OSO 115 32225 BRNSWKTP 115 1	B2_34_Drum - Rio Oso 115 kV No. 2 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1	<100	117.5		Explore potential mitigation
SIERA-NP-T-3	32214 RIO OSO 115 32244 BRNSWCKP 115 2	B2_33_Drum - Rio Oso 115 kV No. 1 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1	<100	98.0		Explore potential mitigation
SIERA-NP-T-4	32218 DRUM 115 32222 DTCH FL2 115 1	B2_34_Drum - Rio Oso 115 kV No. 2 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1	<100	97.4		Explore potential mitigation
SIERA-NP-T-5	32218 DRUM 115 32244 BRNSWCKP 115 2	B2_33_Drum - Rio Oso 115 kV No. 1 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1	<100	112.7		Explore potential mitigation
SIERA-NP-T-6	32225 BRNSWKTP 115 32222 DTCH FL2 115 1	B2_34_Drum - Rio Oso 115 kV No. 2 Line & B2_38_Higgins - Bell 115 kV Line	C3	N-1-1	<100	124.7		Explore potential mitigation

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Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-1	BARRY 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.248	Explore potential mitigation
SIERA-SP-VD-2	OXBOW 60kV	B1_21_OXBOW F 9.11 Unit ID 1	B	N-1	6.74	6.674	6.694	Explore potential mitigation
SIERA-SP-VD-3	TUDOR 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.189	Explore potential mitigation
SIERA-SP-VD-4	PLUMAS 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.297	Explore potential mitigation
SIERA-SP-VD-5	CATLETT 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.143	Explore potential mitigation
SIERA-SP-VD-6	ROLLINS 60kV	B1_18_ROLLINSF 6.60 Unit ID 1	B	N-1	5.388	5.258	5.281	Explore potential mitigation
SIERA-SP-VD-7	WHTLND1 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.426	Explore potential mitigation
SIERA-SP-VD-8	CATLETJT 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.075	Explore potential mitigation
SIERA-SP-VD-9	E.MRY J2 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line	B	N-1	<5.0	<5.0	7.784	Explore potential mitigation
SIERA-SP-VD-10	E.MRYSVE 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line	B	N-1	<5.0	<5.0	7.787	Explore potential mitigation
SIERA-SP-VD-11	E.NICOLS 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line	B	N-1	<5.0	<5.0	12.342	Explore potential mitigation
SIERA-SP-VD-12	ENVRO_HY 60kV	B1_21_OXBOW F 9.11 Unit ID 1	B	N-1	6.559	6.492	6.512	Explore potential mitigation
SIERA-SP-VD-13	FORST HL 60kV	B1_21_OXBOW F 9.11 Unit ID 1	B	N-1	5.833	5.768	5.788	Explore potential mitigation
SIERA-SP-VD-14	GRSS VLY 60kV	B2_49_Colgate-Grass Valley 60 kV Line	B	N-1	6.773	7.345	7.793	Explore potential mitigation
SIERA-SP-VD-15	ROLLNSTP 60kV	B1_18_ROLLINSF 6.60 Unit ID 1	B	N-1	5.152	5.023	5.046	Explore potential mitigation
SIERA-SP-VD-16	SPI-LINC 115kV	B1_27_SPILINCF 12.50 Unit ID 1	B	N-1	6.786	<5.0	<5.0	Short term: Action Plan

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Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-17	WHEATLND 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer	B	N-1	<5.0	<5.0	5.427	Explore potential mitigation
SIERA-SP-VD-18	WHTLNDAL 60kV	B2_60_Smartville - Nicolaus #1 60 kV Line	B	N-1	<5.0	<5.0	6.504	Explore potential mitigation
SIERA-SP-VD-19	BARRY 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	6.006	Explore potential mitigation
SIERA-SP-VD-20	BOGUE 115kV	B2_27_Bogue - Rio Oso 115 kV Line & B1_2_FREQ 13.80 Unit ID 1	B	N-1/G-1	6.115	6.486	7.124	Explore potential mitigation
SIERA-SP-VD-21	TUDOR 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	5.938	Explore potential mitigation
SIERA-SP-VD-22	BANGOR 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.644	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-23	GLEAF2 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.94	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-24	HARTER 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	7.364	<5.0	5.06	Explore potential mitigation
SIERA-SP-VD-25	PLUMAS 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	6.063	Explore potential mitigation
SIERA-SP-VD-26	BEALE_1 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.705	<5.0	<5.0	Explore potential mitigation
SIERA-SP-VD-27	BEALE_2 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.733	<5.0	<5.0	Explore potential mitigation
SIERA-SP-VD-28	CATLETT 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	5.885	Explore potential mitigation
SIERA-SP-VD-29	COLGATE 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.531	<5.0	<5.0	Short term: Action Plan

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ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-30	COLGTE1 230kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.156	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-31	COLGTE2 230kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.141	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-32	DOBBINS 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.573	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-33	ELDORAD 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRADO1 21.60 Unit ID 1	B	N-1/G-1	5.156	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-34	MRYSVLE 60kV	B3_11_Pease #2 115/60 kV Transformer & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.435	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-35	PEAS RG 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	4.254	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-36	PEASETP 60kV	B3_11_Pease #2 115/60 kV Transformer & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.292	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-37	ROLLINS 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	N-1/G-1	<5.0	<5.0	5.063	Explore potential mitigation
SIERA-SP-VD-38	WHTLND1 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	6.213	Explore potential mitigation
SIERA-SP-VD-39	ALLEGHNY 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.673	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-40	ALMENDRA 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.671	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-41	APLHTAP1 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRADO1 21.60 Unit ID 1	B	N-1/G-1	5.055	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-42	APLHTAP2 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRADO1 21.60 Unit ID 1	B	N-1/G-1	5.352	<5.0	<5.0	Short term: Action Plan

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ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-43	APPLE HL 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.061	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-44	BEALE1J1 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.705	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-45	BEALE1J2 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.731	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-46	BEALE2J1 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.731	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-47	BEALE2J2 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.33	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-48	BRWNS VY 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.622	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-49	CATLETJT 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	5.807	Explore potential mitigation
SIERA-SP-VD-50	CATLETJT 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.873	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-51	CHLLNGEA 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.573	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-52	CLMBA HL 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.58	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-53	COLGATEA 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.573	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-54	E.MRY J2 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	6.335	8.231	Explore potential mitigation
SIERA-SP-VD-55	E.MRYSVE 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	6.337	8.234	Explore potential mitigation
SIERA-SP-VD-56	E.NICOLS 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	10.341	12.971	Explore potential mitigation

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ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-57	FREC TAP 115kV	B2_27_Bogue - Rio Oso 115 kV Line & B1_2_FREC 13.80 Unit ID 1	B	N-1/G-1	6.114	6.485	7.124	Explore potential mitigation
SIERA-SP-VD-58	GLEAF2TP 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.94	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-59	GRSS VLY 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	N-1/G-1	12.852	13.439	13.97	Explore potential mitigation
SIERA-SP-VD-60	MIZOU_T1 115kV	B2_23_Missouri Flat - Gold Hill 115 kV No. 1 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.207	<5.0	5.608	Explore potential mitigation
SIERA-SP-VD-61	MIZOU_T2 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.496	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-62	MRYSVLE 60kV	B3_11_Pease #2 115/60 kV Transformer & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.435	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-63	NARRWS 1 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.627	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-64	NARRWS 2 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.576	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-65	NRRWS1TP 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.586	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-66	NRRWS2TP 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.586	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-67	OLIVH J3 115kV	B2_27_Bogue - Rio Oso 115 kV Line & B1_2_FREC 13.80 Unit ID 1	B	N-1/G-1	<5.0	5.313	5.884	Explore potential mitigation
SIERA-SP-VD-68	PIKE CTY 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.635	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-69	PLCRVLB2 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.482	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-70	PLCRVLB3 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.482	<5.0	<5.0	Short term: Action Plan

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ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-71	PLCRVLT1 115kV	B2_23_Missouri Flat - Gold Hill 115 kV No. 1 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.062	<5.0	5.437	Explore potential mitigation
SIERA-SP-VD-72	PLCRVLT2 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.48	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-73	ROLLNSTP 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	N-1/G-1	<5.0	<5.0	5.063	Explore potential mitigation
SIERA-SP-VD-74	SMRTSVLE 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.585	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-75	SMRTVLE1 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.585	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-76	SMRTVLE1 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.585	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-77	SPICAMIN 115kV	B2_22_Missouri Flat - Gold Hill 115 kV No. 2 Line & B1_37_ELDRA01 21.60 Unit ID 1	B	N-1/G-1	5.06	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-78	WEST JCT 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.035	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-79	WHEATLND 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	6.213	Explore potential mitigation
SIERA-SP-VD-80	WHEATLND 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.873	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-81	WHTLNDAL 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.871	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-82	WHTLNDAL 60kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	<5.0	<5.0	5.801	Explore potential mitigation
SIERA-SP-VD-83	YBA CTYJ 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	N-1/G-1	5.671	<5.0	<5.0	Short term: Action Plan

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ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-84	YUBAGOLD 60kV	B2_4_Palermo-Colgate 230 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	N-1/G-1	5.619	<5.0	<5.0	Short term: Action Plan
SIERA-SP-VD-85	CPM 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	12.929	12.439	12.702	Explore potential mitigation
SIERA-SP-VD-86	CPM TAP 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	12.929	12.439	12.702	Explore potential mitigation
SIERA-SP-VD-87	ELDORAD 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	43	41.244	42.215	Explore potential mitigation
SIERA-SP-VD-88	ENCINAL 60kV	C1-21_BUS FAULT AT 32332 PEASE 60.00	C1	Bus	11.871	12.702	13.809	Explore potential mitigation
SIERA-SP-VD-89	SHPRING 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	56.863	56.54	57.718	Explore potential mitigation
SIERA-SP-VD-90	APLHTAP1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	38.429	36.263	37.131	Explore potential mitigation
SIERA-SP-VD-91	APLHTAP2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	49.377	48.265	49.311	Explore potential mitigation
SIERA-SP-VD-92	APPLE HL 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	38.492	36.319	37.193	Explore potential mitigation
SIERA-SP-VD-93	CLRKSVLT 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	14.046	13.684	13.979	Explore potential mitigation
SIERA-SP-VD-94	DIMOND_1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	26.59	23.491	24.056	Explore potential mitigation
SIERA-SP-VD-95	DIMOND_2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	54.694	54.146	55.27	Explore potential mitigation
SIERA-SP-VD-96	DMND SPR 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	54.714	54.168	55.291	Explore potential mitigation
SIERA-SP-VD-97	ENCL TAP 60kV	C1-21_BUS FAULT AT 32332 PEASE 60.00	C1	Bus	11.865	12.696	13.803	Explore potential mitigation
SIERA-SP-VD-98	LIVE OAK 60kV	C1-21_BUS FAULT AT 32332 PEASE 60.00	C1	Bus	11.261	12.055	13.128	Explore potential mitigation
SIERA-SP-VD-99	MIZOU_T1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	28.758	25.83	26.461	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-100	MIZOU_T2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	53.972	53.343	54.45	Explore potential mitigation
SIERA-SP-VD-101	PLCRVLB2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	53.208	52.495	53.579	Explore potential mitigation
SIERA-SP-VD-102	PLCRVLB3 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	53.22	52.508	53.591	Explore potential mitigation
SIERA-SP-VD-103	PLCRVLT1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	30.851	28.091	28.788	Explore potential mitigation
SIERA-SP-VD-104	PLCRVLT2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	53.188	52.473	53.558	Explore potential mitigation
SIERA-SP-VD-105	SHPRING1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	24.665	21.419	21.926	Explore potential mitigation
SIERA-SP-VD-106	SHPRING2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	56.836	56.509	57.688	Explore potential mitigation
SIERA-SP-VD-107	SPICAMIN 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	38.482	36.31	37.183	Explore potential mitigation
SIERA-SP-VD-108	CPM 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.103	64.224	63.793	Explore potential mitigation
SIERA-SP-VD-109	DRUM 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	19.069	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-110	FLINT 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	56.674	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-111	OXBOW 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.394	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-112	AUBURN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.323	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-113	FLINT1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	56.95	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-114	FLINT2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	56.666	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-115	HALSEY 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.193	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-116	LINCLN 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	11.684	<10.0	Explore potential mitigation
SIERA-SP-VD-117	PENRYN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	59.59	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-118	PLACER 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.176	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-119	SUMMIT 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	13.481	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-120	TAYLOR 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	19.108	14.805	Explore potential mitigation
SIERA-SP-VD-121	ATLANTC 230kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	16.923	13.009	Explore potential mitigation
SIERA-SP-VD-122	ATLANTI 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	19.023	14.73	Explore potential mitigation
SIERA-SP-VD-123	CPM TAP 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.103	64.224	63.793	Explore potential mitigation
SIERA-SP-VD-124	DEL MAR 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	19.643	15.246	Explore potential mitigation
SIERA-SP-VD-125	ELDORAD 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	88.143	64.856	64.636	Explore potential mitigation
SIERA-SP-VD-126	HIGGINS 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	48.636	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-127	HORSHE1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	60.28	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-128	HORSHE2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.157	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-129	RIO OSO 230kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	10.683	<10.0	Explore potential mitigation
SIERA-SP-VD-130	ROCKLIN 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	19.143	14.836	Explore potential mitigation
SIERA-SP-VD-131	ROLLINS 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.169	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-132	SHPRING 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	85.98	65.653	65.319	Explore potential mitigation
SIERA-SP-VD-133	APLHTAP1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.895	64.971	64.718	Explore potential mitigation
SIERA-SP-VD-134	APLHTAP2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.268	65.31	65.061	Explore potential mitigation
SIERA-SP-VD-135	APPLE HL 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.868	65.028	64.774	Explore potential mitigation
SIERA-SP-VD-136	ATLANTIC 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	19.626	16.106	Explore potential mitigation
SIERA-SP-VD-137	BELL PGE 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	54.751	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-138	BONNIE N 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.095	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-139	BOWMN PH 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	12.845	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-140	BOWMN TP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	14.597	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-141	BRNSWALT 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	12.883	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-142	BRNSWCKP 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	13.488	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-143	BRNSWKTP 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	12.832	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-144	BRUNSWCK 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	13.609	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-145	CAPEHORN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.299	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-146	CHCGO PK 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	32.671	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-147	CISCO GR 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	13.92	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-148	CISCOTAP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	13.924	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-149	CLRKSULE 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	85.584	65.082	64.666	Explore potential mitigation
SIERA-SP-VD-150	CLRKSULT 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.193	64.276	63.855	Explore potential mitigation
SIERA-SP-VD-151	COLFAXJT 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.29	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-152	CPEHRNTP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.288	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-153	DIMOND_1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.262	64.633	64.293	Explore potential mitigation
SIERA-SP-VD-154	DIMOND_2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.347	65.694	65.404	Explore potential mitigation
SIERA-SP-VD-155	DMND SPR 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.342	65.705	65.414	Explore potential mitigation
SIERA-SP-VD-156	DRUM 1M 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	16.33	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-157	DRUM 2M 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	16.332	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-158	DTCH FL1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	25.906	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-159	DTCH FL2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	16.65	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-160	ENVRO_HY 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.431	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-161	FORST HL 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.576	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-162	GOLD HLL 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	85.305	60.595	60.922	Explore potential mitigation
SIERA-SP-VD-163	GOLDHILL 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	85.744	63.961	63.483	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-164	HAYPRESS 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	12.842	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-165	HORSESHE 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	60.281	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-166	LIMESTNE 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	85.304	61.55	61.886	Explore potential mitigation
SIERA-SP-VD-167	MIZOU_T1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.464	64.703	64.383	Explore potential mitigation
SIERA-SP-VD-168	MIZOU_T2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.474	65.634	65.353	Explore potential mitigation
SIERA-SP-VD-169	MTN_QJCT 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.356	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-170	MTN_QUAR 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.631	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-171	NEWCSTL1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.062	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-172	NEWCSTL2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	57.132	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-173	NEWCSTLE 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	58.086	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-174	PLCRVLB2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.585	65.583	65.311	Explore potential mitigation
SIERA-SP-VD-175	PLCRVLB3 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.582	65.589	65.317	Explore potential mitigation
SIERA-SP-VD-176	PLCRVLT1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.666	64.765	64.463	Explore potential mitigation
SIERA-SP-VD-177	PLCRVLT2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	86.591	65.573	65.301	Explore potential mitigation
SIERA-SP-VD-178	PLSNT GR 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	17.698	14.469	Explore potential mitigation
SIERA-SP-VD-179	ROLLNSTP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.215	<10.0	<10.0	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-VD-180	SHADYGLN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.289	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-181	SHPRING1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.088	64.565	64.209	Explore potential mitigation
SIERA-SP-VD-182	SHPRING2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	85.988	65.635	65.302	Explore potential mitigation
SIERA-SP-VD-183	SIERRAPI 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	19.644	15.246	Explore potential mitigation
SIERA-SP-VD-184	SPAULDNG 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	14.551	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-185	SPI JCT 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	11.824	<10.0	Explore potential mitigation
SIERA-SP-VD-186	SPICAMIN 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	87.872	65.019	64.765	Explore potential mitigation
SIERA-SP-VD-187	TAMARACK 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	13.79	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-188	ULTRA JT 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	16.633	13.547	Explore potential mitigation
SIERA-SP-VD-189	ULTR-RCK 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	<10.0	16.581	13.512	Explore potential mitigation
SIERA-SP-VD-190	WEMR SWS 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	17.392	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-191	PLACER 115kV	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL	12.811	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-192	HIGGINS 115kV	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL	10.242	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-193	BELL PGE 115kV	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL	12.21	<10.0	<10.0	Short term: Action Plan
SIERA-SP-VD-194	E.NICOLS 115kV	C5_12_Rio Oso-Nicolaus 115 kV Line & Bogue-Rio Oso 115 kV Line	C5	DCTL	<10.0	10.075	12.714	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Spring Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
SIERA-SpP-VD-1	COLGATE 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.11		Explore potential mitigation
SIERA-SpP-VD-2	DOBBINS 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.141		Explore potential mitigation
SIERA-SpP-VD-3	ALLEGHNY 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.229		Explore potential mitigation
SIERA-SpP-VD-4	CHLLNGEA 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.141		Explore potential mitigation
SIERA-SpP-VD-5	CLMBA HL 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.151		Explore potential mitigation
SIERA-SpP-VD-6	COLGATEA 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.141		Explore potential mitigation
SIERA-SpP-VD-7	E.NICOLS 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line	B	N-1		5.479		Explore potential mitigation
SIERA-SpP-VD-8	PIKE CTY 60kV	B3_1_Colgate #3 230/60 kV Transformer	B	N-1		7.198		Explore potential mitigation
SIERA-SpP-VD-9	BANGOR & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		5.442		Explore potential mitigation
SIERA-SpP-VD-10	BEALE_1 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_11_NARROWS1 11.00 Unit ID 1	B	L-1/G-1		5.537		Explore potential mitigation
SIERA-SpP-VD-11	BEALE_1 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.132		Explore potential mitigation
SIERA-SpP-VD-12	BEALE_2 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		8.098		Explore potential mitigation
SIERA-SpP-VD-13	COLGATE & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.384		Explore potential mitigation
SIERA-SpP-VD-14	DOBBINS & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.442		Explore potential mitigation
SIERA-SpP-VD-15	WHTLND1 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		5.103		Explore potential mitigation
SIERA-SpP-VD-16	ALLEGHNY & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.604		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Spring Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
SIERA-SpP-VD-17	BEALE1J1 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.131		Explore potential mitigation
SIERA-SpP-VD-18	BEALE2J2 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_11_NARROWS1 11.00 Unit ID 1	B	L-1/G-1		5.509		Explore potential mitigation
SIERA-SpP-VD-19	BRWNS VY & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		6.257		Explore potential mitigation
SIERA-SpP-VD-20	CHLLNGEA & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.442		Explore potential mitigation
SIERA-SpP-VD-21	CLMBA HL & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.461		Explore potential mitigation
SIERA-SpP-VD-22	CMP FRWT & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.081		Explore potential mitigation
SIERA-SpP-VD-23	COLGATEA & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.442		Explore potential mitigation
SIERA-SpP-VD-24	GRSS VLY & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.615		Explore potential mitigation
SIERA-SpP-VD-25	NARRWS 1 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.024		Explore potential mitigation
SIERA-SpP-VD-26	NARRWS 2 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.123		Explore potential mitigation
SIERA-SpP-VD-27	NRRWS1TP & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_11_NARROWS1 11.00 Unit ID 1	B	L-1/G-1		5.575		Explore potential mitigation
SIERA-SpP-VD-28	NRRWS2TP & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_11_NARROWS1 11.00 Unit ID 1	B	L-1/G-1		5.458		Explore potential mitigation
SIERA-SpP-VD-29	PIKE CTY & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		12.546		Explore potential mitigation
SIERA-SpP-VD-30	SMRTSVLE & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.074		Explore potential mitigation
SIERA-SpP-VD-31	SMRTVLE1 & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.074		Explore potential mitigation
SIERA-SpP-VD-32	SMRTVLE & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.074		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Spring Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
SIERA-SpP-VD-33	WEST JCT & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		10.08		Explore potential mitigation
SIERA-SpP-VD-34	WHEATLND & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		5.103		Explore potential mitigation
SIERA-SpP-VD-35	YUBAGOLD & 60kV	B3_1_Colgate #3 230/60 kV Transformer & B1_12_NARROWS2 13.80 Unit ID 1	B	L-1/G-1		6.899		Explore potential mitigation
SIERA-SpP-VD-36	SHPRING 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus		10.904		Explore potential mitigation
SIERA-SpP-VD-37	BEALE_1 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.132		Explore potential mitigation
SIERA-SpP-VD-38	COLGATE 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.384		Explore potential mitigation
SIERA-SpP-VD-39	DOBBINS 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.442		Explore potential mitigation
SIERA-SpP-VD-40	ALLEGHNY 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.604		Explore potential mitigation
SIERA-SpP-VD-41	BEALE1J1 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.131		Explore potential mitigation
SIERA-SpP-VD-42	CHLLNGEA 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.442		Explore potential mitigation
SIERA-SpP-VD-43	CLMBA HL 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.461		Explore potential mitigation
SIERA-SpP-VD-44	CMP FRWT 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.081		Explore potential mitigation
SIERA-SpP-VD-45	COLGATEA 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.442		Explore potential mitigation
SIERA-SpP-VD-46	E.NICOLS 115kV	B2_15_Palermo-Nicolaus 115 kV Line & B2_29_East Nicolaus - Rio Oso 115 kV Line	C3	N-1-1		18.135		Explore potential mitigation
SIERA-SpP-VD-47	GRSS VLY 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.615		Explore potential mitigation
SIERA-SpP-VD-48	NARRWS 1 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.024		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Spring Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					N/A	2019 Spring Off-Peak	N/A	
SIERA-SpP-VD-49	NARRWS 2 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.123		Explore potential mitigation
SIERA-SpP-VD-50	NRRWS1TP 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.12		Explore potential mitigation
SIERA-SpP-VD-51	NRRWS2TP 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.1		Explore potential mitigation
SIERA-SpP-VD-52	PIKE CTY 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		12.546		Explore potential mitigation
SIERA-SpP-VD-53	SMRTSVLE 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.074		Explore potential mitigation
SIERA-SpP-VD-54	WEST JCT 60kV	B1_12_NARROWS2 13.80 Unit ID 1 & B3_1_Colgate #3 230/60 kV Transformer	C3	N-1-1		10.08		Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
Sierra-NP-VD-1	PEASE 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.101			Explore potential mitigation
Sierra-NP-VD-2	GLEAF2 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.107			Explore potential mitigation
Sierra-NP-VD-3	HARTER 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.126			Explore potential mitigation
Sierra-NP-VD-4	ENCINAL 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	11.53			Explore potential mitigation
Sierra-NP-VD-5	MRYSVLE 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.165			Explore potential mitigation
Sierra-NP-VD-6	PEASETP 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.104			Explore potential mitigation
Sierra-NP-VD-7	ALMENDRA 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.105			Explore potential mitigation
Sierra-NP-VD-8	ENCL TAP 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	11.527			Explore potential mitigation
Sierra-NP-VD-9	GLEAF2TP 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.106			Explore potential mitigation
Sierra-NP-VD-10	GRSS VLY 60kV	B2_49_Colgate-Grass Valley 60 kV Line	B	N-1		5.027		Explore potential mitigation
Sierra-NP-VD-11	LIVE OAK 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	10.981			Explore potential mitigation
Sierra-NP-VD-12	MRYSVLLE 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.165			Explore potential mitigation
Sierra-NP-VD-13	YBA CTYJ 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.105			Explore potential mitigation
Sierra-NP-VD-14	YUBACITY 60kV	B3_11_Pease #2 115/60 kV Transformer	B	N-1	13.124			Explore potential mitigation
Sierra-NP-VD-15	SPAULDNG & 60kV	B2_65_Drum - Spaulding 60 kV Line & B1_16_SPAULDG 9.11 Unit ID 3	B	L-1/G-1	-5.586	-5.277		Explore potential mitigation
Sierra-NP-VD-16	PEASE 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.303			Explore potential mitigation

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
Sierra-NP-VD-17	GLEAF2 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.309			Explore potential mitigation
Sierra-NP-VD-18	HARTER 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.328			Explore potential mitigation
Sierra-NP-VD-19	ENCINAL 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	11.729			Explore potential mitigation
Sierra-NP-VD-20	MRYSVLE 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.368			Explore potential mitigation
Sierra-NP-VD-21	PEAS RG 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	17.251			Explore potential mitigation
Sierra-NP-VD-22	PEASETP 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.306			Explore potential mitigation
Sierra-NP-VD-23	ALMENDRA 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.307			Explore potential mitigation
Sierra-NP-VD-24	ENCL TAP 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	11.726			Explore potential mitigation
Sierra-NP-VD-25	GLEAF2TP 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.308			Explore potential mitigation
Sierra-NP-VD-26	LIVE OAK 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	11.178			Explore potential mitigation
Sierra-NP-VD-27	MRYSVLE 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.368			Explore potential mitigation
Sierra-NP-VD-28	YBA CTYJ 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.307			Explore potential mitigation
Sierra-NP-VD-29	YUBACITY 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	13.326			Explore potential mitigation
Sierra-NP-VD-30	PEASE 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.342	11.037		Explore potential mitigation
Sierra-NP-VD-31	GLEAF2 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.352	11.042		Explore potential mitigation
Sierra-NP-VD-32	HARTER 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.385	11.033		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
Sierra-NP-VD-33	ENCINAL 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	18.234			Explore potential mitigation
Sierra-NP-VD-34	MRYSVLE 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.455	11.046		Explore potential mitigation
Sierra-NP-VD-35	PEAS RG 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	22.411	11.973		Explore potential mitigation
Sierra-NP-VD-36	PEASETP 60kV	B2_26_Pease - Rio Oso 115 kV Line & B2_25_Palermo - Pease 115 kV Line	C3	N-1-1	20.034	11.523		Explore potential mitigation
Sierra-NP-VD-37	ALMENDRA 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.349	11.041		Explore potential mitigation
Sierra-NP-VD-38	ENCL TAP 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	18.228			Explore potential mitigation
Sierra-NP-VD-39	GLEAF2TP 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.351	11.041		Explore potential mitigation
Sierra-NP-VD-40	LIVE OAK 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	17.463			Explore potential mitigation
Sierra-NP-VD-41	MRYSVLE 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.455	11.046		Explore potential mitigation
Sierra-NP-VD-42	YBA CTYJ 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.349	11.041		Explore potential mitigation
Sierra-NP-VD-43	YUBACITY 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	20.383	11.034		Explore potential mitigation
Sierra-NP-VD-44	PEASE 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.616	11.492		Explore potential mitigation
Sierra-NP-VD-45	PEASE 115kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	25.67	16.509		Explore potential mitigation
Sierra-NP-VD-46	GLEAF2 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.626	11.498		Explore potential mitigation
Sierra-NP-VD-47	HARTER 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.659	11.488		Explore potential mitigation
Sierra-NP-VD-48	ENCINAL 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	18.462	10.286		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SIERA-NP-VD-1	MRYSVLE 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.727	11.501		Explore potential mitigation
SIERA-NP-VD-2	PEAS RG 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	24.059	13.281		Explore potential mitigation
SIERA-NP-VD-3	PEASETP 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.622	11.493		Explore potential mitigation
SIERA-NP-VD-4	ALMENDRA 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.624	11.496		Explore potential mitigation
SIERA-NP-VD-5	ENCL TAP 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	18.456	10.283		Explore potential mitigation
SIERA-NP-VD-6	GLEAF2TP 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.625	11.497		Explore potential mitigation
SIERA-NP-VD-7	LIVE OAK 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	17.675	9.844		Explore potential mitigation
SIERA-NP-VD-8	MRYSVLLE 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.727	11.501		Explore potential mitigation
SIERA-NP-VD-9	YBA CTYJ 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.623	11.496		Explore potential mitigation
SIERA-NP-VD-10	YUBACITY 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	20.657	11.49		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-1	OXBOW 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_21_OXBOW F 9.11 Unit ID 1	B	L-1/G-1	0.8983	0.8997	0.8938	Explore potential mitigation
SIERA-SP-V-2	PEAS RG 60kV	B2_44_Pease - Marysville - Harter 60 kV Line & B1_25_GRNLEAF2 13.80 Unit ID 1	B	L-1/G-1	0.8998	>0.95	>0.95	Explore potential mitigation
SIERA-SP-V-3	E.NICOLS 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line & B1_1_COLGATE1 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8995	Explore potential mitigation
SIERA-SP-V-4	E.NICOLS 115kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_1_COLGATE1 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8943	Explore potential mitigation
SIERA-SP-V-5	E.NICOLS 115kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_2_FRECC 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8983	Explore potential mitigation
SIERA-SP-V-6	E.NICOLS 115kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_25_GRNLEAF2 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8989	Explore potential mitigation
SIERA-SP-V-7	E.NICOLS 115kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_26_YUBA CTY 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8974	Explore potential mitigation
SIERA-SP-V-8	E.NICOLS 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line & B1_3_COLGATE2 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8996	Explore potential mitigation
SIERA-SP-V-9	E.NICOLS 115kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_3_COLGATE2 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8943	Explore potential mitigation
SIERA-SP-V-10	E.NICOLS 115kV	B3_13_East Nicolaus #2 115/60 kV Transformer & B1_39_YCEC 13.80 Unit ID 1	B	L-1/G-1	>0.95	>0.95	0.8984	Explore potential mitigation
SIERA-SP-V-11	ENVRO_HY 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_21_OXBOW F 9.11 Unit ID 1	B	L-1/G-1	0.8983	0.8997	0.8938	Explore potential mitigation

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ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-12	FORST HL 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_21_OXBOW F 9.11 Unit ID 1	B	L-1/G-1	0.8982	0.8996	0.8937	Explore potential mitigation
SIERA-SP-V-13	GRSS VLY 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	B	L-1/G-1	0.8966	0.8959	0.8881	Explore potential mitigation
SIERA-SP-V-14	ELDORAD 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.5867	0.6158	0.5991	Explore potential mitigation
SIERA-SP-V-15	ENCINAL 60kV	C1-21_BUS FAULT AT 32332 PEASE 60.00	C1	Bus	0.8855	0.8822	0.872	Explore potential mitigation
SIERA-SP-V-16	SHPRING 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4431	0.4595	0.4397	Explore potential mitigation
SIERA-SP-V-17	APLHTAP1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.6335	0.6673	0.6516	Explore potential mitigation
SIERA-SP-V-18	APLHTAP2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.5174	0.5404	0.5222	Explore potential mitigation
SIERA-SP-V-19	APPLE HL 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.6318	0.6657	0.6499	Explore potential mitigation
SIERA-SP-V-20	CLRKSVLT 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.893	>0.9	0.8996	Explore potential mitigation
SIERA-SP-V-21	DIMOND_1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.7615	0.806	0.7938	Explore potential mitigation
SIERA-SP-V-22	DIMOND_2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4602	0.4781	0.4586	Explore potential mitigation
SIERA-SP-V-23	DMND SPR 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4598	0.4777	0.4582	Explore potential mitigation
SIERA-SP-V-24	ENCL TAP 60kV	C1-21_BUS FAULT AT 32332 PEASE 60.00	C1	Bus	0.886	0.8827	0.8725	Explore potential mitigation
SIERA-SP-V-25	LIVE OAK 60kV	C1-21_BUS FAULT AT 32332 PEASE 60.00	C1	Bus	0.8861	0.8828	0.8726	Explore potential mitigation
SIERA-SP-V-26	MIZOU_T1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.7387	0.7813	0.7683	Explore potential mitigation
SIERA-SP-V-27	MIZOU_T2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4675	0.4861	0.4668	Explore potential mitigation

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					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-28	PLCRVLB2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4751	0.4943	0.4753	Explore potential mitigation
SIERA-SP-V-29	PLCRVLB3 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4748	0.4941	0.475	Explore potential mitigation
SIERA-SP-V-30	PLCRVLT1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.7166	0.7573	0.7436	Explore potential mitigation
SIERA-SP-V-31	PLCRVLT2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4755	0.4948	0.4757	Explore potential mitigation
SIERA-SP-V-32	SHPRING1 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.7817	0.828	0.8163	Explore potential mitigation
SIERA-SP-V-33	SHPRING2 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.4438	0.4602	0.4404	Explore potential mitigation
SIERA-SP-V-34	SPICAMIN 115kV	C1-7_BUS FAULT AT 32018 GOLDHILL 115.00 Bus 2E	C1	Bus	0.6321	0.666	0.6502	Explore potential mitigation
SIERA-SP-V-35	CPM 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.173	0.4042	0.4021	Explore potential mitigation
SIERA-SP-V-36	DRUM 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8481	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-37	FLINT 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.443	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-38	OXBOW 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8278	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-39	AUBURN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4403	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-40	FLINT1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4404	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-41	FLINT2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4432	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-42	HALSEY 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.441	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-43	PENRYN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4144	>0.9	>0.9	Short term: Action Plan

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					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-44	PLACER 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4437	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-45	SUMMIT 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8924	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-46	TAYLOR 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8311	0.8637	Explore potential mitigation
SIERA-SP-V-47	ATLANTC 230kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8386	0.8726	Explore potential mitigation
SIERA-SP-V-48	ATLANTI 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8354	0.8685	Explore potential mitigation
SIERA-SP-V-49	CPM TAP 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.173	0.4042	0.4021	Explore potential mitigation
SIERA-SP-V-50	DEL MAR 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8099	0.8418	Explore potential mitigation
SIERA-SP-V-51	ELDORAD 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1352	0.3797	0.3748	Explore potential mitigation
SIERA-SP-V-52	HIGGINS 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.525	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-53	HORSHE1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4171	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-54	HORSHE2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4433	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-55	RIO OSO 230kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8932	>0.9	Explore potential mitigation
SIERA-SP-V-56	ROCKLIN 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8292	0.8616	Explore potential mitigation
SIERA-SP-V-57	ROLLINS 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8371	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-58	SHPRING 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.152	0.3684	0.3637	Explore potential mitigation
SIERA-SP-V-59	APLHTAP1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1388	0.3802	0.3757	Explore potential mitigation

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					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-60	APLHTAP2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1385	0.37	0.3647	Explore potential mitigation
SIERA-SP-V-61	APPLE HL 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1381	0.3786	0.3741	Explore potential mitigation
SIERA-SP-V-62	ATLANTIC 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.832	0.8625	Explore potential mitigation
SIERA-SP-V-63	BELL PGE 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4595	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-64	BONNIE N 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8349	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-65	BOWMN PH 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	>0.9	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-66	BOWMN TP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8872	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-67	BRNSWALT 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8925	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-68	BRNSWCKP 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.881	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-69	BRNSWKTP 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8963	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-70	BRUNSWCK 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8724	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-71	CAPEHORN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8289	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-72	CHCGO PK 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.7049	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-73	CISCO GR 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8886	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-74	CISCOTAP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8883	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-75	CLRKSVLE 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1658	0.3833	0.3799	Explore potential mitigation

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					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-76	CLRKSVLT 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1716	0.4031	0.4008	Explore potential mitigation
SIERA-SP-V-77	COLFAXJT 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8296	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-78	CPEHRNTP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8295	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-79	DIMOND_1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1548	0.3946	0.3914	Explore potential mitigation
SIERA-SP-V-80	DIMOND_2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1437	0.3627	0.3573	Explore potential mitigation
SIERA-SP-V-81	DMND SPR 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1435	0.3623	0.3569	Explore potential mitigation
SIERA-SP-V-82	DRUM 1M 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8233	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-83	DRUM 2M 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8226	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-84	DTCH FL1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.7741	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-85	DTCH FL2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8688	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-86	ENVRO_HY 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8256	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-87	FORST HL 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8168	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-88	GOLD HLL 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.188	0.4326	0.4306	Explore potential mitigation
SIERA-SP-V-89	GOLDHILL 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1786	0.4096	0.408	Explore potential mitigation
SIERA-SP-V-90	HAYPRESS 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	>0.9	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-91	HORSESHE 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4171	>0.9	>0.9	Short term: Action Plan

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					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-92	LIMESTNE 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1771	0.4118	0.4095	Explore potential mitigation
SIERA-SP-V-93	MIZOU_T1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1516	0.3925	0.3891	Explore potential mitigation
SIERA-SP-V-94	MIZOU_T2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1425	0.3632	0.3578	Explore potential mitigation
SIERA-SP-V-95	MTN_QJCT 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4392	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-96	MTN_QUAR 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.433	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-97	NEWCSTL1 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4336	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-98	NEWCSTL2 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4432	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-99	NEWCSTLE 115kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.4336	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-100	PLCRVLB2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1413	0.3634	0.358	Explore potential mitigation
SIERA-SP-V-101	PLCRVLB3 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1412	0.3632	0.3578	Explore potential mitigation
SIERA-SP-V-102	PLCRVLT1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1485	0.3905	0.3869	Explore potential mitigation
SIERA-SP-V-103	PLCRVLT2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1414	0.3637	0.3583	Explore potential mitigation
SIERA-SP-V-104	PLSNT GR 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8479	0.8755	Explore potential mitigation
SIERA-SP-V-105	ROLLNSTP 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8343	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-106	SHADYGLN 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8296	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-107	SHPRING1 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1575	0.3965	0.3935	Explore potential mitigation

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					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-108	SHPRING2 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1522	0.3689	0.3643	Explore potential mitigation
SIERA-SP-V-109	SIERRAPI 60kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.8098	0.8418	Explore potential mitigation
SIERA-SP-V-110	SPAULDNG 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8891	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-111	SPICAMIN 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	0.1382	0.3789	0.3744	Explore potential mitigation
SIERA-SP-V-112	TAMARACK 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8897	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-113	ULTRA JT 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.86	0.8865	Explore potential mitigation
SIERA-SP-V-114	ULTR-RCK 115kV	C2-3_GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	CB	>0.9	0.863	0.8894	Explore potential mitigation
SIERA-SP-V-115	WEMR SWS 60kV	C2-4_GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	CB	0.8251	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-116	CPM 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4242	0.4075	Explore potential mitigation
SIERA-SP-V-117	DRUM 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.827	0.8313	Explore potential mitigation
SIERA-SP-V-118	FLINT 115kV	B2_36_Drum - Higgins 115 kV Line & B2_19_Placer - Gold Hill 115 kV Line No. 1	C3	N-1-1	0.8982	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-119	FLINT 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.5922	0.5797	Explore potential mitigation
SIERA-SP-V-120	OXBOW 60kV	B1_18_ROLLINSF 6.60 Unit ID 1 & B1_21_OXBOW F 9.11 Unit ID 1	C3	N-1-1	0.879	0.8825	0.8834	Explore potential mitigation
SIERA-SP-V-121	AUBURN 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.6283	0.6179	Explore potential mitigation

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ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-122	FLINT1 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.5913	0.5788	Explore potential mitigation
SIERA-SP-V-123	FLINT2 115kV	B2_36_Drum - Higgins 115 kV Line & B2_19_Placer - Gold Hill 115 kV Line No. 1	C3	N-1-1	0.8983	>0.9	>0.9	Explore potential mitigation
SIERA-SP-V-124	FLINT2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.5924	0.5799	Explore potential mitigation
SIERA-SP-V-125	HALSEY 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.6266	0.6156	Explore potential mitigation
SIERA-SP-V-126	PENRYN 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.6032	0.5892	Explore potential mitigation
SIERA-SP-V-127	PLACER 115kV	B2_36_Drum - Higgins 115 kV Line & B2_19_Placer - Gold Hill 115 kV Line No. 1	C3	N-1-1	0.8918	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-128	PLACER 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.6093	0.5972	Explore potential mitigation
SIERA-SP-V-129	SUMMIT 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8694	0.8978	Explore potential mitigation
SIERA-SP-V-130	TAYLOR 60kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8238	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-131	ATLANTC 230kV	B2_6_Rio Oso - Atlantic 230 kV Line & B2_10_Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.8292	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-132	ATLANTI 60kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8277	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-133	CPM TAP 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4242	0.4075	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-134	DEL MAR 60kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8033	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-135	DEL MAR 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.8959	0.8898	Explore potential mitigation
SIERA-SP-V-136	ELDORAD 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.3964	0.3792	Explore potential mitigation
SIERA-SP-V-137	HIGGINS 115kV	B2_19_Placer - Gold Hill 115 kV Line No. 1 & B2_36_Drum - Higgins 115 kV Line	C3	N-1-1	0.882	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-138	HIGGINS 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.667	0.6572	Explore potential mitigation
SIERA-SP-V-139	HORSHE1 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4789	0.4632	Explore potential mitigation
SIERA-SP-V-140	HORSHE2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.4911	0.4762	Explore potential mitigation
SIERA-SP-V-141	PEAS RG 60kV	B1_25_GRNLEAF2 13.80 Unit ID 1 & B2_44_Pease - Marysville - Harter 60 kV Line	C3	N-1-1	0.8998	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-142	ROCKLIN 60kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8222	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-143	ROLLINS 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B1_18_ROLLINSF 6.60 Unit ID 1	C3	N-1-1	>0.9	0.8815	0.8971	Explore potential mitigation
SIERA-SP-V-144	SHPRING 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3853	0.3681	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-145	APLHTAP1 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.3973	0.3803	Explore potential mitigation
SIERA-SP-V-146	APLHTAP2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3862	0.3689	Explore potential mitigation
SIERA-SP-V-147	APPLE HL 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3957	0.3786	Explore potential mitigation
SIERA-SP-V-148	ATLANTIC 115kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8516	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-149	ATLANTIC 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.8983	0.8977	Explore potential mitigation
SIERA-SP-V-150	BELL PGE 115kV	B2_19_Placer - Gold Hill 115 kV Line No. 1 & B2_20_Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.8783	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-151	BELL PGE 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.6205	0.6089	Explore potential mitigation
SIERA-SP-V-152	BONNIE N 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8121	0.8203	Explore potential mitigation
SIERA-SP-V-153	BOWMN PH 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.8589	0.8683	Explore potential mitigation
SIERA-SP-V-154	BOWMN TP 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.8458	0.8553	Explore potential mitigation
SIERA-SP-V-155	BRUNSWCK 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.898	0.8958	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-156	CAPEHORN 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.7845	0.8004	Explore potential mitigation
SIERA-SP-V-157	CHCGO PK 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.7867	0.7816	Explore potential mitigation
SIERA-SP-V-158	CISCO GR 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.86	0.8823	Explore potential mitigation
SIERA-SP-V-159	CISCOTAP 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8597	0.8819	Explore potential mitigation
SIERA-SP-V-160	CLRKSVLE 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.4026	0.3852	Explore potential mitigation
SIERA-SP-V-161	CLRKSVLT 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.423	0.4062	Explore potential mitigation
SIERA-SP-V-162	COLFAXJT 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.7845	0.8006	Explore potential mitigation
SIERA-SP-V-163	CPEHRNTP 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B1_18_ROLLINSF 6.60 Unit ID 1	C3	N-1-1	>0.9	0.883	0.8985	Explore potential mitigation
SIERA-SP-V-164	DIMOND_1 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4134	0.3964	Explore potential mitigation
SIERA-SP-V-165	DIMOND_2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3787	0.3614	Explore potential mitigation
SIERA-SP-V-166	DMND SPR 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.3784	0.361	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-167	DRUM 1M 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8085	0.8134	Explore potential mitigation
SIERA-SP-V-168	DRUM 2M 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.8085	0.8135	Explore potential mitigation
SIERA-SP-V-169	DTCH FL1 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.828	0.825	Explore potential mitigation
SIERA-SP-V-170	DTCH FL2 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8852	0.8841	Explore potential mitigation
SIERA-SP-V-171	E.NICOLS 115kV	B1_1_COLGATE1 13.80 Unit ID 1 & B2_29_East Nicolaus - Rio Oso 115 kV Line	C3	N-1-1	>0.9	>0.9	0.8995	Explore potential mitigation
SIERA-SP-V-172	ENVRO_HY 60kV	B1_21_OXBOW F 9.11 Unit ID 1 & B2_49_Colgate-Grass Valley 60 kV Line	C3	N-1-1	0.8983	0.8997	0.8938	Explore potential mitigation
SIERA-SP-V-173	FORST HL 60kV	B1_18_ROLLINSF 6.60 Unit ID 1 & B1_21_OXBOW F 9.11 Unit ID 1	C3	N-1-1	0.8789	0.8824	0.8833	Explore potential mitigation
SIERA-SP-V-174	GOLD HLL 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4544	0.4366	Explore potential mitigation
SIERA-SP-V-175	GOLDHILL 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.4303	0.4137	Explore potential mitigation
SIERA-SP-V-176	GRSS VLY 60kV	B2_49_Colgate-Grass Valley 60 kV Line & B1_18_ROLLINSF 6.60 Unit ID 1	C3	N-1-1	0.8965	0.8959	0.8881	Explore potential mitigation
SIERA-SP-V-177	HAYPRESS 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8589	0.8683	Explore potential mitigation
SIERA-SP-V-178	HORSESHE 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.4789	0.4632	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-179	LIMESTNE 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.4326	0.4152	Explore potential mitigation
SIERA-SP-V-180	MIZOU_T1 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.4111	0.3941	Explore potential mitigation
SIERA-SP-V-181	MIZOU_T2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3792	0.3619	Explore potential mitigation
SIERA-SP-V-182	MTN_QJCT 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.627	0.6164	Explore potential mitigation
SIERA-SP-V-183	MTN_QUAR 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.6212	0.6104	Explore potential mitigation
SIERA-SP-V-184	NEWCSTL1 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.5546	0.541	Explore potential mitigation
SIERA-SP-V-185	NEWCSTL2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.5588	0.5456	Explore potential mitigation
SIERA-SP-V-186	NEWCSTLE 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.5549	0.5413	Explore potential mitigation
SIERA-SP-V-187	PLCRVLB2 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.3793	0.3621	Explore potential mitigation
SIERA-SP-V-188	PLCRVLB3 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3791	0.3619	Explore potential mitigation
SIERA-SP-V-189	PLCRVLT1 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4088	0.3918	Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-190	PLCRVLT2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3797	0.3624	Explore potential mitigation
SIERA-SP-V-191	PLSNT GR 115kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8625	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-192	ROLLNSTP 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B1_18_ROLLINSF 6.60 Unit ID 1	C3	N-1-1	>0.9	0.8815	0.8971	Explore potential mitigation
SIERA-SP-V-193	SHADYGLN 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B1_18_ROLLINSF 6.60 Unit ID 1	C3	N-1-1	>0.9	0.8815	0.8971	Explore potential mitigation
SIERA-SP-V-194	SHPRING1 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.4155	0.3986	Explore potential mitigation
SIERA-SP-V-195	SHPRING2 115kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.3859	0.3686	Explore potential mitigation
SIERA-SP-V-196	SIERRAPI 60kV	B2_6_Rio Oso - Atlantic 230 kV Line & B2_10_Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.8041	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-197	SIERRAPI 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8958	0.8897	Explore potential mitigation
SIERA-SP-V-198	SPAULDNG 60kV	B3_8_Goldhill #2 230/115 kV Transformer & B3_7_Goldhill #1 230/115 kV Transformer	C3	N-1-1	>0.9	0.8461	0.8561	Explore potential mitigation
SIERA-SP-V-199	SPICAMIN 115kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.3959	0.3789	Explore potential mitigation
SIERA-SP-V-200	TAMARACK 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B3_8_Goldhill #2 230/115 kV Transformer	C3	N-1-1	>0.9	0.8627	0.8869	Explore potential mitigation
SIERA-SP-V-201	ULTRA JT 115kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8708	>0.9	>0.9	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SIERA-SP-V-202	ULTR-RCK 115kV	B2_10_Atlantic - Gold Hill 230 kV Line & B2_6_Rio Oso - Atlantic 230 kV Line	C3	N-1-1	0.8738	>0.9	>0.9	Short term: Action Plan
SIERA-SP-V-203	WEMR SWS 60kV	B3_7_Goldhill #1 230/115 kV Transformer & B1_18_ROLLINSF 6.60 Unit ID 1	C3	N-1-1	>0.9	0.8716	0.8897	Explore potential mitigation
SIERA-SP-V-204	PLACER 115kV	C5_19_Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No.	C5	DCTL	0.8798	>0.9	>0.9	Short term: Action Plan

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Study Area: **PG&E Central Valley Sierra - Spring Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					N/A	2019 Spring Peak	N/A	
SIERA-WP-V-1	E.NICOLS 115kV	B2_29_East Nicolaus - Rio Oso 115 kV Line & B2_15_Palermo-Nicolaus 115 kV Line	C3	N-1-1		0.865		Explore potential mitigation

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Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SIERA-NP-V-1	PEAS RG 60kV	C1-9_BUS FAULT AT 32200 PEASE 115.00	C1	Bus	0.8425	>0.95		Dispatch local generation or voltage support
SIERA-NP-V-2	PEASE 115kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.7885	0.8728		Dispatch local generation or voltage support
SIERA-NP-V-3	GLEAF2 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8302	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-4	HARTER 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8288	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-5	ENCINAL 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8451	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-6	MRYSVLE 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8257	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-7	PEAS RG 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.7726	0.8539		Dispatch local generation or voltage support
SIERA-NP-V-8	PEASETP 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8303	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-9	ALMENDRA 60kV	B2_26_Pease - Rio Oso 115 kV Line & B2_25_Palermo - Pease 115 kV Line	C3	N-1-1	0.8322	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-10	ENCL TAP 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8454	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-11	GLEAF2TP 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8302	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-12	LIVE OAK 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.851	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-13	MRYSVLE 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8257	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-14	YBA CTYJ 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.8303	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-15	YUBACITY 60kV	B2_25_Palermo - Pease 115 kV Line & B2_26_Pease - Rio Oso 115 kV Line	C3	N-1-1	0.829	>0.90		Dispatch local generation or voltage support
SIERA-NP-V-16	PEASE 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8325	>0.90		Dispatch local generation or voltage support

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SIERA-NP-V-17	PEASE 115kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.7904	0.8731		Explore potential mitigation
SIERA-NP-V-18	GLEAF2 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8321	>0.90		Short term: Action Plan
SIERA-NP-V-19	HARTER 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8308	>0.90		Short term: Action Plan
SIERA-NP-V-20	ENCINAL 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8469	>0.90		Short term: Action Plan
SIERA-NP-V-21	MRYSVLE 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8277	>0.90		Short term: Action Plan
SIERA-NP-V-22	PEAS RG 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.7744	0.8542		Explore potential mitigation
SIERA-NP-V-23	PEASETP 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8323	>0.90		Short term: Action Plan
SIERA-NP-V-24	ALMENDRA 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8323	>0.90		Short term: Action Plan
SIERA-NP-V-25	ENCL TAP 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8472	>0.90		Short term: Action Plan
SIERA-NP-V-26	GLEAF2TP 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8322	>0.90		Short term: Action Plan
SIERA-NP-V-27	LIVE OAK 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8528	>0.90		Short term: Action Plan
SIERA-NP-V-28	MRYSVLLE 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8277	>0.90		Short term: Action Plan
SIERA-NP-V-29	YBA CTYJ 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8323	>0.90		Short term: Action Plan
SIERA-NP-V-30	YUBACITY 60kV	C5_20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	0.8309	>0.90		Short term: Action Plan



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Spring Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				N/A	2019 Spring Peak	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Spring Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		N/A	2019 Spring Peak	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Valley Sierra - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-1	Cooley Landing-Los Altos 60kV Line	Monta Vista-Los Altos 60 kV (Loyola-Monta Vista)	B	N-1	100.4	60.7	61.0	Short Term : Action Plan; Long Term : Cooley Landing - Los Altos 60 kV Line Reconductor Project
BA-SP-T-2	Newark-Dixon Landing 115kV Line	Piercy-Metcalf 115 kV	B	N-1	104.4	71.4	67.6	Short Term : Action Plan; Long Term : Evergreen-Mabury Voltage Conversion Project
BA-SP-T-3	Monta Vista-Los Gatos 60 kV Line	Evergreen-Almaden 60 kV	B	N-1	138.7	96.8	96.4	Short Term : Action Plan ; Long Term : Monta Vista-Los Gatos-Evergreen 60kV Line Reconductor Project
BA-SP-T-4	Oleum-Christie 115kV Line	UNION CH 9.11 Unit ID 1 & Christie-Sobrante (Oleum-Sobrante) 115kV Line	B	G-1/L-1	116.4	116.2	<90	Short Term: Action Plan; Long Term :North Tower 115 kV Looping Project
BA-SP-T-5	Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	CARDINAL 12.47 Unit ID 1 & Jefferson-Stanford #1 60kV Line	B	G-1/L-1	121.3	<90	<90	Short Term: Action Plan Long Term: Jefferson-Stanford No. 2 60 kV Line
BA-SP-T-6	Jefferson-Stanford #1 60kV Line	CARDINAL 12.47 Unit ID 1 & Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	B	G-1/L-1	131.8	<90	<90	Short Term: Action Plan Long Term: Jefferson-Stanford No. 2 60 kV Line
BA-SP-T-7	Contra Costa-Moraga #2 230kV Line	BUS 1E FAULT AT 30525 C.COSTA 230 kV	C1	Bus Section	102.7	62.0	62.3	Short Term: Action Plan - Reduce Contra Costa Area gen Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-8	Sobrante-El Cerrito STA G #2 115kV Line	BUS 1 FAULT AT 33010 SOBRANTE 115.00 kV	C1	Bus Section	102.1	100.5	90.4	Short Term : Action Plan; Long Term : North Tower 115 kV Looping Project
BA-SP-T-9	Oakland D - Oakland L 115kV Cable	BUS E FAULT AT 32786 OAK C115 115.00 kV	C1	Bus Section	66.6	106.0	105.0	Increase generation in the Oakland Area

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-10	Moraga-Claremont #1 115kV Line	BUS E FAULT AT 32786 OAK C115 115.00	C1	Bus Section	73.3	102.9	103.8	Increase generation in the Oakland Area
BA-SP-T-11	Moraga-Claremont #2 115kV Line	BUS E FAULT AT 32786 OAK C115 115.00	C1	Bus Section	73.4	103.1	103.9	Increase generation in the Oakland Area
BA-SP-T-12	Moraga-Oakland J 115kV Line	BUS D FAULT AT 35101 SN LNDRO 115.00 kV	C1	Bus Section	135.6	75.0	72.5	Short Term: Action plan - Open Grant-J line at Oakland J following RCEC outage Long Term: Reconductor Moraga-Oakland J 115 kV Line
BA-SP-T-13	Moraga-San Leandro #1 115kV Line	BUS 2E FAULT AT 33020 MORAGA 115.00 kV	C1	Bus Section	123.5	82.0	80.2	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-14	Moraga-San Leandro #2 115kV Line	BUS 1E FAULT AT 33020 MORAGA 115.00	C1	Bus Section	144.3	100.6	98.6	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-15	Moraga-San Leandro #3 115kV Line	BUS 2E FAULT AT 33020 MORAGA 115.00	C1	Bus Section	106.0	70.4	68.8	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-16	San Leandro - Oakland J #1 115kV Line	BUS 2E FAULT AT 33020 MORAGA 115.00	C1	Bus Section	100.1	57.6	55.4	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-17	Newark-Dixon Landing 115kV Line	FAULT AT 35643 MTCALF E 115.00	C2	Breaker	105.5	103.6	99.6	Short Term : Action Plan ; Long Term : Evergreen-Mabury Voltage Conversion Project
BA-SP-T-18	Newark-Dixon Landing 115kV Line	FAULT AT 35642 MTCALF 2D 115.00	C2	Breaker	104.7	80.3	76.5	Short Term : Action Plan ; Long Term : Evergreen-Mabury Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-19	Trimble-San Jose 'B' 115 kV Line	FAULT AT 35642 MTCALF D 115.00	C2	Breaker	106.2	103.4	104.3	Reconductor, rerate or explore the SPS option
BA-SP-T-20	Contra Costa-Moraga #1 230kV Line	FAULT AT 30525 C.COSTA 230 CB820	C2	Breaker	109.5	79.5	79.3	Short Term: Action Plan - Reduce Contra Costa Area gen Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-21	North Dublin-Cayetano 230kV Cable	FAULT AT 30525 C.COSTA 230 CB600	C2	Breaker	93.0	106.2	104.1	Reconductor, rerate ,explore the SPS option or Rely on congestion management.
BA-SP-T-22	Contra Costa-Moraga #1 230kV Line	FAULT AT 30525 C.COSTA 230 CB820	C2	Breaker	113.1	70.2	69.6	Short Term: Action Plan - Reduce Contra Costa Area gen Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-23	Contra Costa-Moraga #2 230kV Line	FAULT AT 30525 C.COSTA 230 CB810	C2	Breaker	109.7	65.7	66.0	Short Term: Action Plan - Reduce Contra Costa Area gen Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-24	Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	FAULT AT 30525 C.COSTA 230 CB600	C2	Breaker	93.5	107.1	105.4	Reconductor, rerate ,explore the SPS option or Rely on congestion management.
BA-SP-T-25	Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	FAULT AT 30525 C.COSTA 230 CB600	C2	Breaker	99.1	112.8	111.1	Reconductor, rerate ,explore the SPS option or Rely on congestion management.
BA-SP-T-26	Oakland D - Oakland L 115kV Cable	FAULT AT 32790 STATIN X 115.00 CB 372	C2	Breaker	64.8	105.2	105.0	Increase generation in the Oakland Area
BA-SP-T-27	Oakland C-Oakland L 115 kV Cable	FAULT AT 32780 CLARMNT 115.00 CB122	C2	Breaker	102.6	103.8	104.4	Claremont bus upgrade or explore the SPS option

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-28	Sobrante-Grizzly-Claremont #2 115kV Line (Hillside-Grizzly JCT)	FAULT AT 30550 MORAGA 230 CB202	C2	Breaker	101.1	85.3	84.4	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-29	Sobrante-Grizzly-Claremont #2 115kV Line (Hillside-Grizzly JCT)	FAULT AT 30550 MORAGA 230 CB202	C2	Breaker	104.5	88.6	87.7	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-30	Moraga-Claremont #1 115kV Line	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	77.6	109.6	111.7	Increase generation in the Oakland Area
BA-SP-T-31	Moraga-Claremont #2 115kV Line	FAULT AT 32790 STATIN X 115.00 CB 372	C2	Breaker	76.2	106.1	107.3	Increase generation in the Oakland Area
BA-SP-T-32	Moraga-Oakland J 115kV Line	FAULT AT 351001 SN LNDRO 115 CB102	C2	Breaker	135.4	76.1	73.5	Short Term: Action plan Long Term: Reconductor Moraga-Oakland J 115 kV Line
BA-SP-T-33	Sobrante-Moraga 115kV Line	FAULT AT 30550 MORAGA 230 CB202	C2	Breaker	130.4	98.0	96.2	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-34	Moraga-Station X # 1	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	74.9	104.0	104.9	Increase generation in the Oakland Area
BA-SP-T-35	Moraga-Oakland X #2 115kV Line	FAULT AT 32780 CLARMNT 115.00 CB122	C2	Breaker	81.1	100.6	100.4	Increase generation in the Oakland Area
BA-SP-T-36	Moraga-Station X # 3	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	79.8	122.5	124.5	Increase generation in the Oakland Area
BA-SP-T-37	Moraga-Station X # 4	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	79.8	122.5	124.5	Increase generation in the Oakland Area
BA-SP-T-38	Moraga-San Leandro #1 115kV Line	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	123.0	79.6	77.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-39	Moraga-San Leandro #2 115kV Line	FAULT AT 33020 MORAGA 115 CB432	C2	Breaker	150.3	94.7	92.7	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-40	Moraga-San Leandro #3 115kV Line	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	105.6	68.3	66.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-41	Moraga-Station X # 1	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	76.0	105.5	106.5	Increase generation in the Oakland Area
BA-SP-T-42	Moraga-Oakland X #2 115kV Line	FAULT AT 32780 CLARMNT 115.00 CB122	C2	Breaker	82.3	102.2	101.9	Increase generation in the Oakland Area
BA-SP-T-43	Moraga-Station X # 3	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	81.0	124.4	126.4	Increase generation in the Oakland Area
BA-SP-T-44	Moraga-Station X # 4	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	81.0	124.4	126.4	Increase generation in the Oakland Area
BA-SP-T-45	Potrero-Larkin #2 (AY-2) 115kV Cable	FAULT AT 33204 POTRERO 115 CB102	C2	Breaker	149.9	87.7	87.2	Short Term : Action Plan; Long Term : Potrero bus upgrade project.
BA-SP-T-46	Grant-Eastshore #1 115kV Line	FAULT AT 33020 MORAGA 115 CB602	C2	Breaker	27.1	102.5	103.0	Rerate/Install larger conductor as part of the Eastshore-Oakland J Reconductoring Project
BA-SP-T-47	Grant-Eastshore #2 115kV Line	FAULT AT 33020 MORAGA 115 CB602	C2	Breaker	27.1	102.5	103.0	Rerate/Install larger conductor as part of the Eastshore-Oakland J Reconductoring Project
BA-SP-T-48	Ravenswood-Palo Alto #2 115kV Line	FAULT AT RVNSWD 115 CB522	C2	Breaker	107.2	104.2	115.4	Palo Alto interim SPS

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-49	Oleum-Christie 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	101.8	101.7	73.2	Short Term : Action Plan ; Long Term : North Tower 115 kV Looping Project
BA-SP-T-50	Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	128.8	127.0	111.7	Short Term : Action Plan ; Long Term: Christie SPS
BA-SP-T-51	Martinez-Oleum 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	106.7	108.1	89.7	Short Term: Action Plan; Long Term :North Tower 115 kV Looping Project
BA-SP-T-52	Oleum-Martinez 115kV Line (OLEUM-MARTINEZ - From Oleum PP To 7/50)	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	99.7	101.0	83.8	North Tower 115 kV Loop project
BA-SP-T-53	Moraga-San Leandro #1 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115	C5	N-2	129.5	84.7	82.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-54	Moraga-San Leandro #2 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115	C5	N-2	130.8	85.6	83.7	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-55	Moraga-San Leandro #3 115kV Line	Moraga-San Leandro Nos. 1 & 2 115 kV lines	C5	N-2	115.3	84.6	83.0	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-56	San Leandro - Oakland J #1 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115	C5	N-2	100.6	56.9	54.6	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-57	Newark-Dixon Landing 115kV Line	Swift - Metcalf & Piercy - Metcalf 115 kV Lines	C5	N-2	105.0	65.3	61.6	Short Term : Action Plan; Long Term : Evergreen-Mabury Voltage Conversion Project
BA-SP-T-58	Ravenswood-Cooley Landing #1 115kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	N-2	128.4	94.3	104.3	Palo Alto interim SPS

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-59	Cooley Landing-Palo Alto 115kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	N-2	110.1	113.1	130.3	Palo Alto interim SPS
BA-SP-T-60	Moraga 230/115kV Transformer #2	Moraga 230/115kV Transformer #3 & Moraga 230/115kV Transformer #1	C3	N-1-1	125.0	<90	<90	Short Term: Action Plan Long Term: Moraga 230/115 kV Transformer Replacement project
BA-SP-T-61	Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-El Cerrito STA G #1 115kV Line & Sobrante-El Cerrito STA G #2 115kV Line	C3	N-1-1	127.8	126.7	105.0	Short Term : Action Plan ; Long Term: Christie SPS
BA-SP-T-62	Oakland D - Oakland L 115kV Cable	Oakland C - Oakland X #2 115kV Cable & Oakland C - Oakland X #3 115kV Cable	C3	N-1-1	<90	105.5	105.3	Increase generation in the Oakland Area
BA-SP-T-63	Oakland C - Oakland L #1 115kV Cable	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	102.9	104.0	104.6	Action plan or explore potential mitigation
BA-SP-T-64	Oakland C - Oakland X #2 115kV Cable	Oakland C - Oakland X #3 115kV Cable & Oakland D - Oakland L 115kV Cable	C3	N-1-1	<90	105.2	105.0	Increase generation in the Oakland Area
BA-SP-T-65	San Leandro - Oakland J #1 115kV Line	Moraga-Oakland J 115kV Line & Moraga-San Leandro #3 115kV Line	C3	N-1-1	100.6	<90	<90	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-66	San Leandro - Oakland J #1 115kV Line	Moraga-Oakland J 115kV Line & Oakland J - Grant 115kV Line	C3	N-1-1	<90	100.1	100.8	Action plan or explore potential mitigation
BA-SP-T-67	Pittsburg 230/115kV Transformer #12	LMEC GSU CST1 & Pittsburg 230/115kV Transformer #13	C3	N-1-1	131.3	90.3	<90	Short Term: Action plan Long Term: Pittsburg 230/115 kV Transformer Addition project
BA-SP-T-68	Pittsburg 230/115kV Transformer #13	LMEC GSU CST1 & Pittsburg 230/115kV Transformer #12	C3	N-1-1	152.2	100.0	94.3	Short Term: Action plan Long Term: Pittsburg 230/115 kV Transformer Addition project

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Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-69	Martinez-Oleum 115kV Line	Sobrante-El Cerrito STA G #2 115kV Line & Sobrante-El Cerrito STA G #1 115kV Line	C3	N-1-1	107.7	108.3	95.7	Short Term : Action Plan; Long Term : North Tower 115 kV Looping Project
BA-SP-T-70	Oleum-Martinez 115kV Line	Sobrante-El Cerrito STA G #2 115kV Line & Sobrante-El Cerrito STA G #1 115kV Line	C3	N-1-1	100.6	101.2	<90	Short Term : Action Plan; Long Term : North Tower 115 kV Looping Project
BA-SP-T-71	Moraga-Claremont #1 115kV Line	DEC GSU CTG3 & Moraga-Claremont #2 115kV Line	C3	N-1-1	90.7	104.1	105.8	Increase generation in the Oakland Area
BA-SP-T-72	Moraga-Claremont #2 115kV Line	DEC GSU CTG3 & Moraga-Claremont #1 115kV Line	C3	N-1-1	90.8	104.1	105.9	Increase generation in the Oakland Area
BA-SP-T-73	Moraga-Station X 115 kV #1 Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-74	Moraga-Oakland X #2 115kV Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-75	Moraga-Station X 115 kV #3 Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-76	Moraga-Station X 115 kV #4 Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-77	Moraga-San Leandro #1 115kV Line	Moraga-San Leandro #2 115kV Line & Moraga-San Leandro #3 115kV Line	C3	N-1-1	143.8	101.4	99.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-78	Moraga-San Leandro #2 115kV Line	Moraga-San Leandro #1 115kV Line & Moraga-San Leandro #3 115kV Line	C3	N-1-1	144.2	101.9	99.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project

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Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-79	Moraga-San Leandro #3 115kV Line	Moraga-San Leandro #1 115kV Line & Moraga-San Leandro #2 115kV Line	C3	N-1-1	115.3	<90	<90	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-80	Potrero-Larkin #1 (AY-1) 115kV Cable	Mission-Larkin (XY-1) 115kV Cable & Martin-Larkin (HY-1) 115kV Cable	C3	N-1-1	144.4	140.5	134.4	Action plan or explore potential mitigation
BA-SP-T-81	Potrero-Larkin #2 (AY-2) 115kV Cable	Potrero-Larkin #1 (AY-1) 115kV Cable & Potrero-Mission (AX) 115kV Cable	C3	N-1-1	114.6	114.3	112.8	Action plan or explore potential mitigation
BA-SP-T-82	Potrero-Mission (AX) 115kV Cable	Potrero-Larkin #1 (AY-1) 115kV Cable & Potrero-Larkin #2 (AY-2) 115kV Cable	C3	N-1-1	133.5	133.3	131.9	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme
BA-SP-T-83	Martin-Sneath Lane 60kV Line	Millbrae-San Mateo #1 115kV Line & Martin-Millbrae 115kV Line	C3	N-1-1	156.1	157.7	156.7	Reverse power relay at Millbrae
BA-SP-T-84	San Mateo-Belmont 115kV Line	Ravenswood 230/115kV Transformer #1 & Ravenswood 230/115kV Transformer #2	C3	N-1-1	99.9	100.1	103.8	Action plan or explore potential mitigation
BA-SP-T-85	Ravenswood-Palo Alto #1 115kV Line	Ravenswood-Palo Alto #2 115kV Line & Ravenswood-Cooley Landing #1 115kV Line	C3	N-1-1	105.3	102.7	114.1	Palo Alto interim SPS
BA-SP-T-86	Ravenswood-Palo Alto #2 115kV Line	Ravenswood-Palo Alto #1 115kV Line & Ravenswood-Cooley Landing #1 115kV Line	C3	N-1-1	105.1	102.6	114.0	Palo Alto interim SPS
BA-SP-T-87	Millbrae-Sneath Lane 60kV Line	Hillsdale JCT - Half Moon Bay 60kV Line & Martin-Sneath Lane 60kV Line	C3	N-1-1	120.8	125.4	132.4	Action plan or explore potential mitigation
BA-SP-T-88	Bair 115/60kV Transformer #1	Ravenswood-Cooley Landing #2 115kV Line & Cooley Landing 115/60kV Transformer #1	C3	N-1-1	102.6	107.9	106.0	Action plan or explore potential mitigation

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Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-89	Cooley Landing 115/60kV Transformer #2	Bair 115/60kV Transformer #1 & Cooley Landing 115/60kV Transformer #1	C3	N-1-1	103.8	<90	<90	Short Term : Action Plan ; Long Term : Cooley Landing 115/60 kV Transformer Capacity Upgrade
BA-SP-T-90	Jefferson-Stanford #1 60kV Line	Jefferson-Las Pulgas 60kV Line (Jefferson-Woodside) & Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	C3	N-1-1	99.2	108.4	110.5	Short Term: Action Plan Long Term: Jefferson-Stanford No. 2 60 kV Line
BA-SP-T-91	Grant-Eastshore #1 115kV Line	San Leandro-Oakland J 115kV Line & Grant-Eastshore #2 115kV Line	C3	N-1-1	107.6	<90	<90	Short Term : Action Plan Long Term :East shore-Oakland project
BA-SP-T-92	Grant-Eastshore #1 115kV Line	Grant-Eastshore #2 115kV Line & Eastshore-San Mateo 230kV Line	C3	N-1-1	<90	100.3	100.4	Rerate or explore the SPS option.
BA-SP-T-93	Grant-Eastshore #2 115kV Line	San Leandro-Oakland J 115kV Line & Grant-Eastshore #1 115kV Line	C3	N-1-1	107.6	<90	<90	Short Term : Action Plan Long Term :East shore-Oakland project
BA-SP-T-94	Grant-Eastshore #2 115kV Line	Grant-Eastshore #1 115kV Line & Eastshore-San Mateo 230kV Line	C3	N-1-1	<90	100.3	100.4	Rerate or explore the SPS option.
BA-SP-T-95	Newark 115/60kV Transformer #1	Las Positas-Newark 230kV Line & Contra Costa-Las Positas 230kV Line	C3	N-1-1	149.8	149.8	150.9	Action plan or explore potential mitigation
BA-SP-T-96	Newark-Applied Materials 115kV Line	Newark-Lawrence 115 kV & Britton-Monta Vista 115 kV	C3	N-1-1	103.7	<90	<90	Short Term : Action Plan; Long Term : Monta Vista 230 kV Bus Upgrade Project
BA-SP-T-97	Newark-Milpitas #1 115kV Line	Newark-Milpitas 115 kV #2 & Swift-Metcalf 115 kV	C3	N-1-1	141.0	140.1	138.3	Action plan or explore potential mitigation
BA-SP-T-98	Newark-Milpitas #2 115kV Line	Newark-Milpitas 115 kV #1 & Swift-Metcalf 115 kV	C3	N-1-1	117.3	116.6	115.2	Action plan or explore potential mitigation
BA-SP-T-99	Livermore-Las Positas 60kV Line	Contra Costa-Las Positas 230kV Line & Las Positas-Newark 230kV Line	C3	N-1-1	199.8	200.3	200.5	Existing reverse power relay at Las Positas

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Study Area: **PG&E Greater Bay Area - Summer Peak**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-100	Radum-Livermore 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	226.3	227.4	226.8	Existing reverse power relay at San Ramon
BA-SP-T-101	San Ramon 230/60kV Transformer #1	Contra Costa-Las Positas 230kV Line & Las Positas-Newark 230kV Line	C3	N-1-1	140.1	142.2	142.8	Existing reverse power relay at Las Positas
BA-SP-T-102	San Ramon-Radum 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	209.1	209.6	208.6	Existing reverse power relay at San Ramon
BA-SP-T-103	Radum-Vallecitos 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	146.4	146.7	146.4	Existing reverse power relay at San Ramon
BA-SP-T-104	Newark-Vallecitos 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	163.6	164.4	165.3	Existing reverse power relay at San Ramon
BA-SP-T-105	Las Positas 230/60kV Transformer #4	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	136.2	138.7	139.2	Existing reverse power relay at San Ramon
BA-SP-T-106	Newark-Livermore 60kV Line	Contra Costa-Las Positas 230kV Line & Las Positas-Newark 230kV Line	C3	N-1-1	176.2	175.8	176.8	Existing reverse power relay at Las Positas
BA-SP-T-107	Monta Vista 230/60 kV Trans No. 5	Evergreen-Almaden 60 kV & Monta Vista 115/60 kV Transformer #6	C3	N-1-1	115.7	111.8	112.0	Action plan or explore potential mitigation
BA-SP-T-108	Monta Vista-Los Gatos 60 kV Line	Monta Vista 115/60 kV Transformer #6 & Evergreen-Almaden 60 kV	C3	N-1-1	147.9	102.1	<90	Short Term : Action Plan ; Long Term : Monta Vista-Los Gatos-Evergreen 60kV Line Reconductor Project
BA-SP-T-109	Swift-Metcalf 115 kV Line	Newark-Milpitas 115 kV #1 & Newark-Milpitas 115 kV #2	C3	N-1-1	103.6	<90	<90	Short Term : Action Plan ; Long Term : Swift-Metcalf reconductor project
BA-SP-T-110	Dixon Landing-McKee 115 kV Line (Mabury-Mabury J)	Newark-Dixon Landing 115 kV & Piercy-Metcalf 115 kV	C3	N-1-1	<90	108.3	105.2	Action plan or explore potential mitigation
BA-SP-T-111	Mabury-Jennings J. 115 kV Line	Newark-Dixon Landing 115 kV & Piercy-Metcalf 115 kV	C3	N-1-1	<90	125.7	122.4	Action plan or explore potential mitigation

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Study Area: **PG&E Greater Bay Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-112	Metcalf-Llagas 115 kV Line	Metcalf-Morgan Hill 115 kV & Llagas-Gilroy Foods 115 kV	C3	N-1-1	112.3	115.5	<90	Short Term: Action Plan Long Term: Morgan Hill Area Reinforcement Project
BA-SP-T-113	Markham No. 2 115 kV Tap	Markham #1 115 kV Tap & Metcalf-Evergreen #1 115 kV	C3	N-1-1	102.0	<90	<90	Short Term : Action Plan ; Long Term : Stone back-tie reconductor project
BA-SP-T-114	Los Esteros-Montague 115 kV Line	Nortech-NRS 115 kV & Los Esteros-Trimble 115 kV	C3	N-1-1	100.0	<90	<90	Short Term : Action Plan ; Long Term : Los Esteros-Montague 115 kV Substation Equipment Upgrade Project

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Study Area: **PG&E Greater Bay Area - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
BA-WP-T-1	Potrero-Larkin #2 (AY-2) 115kV Cable	Potrero-Mission (AX) 115kV Cable	B	N-1	110.3	108.3	106.9	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme
BA-WP-T-2	Potrero-Mission (AX) 115kV Cable	Potrero-Larkin #2 (AY-2) 115kV Cable	B	N-1	131.9	129.8	128.6	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme & relying on short term emergency cable ratings.
BA-WP-T-3	Millbrae-Sneath Lane 60kV Line	Hillsdale JCT - Half Moon Bay 60kV Line	B	N-1	97.2	100.5	103.4	Disable automatics at Half Moon Bay
BA-WP-T-4	Jefferson-Stanford #1 60kV Line	Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI) & CARDINAL 12.47 Unit ID 1	B	G-1/L-1	105.7	<90.0	<90.0	Short Term: Action Plan Long Term: Jefferson-Stanford No. 2 60 kV Line
BA-WP-T-5	Potrero-Larkin #2 (AY-2) 115kV Cable	Bus 2D Fault At 33204 Potrero 115.00	C1	Bus Section	103.5	95.2	94.3	Short Term: Action plan Long Term: Potrero bus upgrade
BA-WP-T-6	Potrero-Mission (AX) 115kV Cable	Bus 1D Fault At 33204 Potrero 115.00	C1	Bus Section	116.3	92.1	91.5	Short Term: Action plan Long Term: Potrero bus upgrade
BA-WP-T-7	Potrero-Mission (AX) 115kV Cable	Bus 1E Fault At 33204 Potrero 115.00	C1	Bus Section	86.2	122.4	121.2	Explore the option of modifying TBC DC Runback Scheme
BA-WP-T-8	Potrero-Larkin #2 (AY-2) 115kV Cable	CB Fault At 33204 Potrero 115 CB102	C2	Breaker	173.9	100.6	99.8	Short Term: Action plan Long Term: Potrero bus upgrade
BA-WP-T-9	Potrero-Mission (AX) 115kV Cable	CB Fault At 33204 Potrero 115 CB412	C2	Breaker	110.7	127.4	125.5	Short Term: Action Plan Long Term: Potrero bus upgrade
BA-WP-T-10	Ravenswood-San Mateo #1 115kV Line	CB Fault At 30700 Sanmateo 230 CB712	C2	Breaker	109.8	55.6	51.6	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project

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Study Area: **PG&E Greater Bay Area - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
BA-WP-T-11	San Mateo-Belmont 115kV Line	Ravenswood-San Mateo Nos. 1 & 2 230 kV lines	C5	N-2	125.4	98.9	87.3	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-12	Ravenswood-San Mateo #1 115kV Line	Ravenswood-San Mateo Nos. 1 & 2 230 kV lines	C5	N-2	173.9	76.9	68.9	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-13	Ravenswood-Ames #1 115 kV Line	Newark-Ravenswood 230 kV and Tesla-Ravenswood 230 kV lines	C5	N-2	114.5	96.8	92.2	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-14	Ravenswood-Cooley Landing #1 115kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	N-2	102.0	75.4	82.2	Short Term: Action Plan Long Term: Ravenswood-Cooley Landing 115 kV lines reconductor
BA-WP-T-15	San Mateo-Bair 60kV Line (San Carlos-Bair)	Ravenswood-San Mateo Nos. 1 & 2 230 kV lines	C5	N-2	100.5	40.8	36.8	Short Term : Action Plan ; Long Term: San Mateo - Bair 60 kV Line Reconductor
BA-WP-T-16	Potrero-Larkin #1 (AY-1) 115kV Cable	Martin-Larkin (HY-1) 115kV Cable & Mission-Larkin (XY-1) 115kV Cable	C3	N-1-1	158.0	152.8	141.9	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme
BA-WP-T-17	Mission-Larkin (XY-1) 115kV Cable	Potrero-Larkin #1 (AY-1) 115kV Cable & Potrero-Larkin #2 (AY-2) 115kV Cable	C3	N-1-1	101.2	97.0	97.4	Action plan or explore potential mitigation
BA-WP-T-18	Potrero-Larkin #2 (AY-2) 115kV Cable	Potrero-Mission (AX) 115kV Cable & Potrero-Larkin #1 (AY-1) 115kV Cable	C3	N-1-1	135.7	131.6	129.3	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme

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Study Area: **PG&E Greater Bay Area - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
BA-WP-T-19	Potrero-Mission (AX) 115kV Cable	Potrero-Larkin #1 (AY-1) 115kV Cable & Potrero-Larkin #2 (AY-2) 115kV Cable	C3	N-1-1	157.6	155.4	152.7	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme
BA-WP-T-20	Martin-Sneath Lane 60kV Line	Martin-Millbrae 115kV Line & Millbrae-San Mateo #1 115kV Line	C3	N-1-1	120.0	105.3	115.6	Reverse power relay at Millbrae
BA-WP-T-21	Martin-Sneath Lane 60kV Line	Hillsdale JCT - Half Moon Bay 60kV Line & Millbrae 115/60kV Transformer #5	C3	N-1-1	102.3	120.6	126.7	Action plan or explore potential mitigation
BA-WP-T-22	Millbrae 115/60kV Transformer #5	Martin-Sneath Lane 60kV Line & Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	96.5	98.5	102.7	Action plan or explore potential mitigation
BA-WP-T-23	San Mateo-Belmont 115kV Line	Ravenswood-San Mateo #1 230kV Line & Ravenswood-San Mateo #2 230kV Line	C3	N-1-1	117.0	92.1	<90.0	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-24	Ravenswood-San Mateo #1 115kV Line	Ravenswood-San Mateo #1 230kV Line & Ravenswood-San Mateo #2 230kV Line	C3	N-1-1	160.0	<90.0	<90.0	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-25	Ravenswood-Ames #1 115 kV Line	Newark-Ravenswood 230kV Line & Tesla-Ravenswood 230kV Line	C3	N-1-1	105.8	92.0	<90.0	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-26	Ravenswood-Ames #2 115kV Line	Newark-Ravenswood 230kV Line & Tesla-Ravenswood 230kV Line	C3	N-1-1	105.4	91.5	<90.0	Short Term: Action Plan Long Term: South of San Mateo Capacity Increase project
BA-WP-T-27	Millbrae-Sneath Lane 60kV Line	Martin-Sneath Lane 60kV Line & Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	129.0	131.7	138.1	Action plan or explore potential mitigation
BA-WP-T-28	Jefferson-Hillsdale JCT 60kV Line	Tesla-Ravenswood 230kV Line & Jefferson-Martin 230kV Line	C3	N-1-1	107.1	<90.0	<90.0	Action plan or explore potential mitigation

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Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
BA-NP-T-1	Sobrante-Grizzly-Claremont #2 115kV Line (Hillside-Grizzly JCT)	BUS 1 FAULT AT 33010 SOBRANTE 115.00	C1	Bus Section	101.3	<100		Short Term: Action Plan Long Term: Eastshore-Oakland J 115 kV reconductor.
BA-NP-T-2	Potrero-Larkin #2 (AY-2) 115kV Cable	CB FAULT AT 33204 POTRERO 115 CB102	C2	Breaker	104.4	71.4		Explore the option of modifying TBC DC Runback Scheme
BA-NP-T-3	Livermore-Las Positas 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	122.4	95.1		Existing reverse power relay at San Ramon
BA-NP-T-4	Radum-Livermore 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	141.2	105.5		Existing reverse power relay at San Ramon
BA-NP-T-5	San Ramon-Radum 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	134.1	97.9		Existing reverse power relay at San Ramon

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Study Area: **PG&E Greater Bay Area - Summer Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-VD-1	Edes 115 kV	San Leandro-Oakland J 115kV Line	B	N-1	6.02	0.99	0.99	Short Term : Action Plan
BA-SP-VD-2	Willw Pss 60 kV	Willow Pass-Contra Costa 60kV Line	B	N-1	6.36	5.77	4.61	Short Term : Action Plan ; Long Term : Reactive support
BA-SP-VD-3	Half Moon Bay 60 kV	Hillsdale JCT - Half Moon Bay 60kV Line	B	N-1	5.40	5.79	6.42	Short Term : Action Plan ; Long Term : Reactive support
BA-SP-VD-4	Los Gatos 60 kV	Evergreen-Almaden 60 kV	B	N-1	8.86	6.37	6.45	Short Term : Action Plan ; Long Term : Reactive support
BA-SP-VD-5	Dixon Ld 115 kV	Newark-Dixon Landing 115 kV	B	N-1	5.66	2.78	2.70	Evergreen-Mabury Voltage Conversion
BA-SP-VD-6	Piercy 115 kV	Piercy-Metcalf 115 kV	B	N-1	6.37	4.64	4.38	Evergreen-Mabury Voltage Conversion
BA-SP-VD-7	Almaden 60 kV	Evergreen-Almaden 60 kV	B	N-1	10.48	6.49	8.84	Almaden Shunt Capacitor Project

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Study Area: **PG&E Greater Bay Area - Winter Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
BA-WP-VD-1	Pacifica 60 kV	Newark-Ravenswood 230kV Line	B	N-1	5.01	0.29	2.96	Review Martin transformer tap and voltage schedule settings
BA-WP-VD-2	Pacifica 60 kV	Eastshore-San Mateo 230kV Line	B	N-1	2.19	5.91	5.80	Review Martin transformer tap and voltage schedule settings
BA-WP-VD-3	Hlf Mnby 60 kV	Hillsdale JCT - Half Moon Bay 60kV Line	B	N-1	8.55	8.58	9.51	Short Term : Action Plan ; Long Term : Reactive support
BA-WP-VD-4	Snth Lne 60 kV	Eastshore-San Mateo 230kV Line	B	N-1	2.18	5.88	5.77	Review Martin transformer tap and voltage schedule settings
BA-WP-VD-5	Sn Brnot 60 kV	Eastshore-San Mateo 230kV Line	B	N-1	2.14	5.71	5.60	Review Martin transformer tap and voltage schedule settings

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Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
BA-NP-VD-1	SNTH LNE 60 kV	Millbrae-Sneath Lane 60kV Line	B	N-1	8.77	8.42		Review Martin transformer tap and voltage schedule settings
BA-NP-VD-2	SN BRNOT 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	8.68	8.43		Review Martin transformer tap and voltage schedule settings
BA-NP-VD-3	SNANDRES 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	9.83	9.55		Review Martin transformer tap and voltage schedule settings
BA-NP-VD-4	MILLBRAE 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	11.19	10.88		Review Martin transformer tap and voltage schedule settings
BA-NP-VD-5	PACIFICA 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	8.48	8.23		Review Martin transformer tap and voltage schedule settings
BA-NP-VD-6	HLF MNBY 60 kV	Hillsdale JCT - Half Moon Bay 60kV Line	B	N-1	5.21	4.21		Short Term : Action Plan
BA-NP-VD-7	LOS ALTS 60 kV	Monta Vista-Los Altos 60 kV (Loyola-Monta Vista)	B	N-1	5.61	2.73		Short Term : Action Plan
BA-NP-VD-8	LOYOLA 60 kV	Monta Vista-Los Altos 60 kV (Loyola-Monta Vista)	B	N-1	6.08	2.77		Short Term : Action Plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-V-1	Domtar 115 kV	Base Case	A	Normal	1.06	1.05	1.05	Change Contra Costa 230/115 kV transformer tap setting
BA-SP-V-2	Crown Z 115 kV	Base Case	A	Normal	1.06	1.05	1.05	Change Contra Costa 230/115 kV transformer tap setting
BA-SP-V-3	Cc Sub 60 kV	Base Case	A	Normal	1.08	1.08	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-4	Du Pont 60 kV	Base Case	A	Normal	1.08	1.07	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-5	Marsh 60 kV	Base Case	A	Normal	1.07	1.06	1.05	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-6	Briones 60 kV	Base Case	A	Normal	1.06	1.06	1.05	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-7	Balfour 60 kV	Base Case	A	Normal	1.07	1.06	1.06	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-8	Antioch 60 kV	Base Case	A	Normal	1.08	1.08	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-9	Pittsbrg 60 kV	Base Case	A	Normal	1.07	1.07	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-10	Shll Chm 60 kV	Base Case	A	Normal	1.07	1.06	1.06	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-11	Wllw Pss 60 kV	Base Case	A	Normal	1.07	1.06	1.06	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-12	Shllchmt 60 kV	Base Case	A	Normal	1.07	1.07	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-13	Martin 60 kV	Base Case	A	Normal	1.05	1.05	1.05	Review Martin transformer tap and voltage schedule settings
BA-SP-V-14	Almaden 60 kV	Evergreen-Almaden 60 kV	B	N-1	0.87	0.92	0.92	Almaden Shunt Capacitor Project
BA-SP-V-15	Almaden 60 kV	PTSB 7 20.00 Unit ID 1 & Evergreen-Almaden 60 kV	B	G-1/L-1	0.86	>0.90	>0.90	Almaden Shunt Capacitor Project
BA-SP-V-16	Los Gats 60 kV	PTSB 7 20.00 Unit ID 1 & Evergreen-Almaden 60 kV	B	G-1/L-1	0.89	>0.90	>0.90	Almaden Shunt Capacitor Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-V-17	Iuka 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.61	0.61	0.61	Existing reverse power relay at San Ramon
BA-SP-V-18	Parks 60 kV	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C	N-1-1	0.49	0.48	0.48	Existing reverse power relay at San Ramon
BA-SP-V-19	Radum 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.60	0.59	0.59	Existing reverse power relay at San Ramon
BA-SP-V-20	Sunol 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.74	0.74	0.73	Existing reverse power relay at San Ramon
BA-SP-V-21	Vasco 60 kV	Las Positas-Newark 230kV Line & Contra Costa-Las Positas 230kV Line	C	N-1-1	0.48	0.48	0.47	Existing reverse power relay at Las Positas
BA-SP-V-22	Calmat60 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.63	0.63	0.63	Existing reverse power relay at Las Positas
BA-SP-V-23	E Dublin 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.47	0.47	0.47	Existing reverse power relay at San Ramon
BA-SP-V-24	Livermre 60 kV	Las Positas-Newark 230kV Line & Contra Costa-Las Positas 230kV Line	C	N-1-1	0.58	0.58	0.58	Existing reverse power relay at Las Positas
BA-SP-V-25	Livrmr_2 60 kV	Las Positas-Newark 230kV Line & Contra Costa-Las Positas 230kV Line	C	N-1-1	0.58	0.58	0.58	Existing reverse power relay at Las Positas
BA-SP-V-26	Ls Pstas 230 kV	Las Positas-Newark 230kV Line & Contra Costa-Las Positas 230kV Line	C	N-1-1	0.37	0.37	0.36	Existing reverse power relay at Las Positas
BA-SP-V-27	Sanramon 230 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.21	0.20	0.20	Existing reverse power relay at San Ramon
BA-SP-V-28	Std. Oil 115 kV	ChevGen1 13.80 Unit ID 1 & Sobrante-Standard Oil #1 115kV Line	C	N-1-1	0.88	0.88	0.88	Add reactive support
BA-SP-V-29	Vallects 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.70	0.70	0.70	Existing reverse power relay at San Ramon

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Winter Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
BA-WP-V-1	Martin 60 kV	Newark-Ravenswood 230kV Line	B	N-1	1.14	1.05	1.09	Review Martin transformer tap and voltage schedule settings
BA-WP-V-2	Martin 60 kV	B1_2_CARDINAL 12.47 Unit ID 1 & B2_5_Potrero-Larkin #1 (AY-1) 115kV Cable	B	G-1/L-1	<1.10	1.15	1.12	Review Martin transformer tap and voltage schedule settings
BA-WP-V-3	Martin 60 kV	BUS 2D FAULT AT 30700 SANMATEO 230.00	C1	Bus Section	1.10	1.15	1.15	Review Martin transformer tap and voltage schedule settings
BA-WP-V-4	Martin 60 kV	CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	1.15	1.15	1.15	Review Martin transformer tap and voltage schedule settings
BA-WP-V-5	Martin 60 kV	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	N-2	1.08	1.15	1.06	Review Martin transformer tap and voltage schedule settings
BA-WP-V-6	Martin 60 kV	B2_1_Eastshore-San Mateo 230kV Line & B2_25_Martin-Sneath Lane 60kV Line	C3	N-1-1	<1.10	1.18	1.18	Review Martin transformer tap and voltage schedule settings
BA-WP-V-7	Millbrae 60 kV	B1_4_DEC STG1 24.00 Unit ID 1 & B3_14_Millbrae 115/60kV Transformer #5	C3	N-1-1	<1.10	<1.10	1.14	Review Martin transformer tap and voltage schedule settings
BA-WP-V-8	Pacifica 60 kV	B1_4_DEC STG1 24.00 Unit ID 1 & B3_14_Millbrae 115/60kV Transformer #5	C3	N-1-1	<1.10	<1.10	1.14	Review Martin transformer tap and voltage schedule settings
BA-WP-V-9	Sn Brnot 60 kV	B1_4_DEC STG1 24.00 Unit ID 1 & B3_14_Millbrae 115/60kV Transformer #5	C3	N-1-1	<1.10	<1.10	1.14	Review Martin transformer tap and voltage schedule settings
BA-WP-V-10	Snandres 60 kV	B1_4_DEC STG1 24.00 Unit ID 1 & B3_14_Millbrae 115/60kV Transformer #5	C3	N-1-1	<1.10	<1.10	1.14	Review Martin transformer tap and voltage schedule settings
BA-WP-V-11	Snth Lne 60 kV	B1_4_DEC STG1 24.00 Unit ID 1 & B3_14_Millbrae 115/60kV Transformer #5	C3	N-1-1	<1.10	<1.10	1.14	Review Martin transformer tap and voltage schedule settings

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
BA-NP-V-1	TRAN230A 230 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-2	TRAN230B 230 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-3	UNIN CHM 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-4	CHRISTIE 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-5	PRT CSTA 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-6	FRANKLIN 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-7	SEQUOIA 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-8	FRKLNALT 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-9	CC SUB 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-10	DU PONT 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-11	MARSH 60 kV	Base Case	A	N-0	<1.05	1.07		Under review with PTO
BA-NP-V-12	BRIONES 60 kV	Base Case	A	N-0	<1.05	1.07		Under review with PTO
BA-NP-V-13	BALFOUR 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-14	ANTIOCH 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-15	PITTSBRG 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-16	SHLL CHM 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-17	WLLW PSS 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-18	PCBRICK 60 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-19	SHLLCHMT 60 kV	Base Case	A	N-0	<1.05	1.08		Under review with PTO
BA-NP-V-20	LARKIN D 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-21	LARKIN E 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-22	LARKIN F 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-23	MISSON 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-24	POTRERO 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-25	HNTRS PT 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-26	BAYSHOR1 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-27	BAYSHOR2 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-28	MARTIN C 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-29	MARTIN 60 kV	Base Case	A	N-0	1.17	1.15		Under review with PTO
BA-NP-V-30	POT_SVC 115 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-31	DALY CTY 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-32	SERRMNTTE 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-33	EST GRND 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
BA-NP-V-34	UAL COGN 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-35	SHAWROAD 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-36	SFIA 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-37	MILLBRAE 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-38	SANPAULA 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-39	RVNSWD E 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-40	CLY LND 115 kV	Base Case	A	N-0	1.07	1.06		Under review with PTO
BA-NP-V-41	RVNSWD D 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-42	SFASWSTA 115 kV	Base Case	A	N-0	1.06	<1.05		Under review with PTO
BA-NP-V-43	CCSF 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-44	SNTH LNE 60 kV	Base Case	A	N-0	1.11	1.09		Under review with PTO
BA-NP-V-45	SN BRNOT 60 kV	Base Case	A	N-0	1.11	1.09		Under review with PTO
BA-NP-V-46	SNANDRES 60 kV	Base Case	A	N-0	1.10	1.08		Under review with PTO
BA-NP-V-47	MILLBRAE 60 kV	Base Case	A	N-0	1.08	1.07		Under review with PTO
BA-NP-V-48	PACIFICA 60 kV	Base Case	A	N-0	1.11	1.09		Under review with PTO
BA-NP-V-49	USWP-WKR 60 kV	Base Case	A	N-0	1.07	1.06		Under review with PTO
BA-NP-V-50	ALTAMONT 60 kV	Base Case	A	N-0	1.07	1.06		Under review with PTO
BA-NP-V-51	LOS ALTS 60 kV	Base Case	A	N-0	1.07	1.05		Under review with PTO
BA-NP-V-52	LOYOLA 60 kV	Base Case	A	N-0	1.07	1.05		Under review with PTO
BA-NP-V-53	MNTA VSA 60 kV	Base Case	A	N-0	1.07	1.05		Under review with PTO
BA-NP-V-54	PERMNTE 60 kV	Base Case	A	N-0	1.07	<1.05		Under review with PTO
BA-NP-V-55	LOS GATS 60 kV	Base Case	A	N-0	1.06	1.05		Under review with PTO
BA-NP-V-56	EDENVALE 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-57	IBM-HRRS 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-58	IBM-BALY 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-59	MTCALF D 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-60	MTCALF E 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-61	CYTE PMP 115 kV	Base Case	A	N-0	1.06	1.06		Under review with PTO
BA-NP-V-62	MRGN HIL 115 kV	Base Case	A	N-0	1.05	1.06		Under review with PTO
BA-NP-V-63	GILROY 115 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-64	LLAGAS 115 kV	Base Case	A	N-0	<1.05	1.06		Under review with PTO
BA-NP-V-65	PIERCY 115 kV	Base Case	A	N-0	1.05	1.06		Under review with PTO
BA-NP-V-66	MARTIN 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	1.20	1.18		Under review with PTO

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
BA-NP-V-67	SNTH LNE 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	1.19	1.18		Under review with PTO
BA-NP-V-68	SN BRNOT 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	1.19	1.18		Under review with PTO
BA-NP-V-69	SNANDRES 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	1.19	1.18		Under review with PTO
BA-NP-V-70	MILLBRAE 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	1.19	1.18		Under review with PTO
BA-NP-V-71	PACIFICA 60 kV	Millbrae 115/60kV Transformer #5	B	N-1	1.19	1.18		Under review with PTO
BA-NP-V-72	HLF MNBY 60 kV	B2_26_Potrero-Potrero SVC 115kV section & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	<1.10	1.11		Under review with PTO
BA-NP-V-73	CALMAT60 60 kV	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	0.88	>0.90		Existing reverse power relay at San Ramon
BA-NP-V-74	E DUBLIN 60 kV	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	0.83	>0.90		Existing reverse power relay at San Ramon
BA-NP-V-75	SANRAMON 230 kV	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	0.75	>0.90		Existing reverse power relay at San Ramon



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concern identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No transient stability concern identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No transient stability concern identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Winter Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-SS-1	Kirker 115 kV	112	114	120	Loop the Kirker 115 kV substation.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Winter Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-1	Biola-Glass-Madera 70kV (Trigo Jct-El Peco Tap Section)	Base Case	A	N-0	<90%	<90%	108.2%	Reconductor line
FR-SP-T-2	Kearney-Caruthers 70kV	Base Case	A	N-0	114.0%	<90%	<90%	Accelerate approved project
FR-SP-T-3	Borden #1 230/70kV	Borden #2 230/70kV	B	T-1	96.0%	97.0%	108.9%	Upgrade Borden #1 230/70kV to at least 200/220 MVA
FR-SP-T-4	Oro Loma #2 115/70kV	Los Banos-Livingston Jct-Canal 70kV	B	T-1	118.7%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-5	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Oro Loma #2 115/70kV	B	T-1	122.0%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-6	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Oro Loma #2 115/70kV	B	T-1	104.0%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-7	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Gates-Coalinga 1 70kV	B	L-1	101.9%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-8	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche-Mendota 115kV	B	L-1	94.1%	104.4%	113.2%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-9	Reedley-Orosi 70kV (Orosi Jct-Orosi Section)	Reedley-Dinuba 70kV	B	L-1	104.7%	<90%	<90%	Action Plan. Reedley-Orosi 70kV reconductor mitigates later years
FR-SP-T-10	Reedley-Orosi 70kV (Reedley-Orosi Jct Section)	Reedley-Dinuba 70kV	B	L-1	100.7%	<90%	<90%	Action Plan. Reedley-Orosi 70kV reconductor mitigates later years
FR-SP-T-11	Reedley-Dinuba 70kV (Dinuba Jct-Dinuba Section)	Reedley-Orosi 70kV	B	L-1	102.1%	<90%	<90%	Action Plan. Reedley-Dinuba 70kV reconductor mitigates later years

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-12	Reedley-Dinuba 70kV (Reedley-Dinuba Jct Section)	Reedley-Orosi 70kV & Dinuba Energy Unit 1	B	G-1/L-1	104.1%	<90%	<90%	Action Plan. Reedley-Dinuba 70kV reconductor mitigates later years
FR-SP-T-13	Borden #1 230/70kV	Borden E 70kV Bus	C1	Bus	90.7%	97.6%	110.6%	Upgrade Borden #1 230/70kV to at least 200/220 MVA
FR-SP-T-14	Borden-Madera #2 70kV	Borden D 70kV Bus	C1	Bus	126.3%	133.8%	147.6%	Reconductor Borden-Madera #1 & #2 70kV
FR-SP-T-15	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Gates 70kV Bus	C1	Bus	<90%	102.4%	98.9%	Reconductor Coalinga 1-Coalinga 2 70kV line
FR-SP-T-16	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche #1 115kV Bus	C1	Bus	<90%	100.0%	107.4%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-17	Herndon-Bullard #1 115kV (Pinedale Jct-Bullard Section)	Herndon #1 115kV Bus	C1	Bus	99.8%	99.2%	100.3%	Radial line from Herndon 115kV. Consider SPS.
FR-SP-T-18	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Panoche #2 115kV Bus	C1	Bus	118.5%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-19	Oro Loma #2 115/70kV	Los Banos 70kV Bus	C1	Bus	522.0%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-20	Los Banos-Canal-Oro Loma #1 70kV (Oro Loma-Mercy Springs Section)	Los Banos 70kV Bus	C1	Bus	231.0%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-21	Los Banos-Canal-Oro Loma #1 70kV (Ortiga-Mercy Springs Section)	Los Banos 70kV Bus	C1	Bus	213.0%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-22	Los Banos-Canal-Oro Loma 70kV (Canal-Ortiga Section) (2016 Case) Mercy Springs-Canal 70kV (Canal-Ortiga Section) (2019 & Later)	Los Banos 70kV Bus	C1	Bus	151.3%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-23	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Panoche #2 115kV Bus	C1	Bus	100.4%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-24	Oro Loma-Canal #1 70kV (Dos Palos-Santa Rita Section)	Los Banos 70kV Bus	C1	Bus	215.3%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-25	Oro Loma-Canal #1 70kV (Oro Loma-Dos Palos Section)	Los Banos 70kV Bus	C1	Bus	285.6%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-26	Oro Loma-Canal #1 70kV (Santa Rita-Canal Section)	Los Banos 70kV Bus	C1	Bus	160.6%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-27	Oro Loma-Mendota 70kV (Oro Loma-Poso Jct Section)	Los Banos 70kV Bus	C1	Bus	103.8%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-28	Panoche-Oro Loma 115kV (DFS Tap-Oro Loma Section)	Los Banos 70kV Bus	C1	Bus	227.6%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-29	Panoche-Oro Loma 115kV (Hammonds-DFS Tap Section)	Los Banos 70kV Bus	C1	Bus	231.7%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-30	Panoche-Oro Loma 115kV (Panoche-Panoche Jct Section)	Los Banos 70kV Bus	C1	Bus	113.2%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-31	Wilson-Merced #1 115kV	Wilson B 115kV Bus	C1	Bus	118.6%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-32	Wilson-Merced #2 115kV	Wilson A 115kV Bus	C1	Bus	115.7%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-33	Not Solved	Herndon #2 115kV Bus	C1	Bus	Not Solved	Not Solved	Not Solved	Mitigation alternatives under review
FR-SP-T-34	Barton-Airways-Sanger 115kV (Airways-Sanger Section)	Herndon CB202 230kV Failure	C2	Breaker	102.7%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-35	GWF-Kingsburg 115kV (Contadina-Kingsburg Section)	McCall CB202 230kV Failure	C2	Breaker	110.5%	94.3%	98.0%	Consider SPS.
FR-SP-T-36	GWF-Kingsburg 115kV (GWF-Contadina Section)	McCall CB202 230kV Failure	C2	Breaker	114.9%	98.5%	102.3%	Consider SPS.
FR-SP-T-37	Herndon-Barton 115kV	McCall CB202 230kV Failure	C2	Breaker	118.5%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-38	Oro Loma-Mercy Springs 70kV	Panoche CB102 115kV Failure	C2	Breaker	N/A	111.1%	122.7%	Add second Oro Loma-Mercy Springs 70kV line or consider SPS.
FR-SP-T-39	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Panoche CB202 230kV Failure	C2	Breaker	104.1%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-40	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Panoche CB102 115kV Failure	C2	Breaker	105.5%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-41	Oro Loma #2 115/70kV	Panoche CB102 115kV Failure	C2	Breaker	<90%	100.9%	104.6%	Upgrade Oro Loma #2 115/70kV transformer
FR-SP-T-42	Manchester-Herndon 115kV	McCall CB202 230kV Failure	C2	Breaker	120.2%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-43	McCall-Sanger #3 115kV	Herndon CB202 230kV Failure	C2	Breaker	100.8%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-44	Schindler-Huron-Gates 70kV (Huron Jct-Calflax Section)	Panoche CB102 115kV Failure	C2	Breaker	108.2%	108.5%	117.4%	Reconductor limiting section.
FR-SP-T-45	Biola-Glass-Madera 70kV (Canandaigua-Glass Section)	Borden-Madera #1 & #2 70kV	C3	L-1-1	111.9%	120.3%	134.1%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-46	Biola-Glass-Madera 70kV (Trigo Jct-Canandaigua)	Borden-Madera #1 & #2 70kV	C3	L-1-1	101.7%	110.0%	123.7%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-47	Biola-Glass-Madera 70kV (Trigo Jct-Trigo Section)	Borden-Madera #1 & #2 70kV	C3	L-1-1	<90%	91.8%	103.0%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-48	Borden-Glass 70kV	Borden-Madera #1 & #2 70kV	C3	L-1-1	127.9%	136.4%	150.2%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-49	Borden-Madera #1 70kV	Borden-Glass 70kV & Borden-Madera #2 70kV	C3	L-1-1	127.0%	135.4%	149.0%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-50	Borden-Madera #2 70kV	Borden-Glass 70kV & Borden-Madera #1 70kV	C3	L-1-1	125.5%	133.6%	146.8%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-51	Atwater-Livingston-Merced 115kV (Atwater Jct-Merced)	Atwater-El Capitan 115kV & Wilson-Atwater #2 115kV	C3	L-1-1	142.8%	<90%	<90%	Existing Atwater SPS mitigates
FR-SP-T-52	Atwater-Livingston-Merced 115kV (Atwater-Atwater Jct)	Atwater-El Capitan 115kV & Wilson-Atwater #2 115kV	C3	L-1-1	162.3%	<90%	<90%	Existing Atwater SPS mitigates
FR-SP-T-53	Chowchilla-Kerckhoff 2 115kV (Certainteed Jct-Sharon Tap Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	186.2%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-54	Chowchilla-Kerckhoff 2 115kV (Chowchilla-Certainteed Jct Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	187.2%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-55	Chowchilla-Kerckhoff 2 115kV (Kerckhoff 1 Jct-Kerckhoff 2 Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	154.8%	<90%	91.8%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-56	Chowchilla-Kerckhoff 2 115kV (Oakhurst Jct-Kerckhoff 1 Jct Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	155.1%	<90%	91.9%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-57	Chowchilla-Kerckhoff 2 115kV (Sharon Tap-Oakhurst Jct Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	209.1%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-58	Dairyland-Le Grand 115kV	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	146.7%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-59	Exchequer-Le Grand 115kV	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	175.3%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-60	Le Grand-Chowchilla 115kV (Certainteed Tap)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	141.4%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-61	Le Grand-Chowchilla 115kV (Chowchilla Tap)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	141.4%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-62	Coalinga #1-San Miguel 70kV	Gates #5 230/70kV & Schindler #1 115/70kV	C3	T-1-1	117.8%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-63	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Templeton-Gates 230kV & Gates-Coalinga 1 70kV	C3	L-1-1	114.6%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-64	Coalinga 1-Coalinga 2 70kV (Tornado Tap-Pennzier Tap Section)	Gates #5 230/70kV & Schindler #1 115/70kV	C3	T-1-1	101.8%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-65	Gregg-Ashlan 230kV (Gregg-Figarden 2 Tap)	Gregg-Herndon #1 & #2 230kV	C3	L-1-1	121.2%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-66	Kings River-Sanger-Reedley 115kV (Piedra 1 SW-Reedley Section)	Sanger-Reedley 115kV & McCall-Reedley (McCall-Wahtoke Section)	C3	L-1-1	149.4%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-67	Kings River-Sanger-Reedley 115kV (Rainbow Tap-Piedra 1 SW Section)	Sanger-Reedley 115kV & McCall-Reedley (McCall-Wahtoke Section)	C3	L-1-1	149.4%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-68	Kings River-Sanger-Reedley 115kV (Sanger-Rainbow Tap Section)	Sanger-Reedley 115kV & McCall-Reedley (McCall-Wahtoke Section)	C3	L-1-1	118.2%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-69	Los Banos 230/70kV #3	Los Banos #4 230/70kV & Oro Loma #2 115/70kV	C3	T-1-1	123.2%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-70	Los Banos-Canal-Oro Loma #1 70kV (Oro Loma-Mercy Springs Section) (2016 Case) Los Banos-Mercy Springs 70kV (2018 and later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	136.1%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-71	Los Banos-Canal-Oro Loma #1 70kV (Oro Loma-Mercy Springs Section) (2016 Case) Oro Loma-Mercy Springs 70kV (2018 and later)	Panoche-Mendota 115kV & Panoche-Oro Loma 115kV	C3	L-1-1	<90%	<90%	106.1%	Add second Oro Loma-Mercy Springs 70kV line or consider SPS.
FR-SP-T-72	Los Banos-Canal-Oro Loma #1 70kV (Ortiga-Mercy Springs Section)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	159.2%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-73	Los Banos-Canal-Oro Loma 70kV (Mercy Springs-Q648 Section)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	205.1%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-74	Los Banos-Canal-Oro Loma 70kV (Q648-Arburua Section)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	193.9%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-75	Los Banos-Livingston Jct-Canal 70kV (Canal-Livingston Jct Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	171.0%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-76	Los Banos-Livingston Jct-Canal 70kV (Chevron Pipeline-Santa Nella Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	207.1%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-77	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	257.8%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-78	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	241.2%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-79	Los Banos-Canal-Oro Loma 70kV (Los Banos-Pacheco Wind Section) (2016 Case) Los Banos-Mercy Spring 70kV (Los Banos-Pacheco Wind Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	207.1%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-80	Los Banos-Canal-Oro Loma 70kV (Canal-Ortiga Section) (2016 Case) Mercy Springs-Canal 70kV (Canal-Ortiga Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	129.4%	<90%	<90%	Action Plan. New Mercy Spring 230/70kV mitigates later years.
FR-SP-T-81	Los Banos-Canal-Oro Loma 70kV (Pacheco Wind-Wright Tap Section) (2016 Case) Los Banos-Mercy Spring 70kV (Pacheco Wind-Wright Tap Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	180.8%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-82	Los Banos-Canal-Oro Loma 70kV (Aruburaa Tap-Wright Tap Section) (2016 Case) Los Banos-Mercy Spring 70kV (Aruburaa Tap-Wright Tap Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	174.2%	<90%	<90%	Action Plan. New Mercy Spring 230/70kV mitigates later years.
FR-SP-T-83	Oro Loma-Canal #1 70kV (Dos Palos-Santa Rita Section)	Los Banos-Canal-Oro Loma 70kV & Los Banos-Livingston Jct-Canal 70kV	C3	L-1-1	299.0%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-84	Oro Loma-Canal #1 70kV (Dos Palos-Santa Rita Section)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	117.4%	164.5%	Upgrade limiting 1/0 Cu line
FR-SP-T-85	Oro Loma-Canal #1 70kV (Oro Loma-Dos Palos Section)	Los Banos-Canal-Oro Loma 70kV & Los Banos-Livingston Jct-Canal 70kV	C3	L-1-1	353.9%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-86	Oro Loma-Canal #1 70kV (Oro Loma-Dos Palos Section)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	<90%	109.0%	Upgrade limiting 1/0 Cu line
FR-SP-T-87	Oro Loma-Canal #1 70kV (Santa Rita-Canal Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	297.1%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-88	Oro Loma-Canal #1 70kV (Santa Rita-Canal Section)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	165.6%	233.4%	Upgrade limiting 1/0 Cu line
FR-SP-T-89	Oro Loma #2 115/70kV	Los Banos #3 & #4 230/70kV	C3	T-1-1	350.7%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-90	Sanger-Reedley 115kV (Pom Jct-Parlier Section)	Kings River-Sanger-Reedley 115kV & McCall-Reedley 115kV (McCall-Wahtoke Section)	C3	L-1-1	101.1%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-91	Sanger-Reedley 115kV (Sanger CoGen Jct-Pom Jct Section)	Kings River-Sanger-Reedley 115kV & McCall-Reedley 115kV (McCall-Wahtoke Section)	C3	L-1-1	114.8%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-92	McCall-Reedley 115kV (Wahtoke-Reedley Section)	Kings River-Sanger-Reedley 115kV & Sanger-Reedley 115kV	C3	L-1-1	102.8%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-93	McCall-Kingsburg #2 115kV (Guardian Jct-Kingsburg Section)	McCall-Kingsburg #1 115kV & GWF-Kingsburg 115kV	C3	L-1-1	92.4%	101.6%	113.0%	Consider SPS.
FR-SP-T-94	McCall-Kingsburg #1 115kV (Kingsburg Jct 1-Kingsburg Jct 2 Section)	McCall-Kingsburg #2 115kV & GWF-Kingsburg 115kV	C3	L-1-1	92.5%	101.7%	113.0%	Consider SPS.
FR-SP-T-95	McCall-Cal Ave 115kV (McCall-Danish Creamery Section)	Cal Ave-Sanger 115kV & McCall-West Fresno 115kV	C3	L-1-1	<90%	<90%	102.3%	Consider SPS.
FR-SP-T-96	Merced #2 115/70kV	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	92.4%	93.8%	128.9%	Existing Exchequer SPS mitigates.
FR-SP-T-97	Merced Falls-Exchequer 70kV (McSwain-Exchequer Section)	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	123.4%	125.1%	191.3%	Existing Exchequer SPS mitigates.
FR-SP-T-98	Merced Falls-Exchequer 70kV (Merced Falls-McSwain Jct Section)	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	111.6%	112.9%	162.9%	Existing Exchequer SPS mitigates.
FR-SP-T-99	Merced Falls-Exchequer 70kV (Merced Falls-McSwain Jct Section)	Wilson #2 230/115 & Exchequer-Le Grand 115kV	C3	L-1/T-1	121.2%	<90%	<90%	Existing Exchequer SPS mitigates. North Merced 230/70kV mitigates later years.
FR-SP-T-100	Merced-Merced Falls 70kV	Wilson #2 230/115 & Exchequer-Le Grand 115kV	C3	L-1/T-1	109.5%	<90%	<90%	Existing Exchequer SPS mitigates. North Merced 230/70kV mitigates later years.
FR-SP-T-101	Merced-Merced Falls 70kV	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	99.9%	99.9%	147.0%	Existing Exchequer SPS mitigates.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-102	Panoche-Oro Loma 115kV (DFS Tap-Oro Loma Section)	Los Banos #3 & #4 230/70kV	C3	T-1-1	142.5%	<90%	<90%	Action Plan. New Mercy Spring 230/70kV mitigates later years.
FR-SP-T-103	Panoche-Oro Loma 115kV (DFS Tap-Oro Loma Section)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	<90%	106.9%	124.7%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-104	Panoche-Oro Loma 115kV (Hammonds-DFS Tap Section)	Los Banos #3 & #4 230/70kV	C3	T-1-1	145.3%	<90%	<90%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-105	Panoche-Oro Loma 115kV (Hammonds-DFS Tap Section)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	<90%	109.9%	127.8%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-106	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Los Banos #3 & #4 230/70kV	C3	T-1-1	157.2%	<90%	<90%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-107	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	<90%	122.4%	141.2%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-108	Wilson #1 230/115kV	Wilson #2 230/115 & Wilson-North Merced 230kV	C3	L-1/T-1	N/A	94.3%	109.2%	Consider SPS.
FR-SP-T-109	Wilson-Atwater #2 115kV	Atwater-Merced 115kV & El Capitan-Wilson 115kV	C3	L-1-1	138.1%	<90%	<90%	Existing Atwater SPS mitigates
FR-SP-T-110	Wilson-El Capitan 115kV	Atwater-Merced 115kV & Wilson-Atwater #2 115kV	C3	L-1-1	113.1%	<90%	<90%	Existing Atwater SPS mitigates

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-111	Wilson-Le Grand 115kV	Wilson #1 & #2 230/115kV	C3	T-1-1	146.3%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-112	Wilson-Merced #1 115kV	Wilson-Atwater #2 115kV & El Capitan-Wilson 115kV	C3	L-1-1	136.3%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-113	Wilson-Merced #2 115kV	Wilson-Atwater #2 115kV & El Capitan-Wilson 115kV	C3	L-1-1	129.3%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-114	Wilson-Oro Loma 115kV (Le Grand Jct-El Nido Section)	Wilson #1 & #2 230/115kV	C3	T-1-1	111.4%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-115	Wilson-Oro Loma 115kV (Oro Loma-El Nido Section)	Wilson #1 & #2 230/115kV	C3	T-1-1	139.0%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-116	Wilson-Oro Loma 115kV (Wilson-Le Grand Jct Section)	Wilson #1 & #2 230/115kV	C3	T-1-1	111.4%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-117	Chowchilla-Kerckhoff 2 115kV (Sharon Tap-Oakhurst Jct Section)	Gregg-E1 #1 & #2 230kV	C5	L-2	N/A	99.9%	101.5%	Update Helms RAS & Kerckhoff 2 PH RAS
FR-SP-T-118	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Melones-Wilson 230kV & Warnerville-Wilson 230kV	C5	L-2	100.7%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-119	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche-Kearney 230kV & Gates-Gregg 230kV	C5	L-2	110.4%	<90%	<90%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-120	Warnerville-Wilson 230kV	Panoche-Kearney 230kV & Gates-Gregg 230kV	C5	L-2	100.2%	<90%	<90%	Action Plan.

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Study Area: **PG&E Greater Fresno - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
FR-NP-T-1	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Coalinga 2 70kV Bus	C1	Bus	109.6%	107.5%		Redispatch
FR-NP-T-2	Panoche-Gates #1 230kV	Gates CB312 230kV	C2	Breaker	105.6%	<90%		Redispatch

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-VD-1	Borden 230kV	Borden-Gregg 230kV	B	L-1	8.94%	<5%	<5%	Action Plan. Borden 230kV voltage mitigates later years.
FR-SP-VD-2	Chowchilla 115kV (Chowchilla 115kV Area)	Le Grand-Chowchilla 115kV	B	L-1	10.95%	12.65%	13.94%	Add dynamic voltage support at Chowchilla 115kV
FR-SP-VD-3	Dairyland 115kV	Le Grand-Dairyland 115kV	B	L-1	5.70%	5.57%	6.27%	Add dynamic voltage support at Chowchilla 115kV
FR-SP-VD-4	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV	B	L-1	13.85%	<5%	<5%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-5	Angiola 70kV (Kingsburg Area)	Kingsburg-Corcoran #2 115kV	B	L-1	6.32%	6.65%	7.24%	Add dynamic voltage support at Kingsburg 115kV
FR-SP-VD-6	Dinuba 70kV (Reedley 70kV Area)	Reedley-Dinuba 70kV	B	L-1	7.87%	<5%	<5%	Action Plan. Reedley-Dinuba 70kV mitigates later years.
FR-SP-VD-7	Caruthers 70kV (Kearney 70kV Area)	Kearney #4 230/70kV	B	T-1	<5%	5.32%	<5%	Verify transformer settings at Kearney
FR-SP-VD-8	Firebaugh 70kV	Oro Loma #2 115/70kV	B	T-1	9.76%	<5%	<5%	Action Plan. Oro Loma 70kV Area Reinforcement mitigates later years.
FR-SP-VD-9	Oakhurst 115kV (Chowchilla 115kV Area)	Kerckhoff 2 115kV Bus	C1	Bus	11.49%	13.48%	14.67%	Add dynamic voltage support at Chowchilla 115kV
FR-SP-VD-10	Mendota 115kV (Mendota 115kV Area)	Panoche 1 115kV Bus	C1	Bus	13.55%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-11	Santa Nella 70kV (Los Banos 70kV Area)	Los Banos 70kV Bus	C1	Bus	83.60%	<10%	<10%	Not Solved. Oro Loma 70kV Area Reinforcement mitigates later years.
FR-SP-VD-12	Mendota 115kV (Mendota 115kV Area)	Panoche CB102 115kV Failure	C2	Breaker	17.19%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-13	Dairyland 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	100.00%	13.50%	18.17%	Add dynamic reactive support at Mendota 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.
FR-SP-VD-14	Oakhurst 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	20.75%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-15	Chowchilla 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	100.00%	15.52%	16.95%	Add dynamic reactive support at Chowchilla 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-VD-16	Oro Loma 70kV (Los Banos 70kV Area)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	100.00%	N/A	N/A	Not Solved.
FR-SP-VD-17	Oro Loma 70kV (Los Banos 70kV Area)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	27.67%	41.58%	Add second Mercy Spring-Oro Loma 70kV line
FR-SP-VD-18	Bear Valley 70kV (Mariposa 70kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	43.55%	<10%	<10%	Mariposa UVLS mitigates 2016. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-19	Merced 70kV (Mariposa 70kV Area)	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	<10%	<10%	11.64%	Mariposa UVLS mitigates.
FR-SP-VD-20	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	81.55%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-21	Newhall 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	100.00%	10.98%	15.24%	Add dynamic reactive support at Mendota 115kV
FR-SP-VD-22	Wahtoke 115kV (Reedley 70kV Area)	McCall-Reedley 115kV (McCall-Wahtoke) & Sanger-Reedley 115kV	C3	L-1-1	12.74%	<10%	<10%	Action Plan. McCall-Reedley #2 115kV mitigates later years.
FR-SP-VD-23	West Fresno 115kV (Sanger 115kV Area)	California Ave-Sanger 115kV & McCall-West Fresno 115kV	C3	L-1-1	<10%	<10%	14.98%	Add dynamic reactive support at West Fresno 115kV
FR-SP-VD-24	Not Solved	Wilson #1 & #2 230/115kV	C3	T-1-1	Not Solved	<10%	<10%	Action Plan. Wilson 115kV Area Reinforcement mitigates later years.
FR-SP-VD-25	Not Solved	Los Banos #3 & #4 230/70kV	C3	T-1-1	Not Solved	<10%	<10%	Action Plan. Oro Loma 70kV Area Reinforcement mitigates later years.
FR-SP-VD-26	Not Solved	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	Not Solved	<10%	<10%	Mitigation alternatives under review
FR-SP-VD-27	Borden 230kV (Borden 230kV Area)	Borden-Gregg 230kV & Wilson-Gregg 230kV	C5	N-2	11.19%	<10%	<10%	Action Plan. Borden 230kV Voltage mitigates later years.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-V-1	Kearney 70kV	Base Case	A	N-0	1.07	1.09	1.08	Check xfmr taps
FR-SP-V-2	Chowchilla 115kV	Le Grand-Chowchilla 115kV	B	L-1	0.9133	0.8918	0.8733	Add dynamic voltage support at Chowchilla 115kV
FR-SP-V-3	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV	B	L-1	0.8758	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-4	Kearney 70kV	Kearney #2 230/70kV	B	T-1	<1.10	1.1157	1.1079	Check xfmr taps
FR-SP-V-5	Oakhurst 115kV (Chowchilla 115kV Area)	Kerckhoff 2 115kV Bus	C1	Bus	0.8792	0.8759	0.8626	Add dynamic voltage support at Chowchilla 115kV
FR-SP-V-6	Santa Nella 70kV (Los Banos 70kV Area)	Los Banos 70kV Bus	C1	Bus	0.1905	>0.90	>0.90	Not Solved
FR-SP-V-7	Dunlap 70kV (Reedley 70kV Area)	McCall CB202 230kV Failure	C2	Breaker	0.8858	>0.90	>0.90	Action Plan. Reedly-Orosi 70kV mitigates later years.
FR-SP-V-8	Mendota 115kV (Mendota 115kV Area)	Panoche CB102 115kV Failure	C2	Breaker	0.8722	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-9	Borden 230kV (Borden 230kV Area)	Warnerville-Wilson 230kV & Borden-Gregg 230kV	C3	L-1-1	0.8739	>0.90	>0.90	Action Plan. Borden 230kV Voltage mitigates later years.
FR-SP-V-10	Dairyland 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	0	0.8615	0.8069	Add dynamic reactive support at Mendota 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.
FR-SP-V-11	Oakhurst 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0.8183	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-12	Chowchilla 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0	0.8567	0.8378	Add dynamic reactive support at Chowchilla 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.
FR-SP-V-13	Oro Loma 70kV (Los Banos 70kV Area)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	0	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area.
FR-SP-V-14	Oro Loma 70kV (Los Banos 70kV Area)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	0.738	0.5896	Add second Mercy Spring-Oro Loma 70kV line or consider SPS.
FR-SP-V-15	Bear Valley 70kV (Mariposa 70kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0.5919	>0.90	>0.90	Mariposa UVLS mitigates

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-V-16	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-17	Newhall 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	0	0.8769	0.8261	Add dynamic reactive support at Mendota 115kV.
FR-SP-V-18	Wahtoke 115kV (Reedley 70kV Area)	McCall-Reedley 115kV (McCall-Wahtoke) & Sanger-Reedley 115kV	C3	L-1-1	0.8928	>0.90	>0.90	Action Plan. McCall-Reedley #2 115kV mitigates later years.
FR-SP-V-19	West Fresno 115kV (Sanger 115kV Area)	California Ave-Sanger 115kV & McCall-West Fresno 115kV	C3	L-1-1	>0.90	>0.90	0.8361	Add dynamic reactive support at West Fresno 115kV
FR-SP-V-20	Borden 230kV (Borden 230kV Area)	Borden-Gregg 230kV & Wilson-Gregg 230kV	C5	N-2	0.8864	>0.90	>0.90	Action Plan. Borden 230kV Voltage mitigates later years.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
FR-NP-V-1	Fresno Wastewater 70kV	None	A	N-0	1.0855	1.0919		Kearney #4 230/70kV is locked.
FR-NP-V-2	Corcoran 70kV	None	A	N-0	<1.05	1.0628		Under review with PTO
FR-NP-V-3	Los Banos 70kV	None	A	N-0	<1.05	1.0631		Under review with PTO
FR-NP-V-4	Exchequer 70kV	None	A	N-0	<1.05	1.0596		Under review with PTO
FR-NP-V-5	Orosi 70kV	None	A	N-0	<1.05	1.0734		Under review with PTO
FR-NP-V-6	North Merced 115kV	None	A	N-0	<1.05	1.0577		Under review with PTO
FR-NP-V-7	Fresno Wastewater 70kV	Herndon-Kearney 230kV	B	L-1	<1.05	1.1077		Under review with PTO
FR-NP-V-8	Fresno Wastewater 70kV	Kearney #2 230/70kV	B	T-1	1.119	<1.05		Under review with PTO
FR-NP-V-9	Fresno Wastewater 70kV	Kearney #4 230/70kV	B	T-1	<1.05	1.1267		Under review with PTO

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Off-Peak & Summer Light Load**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-O-SP-T-01	LERDO-LRDO JCT 115 kV #1 Line	MT POSO Unit ID 1	B	G-1	<100	<100	106	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-02	LIVE OAK-KERN PWR 115 kV #1 Line	Kern Oil-Witco 115 kV Line	B	L-1	<100	<100	107	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-03	LRDO JCT-KERN OIL 115 kV #1 Line	MT POSO Unit ID 1 & Kern PP-Seventh Standard 115 kV Line	B	G-1/L-1	136	<100	<100	Short term: Action Plan Lon term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-04	KRN OL J-KERNWATR 115 kV #1 Line	PSE-LVOK Unit ID 1 & Kern-Live Oak 115 kV Line	B	G-1/L-1	121	121	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project
KRN-O-SP-T-05	PTRL JCT-POSOMTJT 115 kV #1 Line	MT POSO Unit ID 1 & Kern Oil-Witco 115 kV Line	B	G-1/L-1	111	112	116	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-06	PTRL JCT-LIVE OAK 115 kV #1 Line	MT POSO Unit ID 1 & Kern Oil-Witco 115 kV Line	B	G-1/L-1	111	112	116	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-07	LIVE OAK-KERN PWR 115 kV #1 Line	PSE-LVOK Unit ID 1 & Kern Oil-Witco 115 kV Line	B	G-1/L-1	140	143	148	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-08	KERN PWR-KERNWATR 115 kV #1 Line	PSE-LVOK Unit ID 1 & Kern-Live Oak 115 kV Line	B	G-1/L-1	123	124	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-O-SP-T-09	LERDO-LRDO JCT 115 kV #1 Line	Kern Oil-Witco 115 kV Line & MT POSO Unit ID 1	B	L-1/G-1	102	106	110	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-10	7STNDRD-KERN PWR 115 kV #1 Line	BUS 2E FAULT AT KERN PWR 115.00	C1	BUS	144	145	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project
KRN-O-SP-T-11	LRDO JCT-7STNDRD 115 kV #1 Line	BUS 2E FAULT AT KERN PWR 115.00	C1	BUS	118	118	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project
KRN-O-SP-T-12	LRDO JCT-KERN OIL 115 kV #1 Line	BUS 2D FAULT AT KERN PWR 115.00	C1	BUS	<100	<100	111	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-13	KERN OIL-DSCVRYTP 115 kV #1 Line	BUS FAULT AT LIVE OAK 115.00	C1	BUS	<100	<100	108	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-14	LIVE OAK-KERN PWR 115 kV #1 Line	BUS E FAULT AT KERN OIL 115.00	C1	BUS	<100	<100	107	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-15	LRDO JCT-KERN OIL 115 kV #1 Line	BKR FAILURE KERN PP CB 262 115KV	C2	CB	<100	<100	114	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-16	KERN OIL-DSCVRYTP 115 kV #1 Line	BKR FAILURE KERN PP CB 262 115KV	C2	CB	<100	<100	116	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-17	TPMNT1-TUPMAN 115 kV #1 Line	BKR FAILURE MIDWAY CB 392 115KV	C2	CB	118	121	129	Existing Action Plan - Sectionalize Tupman 115kV sub

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-O-SP-T-18	KERN PWR 115/230 kV #3 Bank	BKR FAILURE KERN PP CB 102 115KV	C2	CB	<100	<100	111	Replace terminal limiting equipment to benefit from the full 420MVA transformer rating. Approved Kern PP 230kV Area Reinforcement Project.
KRN-O-SP-T-19	MIDWAY-STCKDLJ1 230 kV #1 Line	Midway-Kern #3 230 kV Line & Midway-Kern #4 230 kV Line	C3	L-1-1	103	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project
KRN-O-SP-T-20	MIDWAY-STCKDLJ2 230 kV #1 Line	Midway-Kern #1 230 kV Line & Midway-Kern #4 230 kV Line	C3	L-1-1	135	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project
KRN-O-SP-T-21	ARCO-TWSL J1 70 kV #1 Line	Gates-Arco 230 kV Line & Arco 230/70 kV #2 Bank	C3	T-1/L-1	97	99	102	Monitor load growth. Reconductor if necessary
KRN-O-SP-T-22	7STNDRD-KERN PWR 115 kV #1 Line	Kern Oil-Witco 115 kV Line & Live Oak-Kern Oil 115 kV Line	C3	L-1-1	112	116	<100	Short term: Action Plan (Summer operation solution setup) Long term: Wheeler Ridge Junction Station Project
KRN-O-SP-T-23	KERN OIL-DSCVRYTP 115 kV #1 Line	Kern PP-Seventh Standard 115 kV Line & Kern-Live Oak 115 kV Line	C3	L-1-1	106	<100	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-O-SP-T-24	POSOMTJT-KERN OIL 115 kV #1 Line	Kern PP-Seventh Standard 115 kV Line & Kern Oil-Witco 115 kV Line	C3	L-1-1	109	<100	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-25	DSCVRYTP-GODN_BER 115 kV #1 Line	Live Oak-Kern Oil 115 kV Line & Kern PP-Seventh Standard 115 kV Line	C3	L-1-1	108	<100	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-26	DSCVRYTP-GODN_BER 115 kV #1 Line	Kern-Live Oak 115 kV Line & Live Oak 115/9.11 kV GSU Bank	C3	L-1/T-1	<100	102	109	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-27	DSCVRYTP-GODN_BER 115 kV #1 Line	Live Oak 115/9.11 kV GSU & Kern-Live Oak 115 kV Line	C3	L-1/T-1	100	102	109	Short term: ction Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-28	KRN OL J-KERNWATR 115 kV #1 Line	Kern PP-Seventh Standard 115 kV Line & Kern-Live Oak 115 kV Line	C3	L-1-1	129	<100	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-29	KRN OL J-KERNWATR 115 kV #1 Line	Kern Oil-Dexel 115 kV Line & Kern-Live Oak 115 kV Line	C3	L-1-1	110	110	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-30	PTRL JCT-POSOMTJT 115 kV #1 Line	Kern Oil-Dexel 115 kV Line & Kern Oil-Witco 115 kV Line	C3	L-1-1	109	111	114	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-O-SP-T-31	PTRL JCT-POSOMTJT 115 kV #1 Line	Kern Oil-Witco 115 kV Line & Kern PP-Seventh Standard 115 kV Line	C3	L-1-1	141	<100	<100	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-32	PTRL JCT-LIVE OAK 115 kV #1 Line	Kern PP-Seventh Standard 115 kV Line & Kern Oil-Witco 115 kV Line	C3	L-1-1	141	<100	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-33	PTRL JCT-LIVE OAK 115 kV #1 Line	Kern Oil-Dexel 115 kV Line & Kern Oil-Witco 115 kV Line	C3	L-1-1	109	111	114	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-34	LIVE OAK-KERN PWR 115 kV #1 Line	Kern PP-Seventh Standard 115 kV Line & Kern Oil-Witco 115 kV Line	C3	L-1-1	169	<100	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-35	LIVE OAK-KERN PWR 115 kV #1 Line	Kern Oil-Dexel 115 kV Line & Kern Oil-Witco 115 kV Line	C3	L-1-1	121	124	130	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-O-SP-T-36	KERN PWR 115/230 kV #3 Bank	Kern PP 230/115 kV #4 & #5 Bank	C3	T-1-1	149	152	106	Install SPS as part of the Kern PP 230 kV Area Reinforcement Project
KRN-O-SP-T-37	KERN PWR-KERNWATR 115 kV #1 Line	Westpark-Magunden 115 kV Line & (New) Magunden-Wheeler Ridge J 115 kV Line	C3	L-1-1	<100	<100	102	Short term: Action Plan Long term: Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-O-SP-T-38	KERN PWR-KERNWATR 115 kV #1 Line	Live Oak 115/9.11 kV GSU & Kern-Live Oak 115 kV Line	C3	L-1/T-1	123	124	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-O-SP-T-39	MIDWAY-CYMRIC 115 kV #1 Line	Midway-Taft 115 kV Line & Taft-Chalk Cliff 115 kV Line	C3	L-1-1	110	111	115	Generation dispatch/congestion management
KRN-O-SP-T-40	MIDWAY-OXYBVHPT 115 kV #1 Line	Taft-Chalk Cliff 115 kV Line & Fellows-Midsun 115 kV Line	C3	L-1-1	115	115	117	Generation dispatch/congestion management
KRN-O-SP-T-41	MIDSUN-FELLOWSG 115 kV #1 Line	Midway-Taft 115 kV Line & Taft-Chalk Cliff 115 kV Line	C3	L-1-1	123	124	126	Generation dispatch/congestion management
KRN-O-SP-T-42	CYMRIC-TEXCO_NM 115 kV #1 Line	Midway-Taft 115 kV Line & Taft-Chalk Cliff 115 kV Line	C3	L-1-1	112	113	115	Generation dispatch/congestion management
KRN-O-SP-T-43	MIDSET-TAFT 115 kV #1 Line	Midway-Taft 115 kV Line & Taft-Chalk Cliff 115 kV Line	C3	L-1-1	105	106	108	Generation dispatch/congestion management
KRN-O-SP-T-44	KERN PW2-KERN PW1 70 kV #1 Line	Kern-Old River #1 70 kV Line & Kern PP 115/70 kV #2 Bank	C3	L-1/T-1	134	138	<100	Short term: Action Plan (summer setup). Mitigated by the approved Kern PP 115 kV Area Reinforcement Project



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	Select..	

No high/low voltage concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Outlying - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Central - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-C-SP-T-01	7STNDRD-KERN PWR 115 kV #1 Line	BUS 2E FAULT AT 34752 KERN PWR 115 kV Sub	C1	BUS	106	107	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project
KRN-C-SP-T-02	TPMNTP1-TUPMAN 115 kV #1 Line	BKR FAILURE MIDWAY CB 392 115KV	C2	CB	136	141	153	Short term: Action Plan (Summer setup to open CB 182 to sectionalize Tupman 115kV sub) Long term: Kern 230 kV Area Reinforcement Project
KRN-C-SP-T-03	TPMNTP2-TUPMAN 115 kV #1 Line	BKR FAILURE MIDWAY CB 392 115KV	C2	CB	<100	<100	100	Short term: Action Plan (Summer setup to open CB 182 to sectionalize Tupman 115kV sub) Long term: Kern 230 kV Area Reinforcement Project
KRN-C-SP-T-04	KERN PWR 115/230 kV #3 Bank	BKR FAILURE KERN PP CB 102 115KV	C2	CB	<100	<100	106	Replace terminal limiting equipment to benefit from the full 420MVA transformer rating. Kern PP 230kV Area Reinforcement Project.
KRN-C-SP-T-05	KERN PP-STCKDLJ1 230 kV #1 Line	Midway-Kern 230 kV #3 & #4 Lines	C3	L-1-1	103	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project
KRN-C-SP-T-06	KERN PP-STCKDLJ2 230 kV #1 Line	Midway-Kern 230 kV #1 & #4 Lines	C3	L-1-1	103	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Central - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-C-SP-T-07	KERN PP-BKRSFDJ2 230 kV #1 Line	Midway-Kern 230 kV #1 & #3 Lines	C3	L-1-1	103	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project
KRN-C-SP-T-08	MIDWAY-STCKDLJ1 230 kV #1 Line	Midway-Kern 230 kV #3 & #4 Lines	C3	L-1-1	120	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project
KRN-C-SP-T-09	MIDWAY-STCKDLJ2 230 kV #1 Line	Midway-Kern 230 kV #1 & #4 Lines	C3	L-1-1	151	<100	<100	Short term: Action Plan Long term: Mitigated by the approved Midway-Kern PP #1, #3 & #4 230 kV Line Capacity Increase Project
KRN-C-SP-T-10	WESTPARK-KERN PWR 115 kV #1 Line	Kern PP-Westpark 115 kV #2 and Kern-Mgunden-Witco 115 kV Lines	C3	L-1-1	119	122	<100	Short term: Action Plan (summer setup). Long term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-C-SP-T-11	LIVE OAK-KERN PWR 115 kV #1 Line	Live Oak 115/9.11 kV GSU & Kern Oil-Witco 115 kV Line	C3	T-1/L-1	98	100	105	Convert Semitropic-Famoso-Kern PP-Kern Oil 70 kV to 115 kV system
KRN-C-SP-T-12	LRDO JCT-KERN OIL 115 kV #1 Line	Kern PP-Seventh Standard 115 kV Line & Mt Poso Gen Unit #1	C3	L-1/G-1	100	<100	<100	Short term: Action Plan (summer setup). Long term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Central - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-C-SP-T-13	KRN OL J-KERNWATR 115 kV #1 Line	Kern PP-Seventh Standard & Live Oak-Kern Oil 115 kV Lines	C3	L-1-1	102	<100	<100	Short term: Action Plan (summer setup). Long term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-C-SP-T-14	KRN OL J-KERNWATR 115 kV #1 Line	Kern-Live Oak 115 kV Line & Live Oak 115/9.11 kV GSU	C3	L-1/T-1	100	100	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project
KRN-C-SP-T-15	LIVE OAK-KERN PWR 115 kV #1 Line	Kern PP-Seventh Standard 115 & Kern Oil-Witco 115 kV Lines	C3	L-1-1	103	<100	<100	Short term: Action Plan (summer setup). Long term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-C-SP-T-16	KERN PWR 115/230 kV #3 Bank	Kern PP 230/115 kV #4 & #5 Banks	C3	T-1-1	153	159	108	Replace terminal limiting equipment to benefit from the full 420MVA transformer rating as part of the Kern PP 230kV Area Reinforcement Project.
KRN-C-SP-T-17	KERN PWR 115/230 kV #4 Bank	Kern PP 230/115 kV #3 & #5 Banks	C3	T-1-1	170	176	<100	Short term: Action Plan (Install SPS as part of the approved Kern PP 230 kV Area Reinforcement Project) Long term: Kern PP 230 kV Area Reinforcement Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Central - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
KRN-C-SP-T-18	KERN PWR 115/230 kV #5 Bank	Kern PP 230/115 kV #3 & #4 Banks	C3	T-1-1	110	114	<100	Short term: Action Plan (Install SPS as part of the approved Kern PP 230 kV Area Reinforcement Project) Long term: Kern PP 230 kV Area Reinforcement Project
KRN-C-SP-T-19	KERN PWR-TEVISJ2 115 kV #1 Line	Lamont-Q559 & Kern-Stockdale 115 kV Lines	C3	L-1-1	105	107	<100	Short term: Action Plan Long term: Wheeler Ridge Junction Station Project
KRN-C-SP-T-20	KERN PWR-KERNWATR 115 kV #1 Line	Kern PP-Seventh Standard & Live Oak-Kern Oil 115 kV Lines	C3	L-1-1	105	<100	<100	Short term: Action Plan (summer setup). Long term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-C-SP-T-21	KERN PWR-KERNWATR 115 #1 Line	Kern-Live Oak 115 kV Line & Live Oak 115/9.11 kV GSU	C3	L-1/T-1	102	103	<100	Short term: Action Plan (summer setup). Long term: Mitigated by the approved Kern PP 115 kV Area Reinforcement Project
KRN-C-SP-T-22	KERN PW2-KERN PW1 70 kV #1 Line	Kern-Old River 70 kV #1 Line & Kern PP 115/70 kV Bank #2	C3	L-1/T-1	129	134	105	Action Plan

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
KRN-C-NPK-T-01	MIDWAY 230/500 kV #12 Bank	BKR FAILURE MIDWAY CB 662 230 kV Sub	C2	CB	117	<100	N/A	Drop load/congestion management/SPS



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns were identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns were identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns were identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns were identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern Central - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-T-01	CRZY_HRS-NTVD SW1 115 kV #1 Line	MOSS LANDING 115 kV CB 120	C2	CB	149	<100	<100	Short term: existing Action Plan. Long term: Moss Landing BAAH Project
CC-SP-T-02	NTVD SW1-SALINAS 115 kV #1 Line	MOSS LANDING 115 kV CB 120	C2	CB	131	<100	<100	Short term: existing Action Plan. Long term: Moss Landing BAAH Project
CC-SP-T-03	CRZY_HRS-NTVD SW2 115 kV #1 Line	MOSS LANDING 115 kV CB 120	C2	CB	149	<100	<100	Short term: existing Action Plan. Long term: Moss Landing BAAH Project
CC-SP-T-04	NTVD SW2-SALINAS 115 kV #1 Line	MOSS LANDING 115 kV CB 120	C2	CB	131	<100	<100	Short term: existing Action Plan. Long term: Moss Landing BAAH Project
CC-SP-T-05	GREN VLY 60/115 kV #1 Bank	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-06	GRN VLY1-ERTA JCT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-07	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-08	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-T-09	WTSNVLE-AGRILINK 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-10	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-11	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-12	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-13	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-14	SALINAS2-SALINAS1 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-15	CRZY_HRS-NTVD SW2 115 kV #1 Line	Moss Landing-Salinas 115 kV #1 & #2 Lines	C3	L-1-1	145	<100	<100	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-T-16	CRZY_HRS-NTVD SW1 115 kV #1 Line	Moss Landing-Salinas 115 kV #1 & #2 Lines	C3	L-1-1	145	<100	<100	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-17	NTVD SW2-SALINAS 115 kV #1 Line	Moss Landing-Salinas 115 kV #1 & #2 Lines	C3	L-1-1	127	<100	<100	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-18	NTVD SW1-SALINAS 115 kV #1 Line	Moss Landing-Salinas 115 kV #1 & #2 Lines	C3	L-1-1	127	<100	<100	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-19	GREN VLY-GRN VLY1 115 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	387	<100	<100	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-20	GREN VLY-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	303	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-21	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	304	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-22	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	304	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-T-23	WTSNVLE-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Line	C3	L-1-1	305	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-24	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Line	C3	L-1-1	481	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-25	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Line	C3	L-1-1	482	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-26	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Line	C3	L-1-1	549	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-27	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Line	C3	L-1-1	549	N/A	N/A	Short term: Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-T-28	CRZY_HRS-NTVD SW1 115 kV #1 Line	Moss Landing - Salinas 115 kV #1 and #2 Lines	C5	L-2	145	<100	<100	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Natividad Substation Project
CC-SP-T-29	NTVD SW1-SALINAS 115 kV #1 Line	Moss Landing - Salinas 115 kV #1 and #2 Lines	C5	L-2	127	<100	<100	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Natividad Substation Project

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-T-30	CRZY_HRS-NTVD SW2 115 kV #1 Line	Moss Landing - Salinas 115 kV #1 and #2 Lines	C5	L-2	145	<100	<100	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Natividad Substation Project
CC-SP-T-31	NTVD SW2-SALINAS 115 kV #1 Line	Moss Landing - Salinas 115 kV #1 and #2 Lines	C5	L-2	127	<100	<100	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Natividad Substation Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC-WP-T-01	COBURN 230/60 kV #2 Bank	Coburn 230/60 kV #1 Bank	B	T-1	103	101	100	Activate the existing Coburn Special Protection Scheme (SPS)
CC-WP-T-02	GREN VLY 60/115 kV #1 Bank	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-03	GRN VLY1-ERTA JCT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-04	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-05	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-06	WTSNVLL-AGRILINK 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-07	WTSNVLL-GRANT JT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-08	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-09	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC-WP-T-10	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-11	SALINAS2-SALINAS1 60 kV #1 Line	Moss Landing 115 kV CB 110	C2	CB	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-12	COBURN 230/60 kV #2 Bank	Coburn 230/60 kV #1 Bank & King City-Coburn 60 kV #1 Line	C3	T-1/L-1	119	119	119	Activate the existing Coburn Special Protection Scheme (SPS)
CC-WP-T-13	GREN VLY 60/115 kV #1 Bank	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	442	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-14	GRN VLY1-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	270	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-15	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	272	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-16	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	272	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-17	WTSNVLE-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	272	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-18	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	466	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC-WP-T-19	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	440	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-20	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	545	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-21	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3	L-1-1	545	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-22	GREN VLY 60/115 kV #1 Bank	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	<100	<100	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-23	GRN VLY1-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-24	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-25	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-26	WTSNVLE-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-27	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC-WP-T-28	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-29	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-30	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-T-31	SALINAS2-SALINAS1 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5	L-2	Diverge	N/A	N/A	Short term: Existing Action Plan. Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC-NPK-T-01	COBURN 230/60 kV #2 Bank	Coburn 230/60 kV #1 Bank	B		110	<100	N/A	Activate Existing Coburn Special Protection Scheme
CC-NPK-T-02	S ARDOJ2-TEXCO J2 60 kV #1 Line	Coburn-Oil Fields 60 kV #2 Line	B		<100	103	N/A	Monitor line loading and reconductor if needed
CC-NPK-T-03	TEXCO J2-OILFLDS 60 kV #1 Line	Coburn-Oil Fields 60 kV #2 Line	B		<100	102	N/A	Monitor line loading and reconductor if needed
CC-NPK-T-04	TEXCO J1-OILFLDS 60 kV #1 Line	Coburn-Oil Fields 60 kV #1 Line	B		<100	103	N/A	Monitor line loading and reconductor if needed
CC-NPK-T-05	GREN VLY 60/115 kV #1 Bank	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-06	GRN VLY1-ERTA JCT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-07	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-08	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-09	WTSNVLE-AGRILINK 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-10	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC-NPK-T-11	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-12	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-13	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing 115 kV CB 110	C2		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-14	COBURN 230/60 kV #2 Bank	King City-Coburn 60 kV #1 Line & Coburn 230/60 kV #1 Bank	C3		123	N/A	N/A	Activate Existing Coburn Special Protection Scheme
CC-NPK-T-15	GREN VLY 60/115 kV #1 Bank	Salinas 115/60 kV #2 & #3 Banks	C3		237	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-16	GRN VLY1-ERTA JCT 60 kV #1 Line	Salinas 115/60 kV #2 & #3 Banks	C3		177	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-17	CIC JCT-AGRILINK 60 kV #1 Line	Salinas 115/60 kV #2 & #3 Banks	C3		176	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-18	WTSNVLE-AGRILINK 60 kV #1 Line	Salinas 115/60 kV #2 & #3 Banks	C3		175	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-19	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3		267	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC-NPK-T-20	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3		267	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-21	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3		304	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-22	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C3		304	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-23	GREN VLY 60/115 kV #1 Bank	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-24	GRN VLY1-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-25	CIC JCT-ERTA JCT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-26	CIC JCT-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-27	WTSNVLE-AGRILINK 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-28	WTSNVLE-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC-NPK-T-29	BRIGTANO-GRANT JT 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-30	BRIGTANO-LGNSTAP 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-NPK-T-31	LGNSTAP-SALINAS2 60 kV #1 Line	Moss Landing-Green Valley 115 kV #1 & #2 Lines	C5		Diverge	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project

Study Area: **PG&E Central Coast - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-VD-01	GREN VLY 60 kV	Green Valley 115/60 #1 Bank	B	T-1	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-02	ERTA 60 kV	Green Valley 115/60 #1 Bank	B	T-1	14	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-03	AGRILINK 60 kV	Green Valley 115/60 #1 Bank	B	T-1	13	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-04	WTSNVILLE 60 kV	Green Valley 115/60 #1 Bank	B	T-1	13	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-05	GRANT RK 60 kV	Green Valley 115/60 #1 Bank	B	T-1	9	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-06	BRIGHTANO 60 kV	Green Valley 115/60 #1 Bank	B	T-1	9	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-07	ERTA 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	14	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-08	AGRILINK 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	13	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project

Study Area: **PG&E Central Coast - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-VD-09	GREN VLY 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	14	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-10	WTSNVLL 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	13	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-11	ERTA 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	14	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-12	AGRILINK 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	13	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-13	GREN VLY 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	14	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-14	WTSNVLL 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	13	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project
CC-SP-VD-15	DOLAN RD 115 kV	MOSS LANDING 115 kV CB 120	C2	CB	9	10.202	11.474	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project and Moss Landing BAAH Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC_WP_VD_01	GREN VLY 60 kV	Green Valley 115/60 #1 Bank	B	T-1	17	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_02	ERTA 60 kV	Green Valley 115/60 #1 Bank	B	T-1	16	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_03	AGRILINK 60 kV	Green Valley 115/60 #1 Bank	B	T-1	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_04	WTSNVLLE 60 kV	Green Valley 115/60 #1 Bank	B	T-1	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_05	GRANT RK 60 kV	Green Valley 115/60 #1 Bank	B	T-1	11	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_06	BRIGTANO 60 kV	Green Valley 115/60 #1 Bank	B	T-1	10	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_07	GREN VLY 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	17	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_08	ERTA 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	16	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_09	AGRILINK 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_10	WTSNVLLE 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_11	GRANT RK 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	11	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC_WP_VD_12	BRIGHTANO 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	10	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_13	GREEN VLY 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	17	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_14	ERTA 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	16	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_15	AGRILINK 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_16	WTSNVILLE 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	15	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_17	GRANT RK 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	10	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project
CC_WP_VD_18	BRIGHTANO 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	10	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC_NPK_VD_01	GREN VLY 60 kV	Green Valley 115/60 #1 Bank	B	T-1	9	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC_NPK_VD_02	ERTA 60 kV	Green Valley 115/60 #1 Bank	B	T-1	9	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC_NPK_VD_03	AGRILINK 60 kV	Green Valley 115/60 #1 Bank	B	T-1	8	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC_NPK_VD_04	WTSNVLE 60 kV	Green Valley 115/60 #1 Bank	B	T-1	8	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC_NPK_VD_05	GRANT RK 60 kV	Green Valley 115/60 #1 Bank	B	T-1	6	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC_NPK_VD_06	BRIGTANO 60 kV	Green Valley 115/60 #1 Bank	B	T-1	6	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
CC-SP-V-01	ERTA 60 kV	Base Case	A	Normal	1.06	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-SP-V-02	AGRILINK 60 kV	Base Case	A	Normal	1.05	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-SP-V-03	WTSNVILLE 60 kV	Base Case	A	Normal	1.05	N/A	N/A	Short term: Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-SP-V-04	CSTRVILLE 115 kV	Base Case	A	Normal	1.05	<1.05	<1.05	Under review with PTO
CC-SP-V-05	DOLAN RD 115 kV	Base Case	A	Normal	1.05	<1.05	<1.05	Under review with PTO

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
CC-WP-V-01	ERTA 60 kV	Base Case	A	Normal	1.05	N/A	N/A	Under review with PTO
CC-WP-V-02	DOLAN RD 115 kV	Base Case	A	Normal	1.06	1.05	<1.05	Under review with PTO
CC-WP-V-03	CSTRVLE 115 kV	Base Case	A	Normal	1.05	1.05	<1.05	Under review with PTO
CC-WP-V-04	ERTA 60 kV	B3_8_Green Valley 115/60 Transformer #1	B	T-1	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-05	AGRILINK 60 kV	B3_8_Green Valley 115/60 Transformer #1	B	T-1	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-06	WTSNVLE 60 kV	B3_8_Green Valley 115/60 Transformer #1	B	T-1	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-07	ERTA 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-08	AGRILINK 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-09	WTSNVLE 60 kV	BUS FAULT AT GRN VLY1 115 kV Sub	C1	BUS	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-10	ERTA 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-11	AGRILINK 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project
CC-WP-V-12	WTSNVLE 60 kV	GREEN VALLEY 115 kV CB 102	C2	CB	0.89	N/A	N/A	Short term: Existing Action Plan Long term: Watsonville 115 kV Voltage Conversion Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC-NPK-V-01	CRUSHER 60 kV	Base Case	A	Normal	1.06	<1.05	N/A	Under review with PTO
CC-NPK-V-02	BIG BASN 60 kV	Base Case	A	Normal	1.06	<1.05	N/A	Under review with PTO
CC-NPK-V-03	LONE STR 60 kV	Base Case	A	Normal	1.06	<1.05	N/A	Under review with PTO
CC-NPK-V-04	PT MRTTI 60 kV	Base Case	A	Normal	1.06	<1.05	N/A	Under review with PTO
CC-NPK-V-05	HOLST D 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-06	ROB ROY 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-07	SALINAS 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-08	SOLEDAD 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-09	BRIGTANO 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-10	CSTRVLE 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-11	DEL MNTE 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-12	DOLAN RD 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-13	GRANT RK 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-14	GRN VLY1 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-15	GRN VLY2 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO
CC-NPK-V-16	HOLLISTR 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
CC-NPK-V-17	NATIVDAD 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-18	PRUNEDLE 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-19	SNBENITO 115 kV	Base Case	A	Normal	<1.05	1.06	N/A	Under review with PTO
CC-NPK-V-20	WTSNVILLE 115 kV	Base Case	A	Normal	<1.05	1.05	N/A	Under review with PTO



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Winter Peak	2019 Winter Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Winter Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Central Coast - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-SP-T-01	SAN MIGL-COLNGA 1 70 kV #1 Line	Templeton 230/70 kV #1 Bank	B	T-1	Diverge	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-02	SN LS OB-CARRIZO 115 kV #1 Line	MORRO BAY 230 kV CB 612	C2	CB	Diverge	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-03	SAN MIGL-COLNGA 1 70 kV #1 Line	Estrella 230/70 kV & Templeton 230/70 kV Banks	C3	T-1-1	<100	210	216	Install SPS to trip Q877 as part of the Estrella Project
LP-SP-T-04	SAN MIGL-ESTRELLA 70 kV #1 Line	Estrella 230/70 kV & Templeton 230/70 kV Banks	C3	T-1-1	<100	181	185	Install SPS to trip Q877 as part of the Estrella Project
LP-SP-T-05	ESTRELLA-PSA RBLS 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	<100	109	108	Install SPS to trip Q877 as part of the Estrella Project
LP-SP-T-06	MORRO BY 115/230 kV #6 Bank	Mesa 230/115 kV Bank #2 & #3	C3	T-1-1	146	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Morro Bay Transformer Addition Project
LP-SP-T-07	SAN MIGL-COLNGA 1 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	229	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-08	SAN MIGL-PSA RBLS 70 kV #1 Line	Templeton-Gates 230 kV Line & Templeton 230/70 kV Bank	C3	L-1/T-1	175	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-09	TEMPL7-TEMPL J2 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	138	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-10	TEMPL J2-ATASCDRO 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	132	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-SP-T-11	ATASCDRO-SN LS OB 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	171	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-12	ATASCDRO-CACOS J2 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	126	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-13	CACOS J2-CAYUCOS 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	131	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-14	MUSTNG J-SN LS OB 70 kV #1 Line	Morro Bay-Templeton & Templeton-Gates 230 kV Lines	C3	L-1-1	153	<100	<100	Short term: Existing Action Plan Long term: Mitigated by the Estrella Substation Project
LP-SP-T-15	MORRO BY-GLDTRJC1 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	137	149	<100	Short term: Action Plan - - modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-16	GLDTRJC1-FTHILTP2 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	124	138	<100	Short term: Action Plan - - modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-17	FTHILTP2-SN LS OB 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	125	139	<100	Short term: Action Plan - - modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-SP-T-18	MORRO BY-GLDTRJC2 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	133	146	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-19	GLDTRJC2-FTHILTP1 115 kV #1 Line	Mesa 230/115 kV Bank #2 & #3	C3	T-1-1	133	145	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-20	FTHILTP1-SN LS OB 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	128	141	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-21	SN LS OB-CARRIZO 115 kV #1 Line	Morro Bay-Mesa & Morro Bay-Diablo 230 kV Lines	C3	L-1-1	139	130	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-22	SN LS OB-SNTA MRA 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	276	307	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-SP-T-23	SNTA MRA-FRWAYTP 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	117	114	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-24	SNTAMRTP-FAIRWAY 115 kV #1 Line	Mesa 230/115 kV Bank #2 & #3	C3	T-1-1		101	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-25	SN LS OB-OCEANO 115 kV #1 Line	Morro Bay-Diablo & Diablo-Mesa 230 kV Lines	C3	L-1-1	228	250	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-26	OCEANO-UNION OL 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	181	201	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-27	MESA_PGE-UNION OL 115 kV #1 Line	Morro Bay-Mesa & Diablo-Mesa 230 kV Lines	C3	L-1-1	181	193	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-SP-T-28	MESA_PGE-S.M.ASSO 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	140	<100	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-29	S.M.ASSO-SISQUOC 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	140	<100	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-30	SISQUOC-PALMR 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	302	286	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-31	PALMR-ZACA 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	298	282	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-32	S.YNZ JT-ZACA 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	334	317	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-SP-T-33	S.YNZ JT-CABRILLO 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	120	114	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-34	LOMPCJ1-CABRILLO 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	110	104	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-35	SURF JCT-LOMPCJ1 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	110	104	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project
LP-SP-T-36	SN LS OB-CARRIZO 115 kV #1 Line	Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	C5	L-1-1	135	125	<100	Short term: Action Plan -- modified Santa Maria /Mesa SPS/UVLS Long term: Midway-Andrew 230 kV Project

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
LP-NPK-T-01	SAN MIGL-COLNGA 1 70 kV #1 Line	Paso Robles-Templeton 70 kV Line	B	L-1	115	<100	N/A	Install SPS to trip Q877 as part of the Estrella Project
LP-NPK-T-02	SN LS OB-SNTA MRA 115 kV #1 Line	Morro Bay-Diablo & Morro Bay-Mesa 230 kV Lines	C3	L-1-1	112	105	N/A	Install SPS to trip Q877 as part of the Estrella Project
LP-NPK-T-03	SISQUOC-PALMR 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	116	108	N/A	Short term: Action Plan Long term: Mitigated by the Midway-Andrew 230 kV Project
LP-NPK-T-04	PALMR-ZACA 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	114	107	N/A	Short term: Action Plan Long term: Mitigated by the Midway-Andrew 230 kV Project
LP-NPK-T-05	S.YNZ JT-ZACA 115 kV #1 Line	Mesa-Divide 115 kV #1 & #2 Lines	C3	L-1-1	129	121	N/A	Short term: Action Plan Long term: Mitigated by the Midway-Andrew 230 kV Project



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **PG&E Los Padres - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
Bulk-SP-T-1	Lugo – Victorville 500 kV line	Eldorado–Lugo 500 kV line	B	L-1	<100%	<100%	95%	System adjustments after initial contingency including bypassing series caps per ISO OP 6610, utilizing Preferred Resources and Energy Storage (PR&ES) along with the recently approved Delaney–Colorado River 500 kV line.
		Eldorado–Lugo & Eldorado–Mohave or Mohave–Lugo 500 kV lines	C	L-1/L-1	<100%	<100%	125%	
		Eldorado–Lugo & N.Gila–Imperial Valley 500 kV lines	C	L-1/L-1	<100%	<100%	110%	
Bulk-SP-T-2	Otay Mesa–Tijuana 230 kV line or other CFE facilities that trigger tripping of the line (worst loading reported)	Eco–Miguel & Ocotillo–Suncrest 500 kV lines (without system adjustments after initial contingency)	C	L-1/L-1	164%	129%	111%	System adjustments after initial contingency including generation redispatch (2016SP & 2019SP), dispatching existing and authorized PR&ES in SCE and SDGE areas (2024SP), adjusting ISO approved phase shifter (2019SP & 2024SP), and bypassing 500 kV series capacitors as needed. Review the Path 44 flow threshold setting of the SDGE safety net (2016SP).
	N/A	Eco–Miguel & Ocotillo–Suncrest 500 kV lines with Otay Mesa–Tijuana 230 kV line tripped (without system adjustments after initial contingency)	C	L-1/L-1	Diverged	Diverged	Diverged	



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No thermal overload concerns identified.

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	N/A	N/A	
Bulk-WOR/EOR -T-1	Devers–Vista 230 kV line	Devers–Valley #1 & #2 500 kV lines after tripping participating generation per WOD RAS	C	L-2	102%			ISO Operating Procedure OP 7750 or WOD RAS Safety net
Bulk-WOR/EOR -T-2	Diverged	Palo Verde–Colorado River & Imperial Valley–N.Gila 500 kV lines (without reducing transfers on WOR & EOR after the initial contingency)	C	L-1/L-1	Diverged			Reduce transfers on WOR/EOR after initial contingency
Bulk-WOR/EOR -T-3	Lugo–Victorville 500 kV line	Palo Verde–Colorado River & Eldorado–Lugo 500 kV lines (without reducing transfers on WOR & EOR after the initial contingency)	C	L-1/L-1	128%			
Bulk-WOR/EOR -T-4	Eldorado–Moenkopi 500 kV line	Navajo–Crystal & Perkins–Mead or Perkins–Westwing 500 kV lines (without reducing transfers on WOR & EOR after the initial contingency)	C	L-1/L-1	130%			
Bulk-WOR/EOR -T-5	Navajo–Crystal 500 kV line series capacitors	Eldorado–Moenkopi & Perkins–Mead or Perkins–Westwing 500 kV lines (without reducing transfers on WOR & EOR after the initial contingency)	C	L-1/L-1	126%			



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No voltage deviation concerns identified.



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No thigh/low voltage concerns identified.



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No high/low voltage concerns identified.



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No high/low voltage concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: Consolidated Southern CA SCE - Summer Off-Peak & Summer Light Load



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No transient stability concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	N/A	N/A	
Bulk-WOR/EOR-TS-1	Palo Verde–Colorado River & Imperial Valley–N.Gila 500 kV lines (without reducing transfers on WOR & EOR after the initial contingency)	C	L-1/L-1	Diverged			Reduce transfers on WOR/EOR after initial contingency



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient thermal concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No post-transient thermal overloads concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No post-transient thermal overloads concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: Consolidated Southern CA SCE - Summer Off-Peak & Summer Light Load



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No post-transient voltage deviation concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No post-transient voltage deviation concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Consolidated Southern CA SCE - Summer Peak**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Consolidated Southern CA SCE - Summer Off-Peak & Summer Light Load**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No single source substation with more than 100 MW Load



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SP-T-1	Big Creek 3 - Rector #1 230 kV	Big Creek 1 - Rector #1 & Big Creek 3 - Rector #2 230 kV	C	L-1/L-1	102%	102%	100%	Manually reduce big creek generation after first contingency to mitigate overload for the second contingency.



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns were identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns were identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns were identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Peak**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns were identified.



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns were identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns were identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Off-Peak & Summer Light Load**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No transient stability concerns were identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient thermal overload concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient thermal overload concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient thermal overload concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Off-Peak & Summer Light Load**



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	2024 Fall/Winter	

No post-transient thermal overload concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Peak**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Tehachapi & Big Creek Corridor - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No thermal overload concerns identified.

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	Select..	

No high/low voltage concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No transient stability concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient thermal overload concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient thermal overload concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE North of Lugo - Summer Off-Peak & Summer Light Load**



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient voltage deviations concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE North of Lugo - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE North of Lugo - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE North of Lugo - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No thermal overload concerns identified.



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE East of Lugo - Summer Off-Peak & Summer Light Load**



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No transient stability concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE East of Lugo - Summer Peak**

Post-Transient Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
EOL-SP-PTT-1	Lugo - Victorville 500kV line	Palo Verde - Col River 500kV line + IV - North Gila 500kV line	C	N-1-1	111%	<100%	<100%	Please refer to SCE Bulk system results
EOL-SP-PTT-2	Lugo - Victorville 500kV line	Lugo - Eldorado 500kV line + Lugo - Mohave 500kV line	C	N-1-1	<100%	<100%	125%	Please refer to SCE Bulk system results



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient thermal overload concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient voltage overload concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient voltage deviation concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE East of Lugo - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE East of Lugo - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE East of Lugo - Summer Off-Peak & Summer Light Load**



Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

See post transient thermal loading results.

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
EOD-NP-V-1	Buck Boulevard	Julian Hinds–Mirage 230 kV line & Julian Hinds 230 kV reactor	C	L-1/N-1	< 1.1 p.u.	1.1 p.u.	N/A	System adjustment after initial or second contingency.

Transient Stability



ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
EOD-SP-TS-1	Julian Hinds–Mirage & Eagle Mountain–Iron Mountain 230 kV lines	C	C3	Diverged	Diverged	Diverged	System adjustments after initial contingency per SCE OP 128 and ISO OP 7720F.
EOD-SP-TS-2	Julian Hinds–Mirage & Iron Mountain–Camino–Mead–Gene 230 kV lines	C	C3	Did not meet voltage dip requirements	Diverged	Diverged	

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Off-Peak & Summer Light Load**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	
EOD-NP-TS-1	Julian Hinds–Mirage & Eagle Mountain–Iron Mountain 230 kV lines	C	C3	Unstable	Met requirements	N/A	System adjustments after initial contingency per ISO OP 7720F.
EOD-NP-TS-2	Julian Hinds–Mirage & Iron Mountain–Camino–Mead–Gene 230 kV lines	C	C3	Unstable	Met requirements	N/A	



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
EOD-SP-PTT-1	Julian Hinds 161 kV Bus Section	Julian Hinds–Mirage & Eagle Mountain–Iron Mountain 230 kV lines	C	C3	<100%	Diverged	100%	System adjustments after initial contingency per SCE OP 128 and ISO OP 7720F.
EOD-SP-PTT-2	Julian Hinds 161 kV Bus Section	Julian Hinds–Mirage & Iron Mountain–Camino–Mead–Gene 230 kV lines	C	C3	<100%	Diverged	101%	



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
EOD-NP-PTT-1	N/A	Julian Hinds–Mirage & Eagle Mountain–Iron Mountain 230 kV lines	C	C3	Diverged	<100%		System adjustments after initial contingency per ISO OP 7720F.
EOD-NP-PTT-2	N/A	Julian Hinds–Mirage & Iron Mountain–Camino–Mead–Gene 230 kV lines	C	C3	Diverged	<100%		



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Off-Peak & Summer Light Load**



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient voltage deviation concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Off-Peak & Summer Light Load**



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Eastern area - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
Metro-SP-T-1	Mesa-Laguna Bell 230 kV #1 line	Mesa-Laguna Bell #2 230 kV line	B	L-1	<100%	<100%	102%	Increase emergency rating of the line and utilize available Preferred Resources and Energy Storage (PR&ES) after initial contingency as needed
		Mesa-Laguna Bell #2 230 kV line & Malburg CC Module	B	G-1/L-1	<100%	<100%	111%	
		Mesa-Laguna Bell #2 & Mesa-Litehipte 230 kV lines	C	L-2	<100%	<100%	128%	
		Mesa-Litehipte & Mesa-Redondo 230 kV lines (multiple other N-1/N-1 contingencies)	C	L-1/L-1	<100%	<100%	137%	
Metro-SP-T-2	Mesa-Laguna Bell 230 kV #2 line	Mesa-Redondo & Mesa-Laguna Bell #1230 kV lines	C	L-2	<100%	<100%	110%	Increase emergency rating of the line
Metro-SP-T-3	Mesa-Litehipte 230 kV line	Mesa-Laguna Bell #1 230 kV line & Orange County Area Proxy CC Module	B	G-1/L-1	<100%	<100%	101%	Increase emergency rating of the line
		Mesa-Laguna Bell #1 & Mesa-Redondo 230 kV lines	C	L-2	<100%	<100%	106%	
		Mesa-Laguna Bell #1 & Mesa-Litehipte 230 kV lines	C	L-1/L-1	<100%	<100%	110%	
Metro-SP-T-4	Vincent 500/230 kV #1 transformer	Vincent-Mesa 500 kV line & Vincent 500/230 kV #4 transformer	C	L-1/T-1	<100%	<100%	113%	System adjustments after second contingency including closing Vincent 230 kV bus tie .
Metro-SP-T-5	Ellis-Santiago 230 kV line	Ellis-Johanna 230 kV & Imperial Valley-N.Gila 500 kV lines	C	L-1/L-1	<100%	102%	< 100%	Dispatch generation in the San Diego area after initial contingency.
Metro-SP-T-6	Mira Loma 500/230 kV #4 transformer	Lugo-Rancho Vista & Mira Loma-Serrano 500 kV lines	C	L-1/L-1	119%	107%	95%	System adjustments after second contingency including closing Mira Loma-Rancho Vista 500 kV tie.

Study Area: **SCE Metro - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
Metro-SP-T-7	Serrano 500/230 kV transformers	Two Serrano 500/230 kV transformers	C	T-1/T-1	<100%	<100%	111%	System adjustments after second contingency including dispatching PR&ES.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No voltage deviation concerns identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No high/low voltage concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No high/low voltage concerns identified.



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Off-Peak & Summer Light Load**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No transient stability concerns identified.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient thermal overload concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient thermal overload concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient voltage deviation concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Off-Peak & Summer Light Load**



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
Metro-NP-PTVD-1	El Casco 230/115 kV System	El Casco – San Bernardino 230 kV line	B	L-1	5.20%	< 5%	N/A	Temporary exemption from applicable ISO voltage deviation standard until WOD Project is in service.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **SCE Metro - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-T-1	18003 AMARGOSA 230 18030 AMARGOSA 138 1	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	96%	100%	104%	Operational action plan (Radialize the 138kV system in VEA and serve from three separate sources after the first N-1) or rely on UVLS
VEA-SP-T-2	18023 PAHRUMP 230 18085 PAHRUMP 138 1	line_15_SANDY -GAMEBIRD 138 Ckt. 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	91%	94%	102%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-T-3	18023 PAHRUMP 230 18085 PAHRUMP 138 1	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	100%	103%	101%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-T-4	18023 PAHRUMP 230 18085 PAHRUMP 138 1	tran_66_PAHRUMP 138/230-kV Tran Bnk 2 + line_2_JACKASSF -LTHRPWLS 138 Ckt. 1	C	N-1-1	95%	100%	100%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-T-5	18023 PAHRUMP 230 18085 PAHRUMP 138 1	tran_66_PAHRUMP 138/230-kV Tran Bnk 2 + line_48_JACKASSF -LTHRPWLS 138 Circuit 1	C	N-1-1	95%	100%	100%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-T-6	18023 PAHRUMP 230 18085 PAHRUMP 138 2	line_15_SANDY -GAMEBIRD 138 Ckt. 1 + tran_65_PAHRUMP 138/230-kV Tran Bnk 1	C	N-1-1	91%	94%	101%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-T-7	18023 PAHRUMP 230 18085 PAHRUMP 138 2	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + tran_65_PAHRUMP 138/230-kV Tran Bnk 1	C	N-1-1	99%	102%	100%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-T-8	19012 MEAD S 230 18909 BOB SS 230 1	line_154_Line LUGO 500.0 to VICTORVL 500.0 Circuit + line_85_Line ELDORDO 500.0 to MCCULLGH 500.0 Circuit 1	C	N-1-1	<90%	<90%	103%	Congestion management or Operational action plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-T-9	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + line_160_Line CRYSTAL 500.0 to MCCULLGH 500.0 Circuit	C	N-1-1	<90%	<90%	101%	Congestion management or Operational action plan
VEA-SP-T-10	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + line_178_Line N.GILA 500.0 to IMPRLVLY 500.0 Circuit	C	N-1-1	<90%	<90%	102%	Congestion management or Operational action plan
VEA-SP-T-11	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + line_79_Line MOENKOPI 500.0 to ELDORDO 500.0 Circuit 1	C	N-1-1	<90%	<90%	109%	Congestion management or Operational action plan
VEA-SP-T-12	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + tran_131_Tran ELDORDO 500.00 to ELDORDO 230.00 Circui	C	N-1-1	<90%	<90%	100%	Congestion management or Operational action plan
VEA-SP-T-13	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + tran_132_Tran ELDORDO 500.00 to ELDORDO 230.00 Circui	C	N-1-1	<90%	<90%	100%	Congestion management or Operational action plan
VEA-SP-T-14	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + tran_98_Tran ELDORDO 500.00 to ELDORDO 230.00 Circuit	C	N-1-1	<90%	<90%	100%	Congestion management or Operational action plan
VEA-SP-T-15	19012 MEAD S SS 230 1	230 18909 BOB line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit + tran_99_Tran ELDORDO 500.00 to ELDORDO 230.00 Circuit	C	N-1-1	<90%	<90%	100%	Congestion management or Operational action plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-T-16	19012 MEAD S SS 230 1	230 18909 BOB line_160_Line CRYSTAL 500.0 to MCCULLGH 500.0 Circuit + line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit	C	N-1-1	<90%	<90%	101%	Congestion management or Operational action plan
VEA-SP-T-17	19012 MEAD S SS 230 1	230 18909 BOB line_178_Line N.GILA 500.0 to IMPRLVLY 500.0 Circuit + line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit	C	N-1-1	<90%	<90%	102%	Congestion management or Operational action plan
VEA-SP-T-18	19012 MEAD S SS 230 1	230 18909 BOB line_79_Line MOENKOPI 500.0 to ELDORDO 500.0 Circuit 1 + line_158_Line MEAD 500.0 to MARKETPL 500.0 Circuit	C	N-1-1	<90%	<90%	109%	Congestion management or Operational action plan
VEA-SP-T-19	19012 MEAD S SS 230 1	230 18909 BOB line_79_Line MOENKOPI 500.0 to ELDORDO 500.0 Circuit 1 + line_85_Line ELDORDO 500.0 to MCCULLGH 500.0 Circuit 1	C	N-1-1	<90%	<90%	124%	Congestion management or Operational action plan
VEA-SP-T-20	19012 MEAD S SS 230 1	230 18909 BOB line_85_Line ELDORDO 500.0 to MCCULLGH 500.0 Circuit 1 + line_154_Line LUGO 500.0 to VICTORVL 500.0 Circuit	C	N-1-1	<90%	<90%	103%	Congestion management or Operational action plan
VEA-SP-T-21	19012 MEAD S SS 230 1	230 18909 BOB line_85_Line ELDORDO 500.0 to MCCULLGH 500.0 Circuit 1 + line_79_Line MOENKOPI 500.0 to ELDORDO 500.0 Circuit 1	C	N-1-1	<90%	<90%	124%	Congestion management or Operational action plan



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No thermal overload concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-VD-1	BOB SS 230 kV	line_3_MEAD S -BOB SS 230 Ckt. 1	B	N-1	5%	<5%	<5%	Add to the exception list or dynamic reactive support
VEA-SP-VD-2	INNOVATION 230 kV	line_1_NWEST -DESERT VIEW -INNOVATION 230-kV Ckt. 1	B	N-1	6%	6%	6%	Add to the exception list or dynamic reactive support
VEA-SP-VD-3	SANDY 138 kV	tran_66_PAHRUMP 138/230-kV Tran Bnk 2 + tran_65_PAHRUMP 138/230-kV Tran Bnk 1	C	N-1-1	<10%	12%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-4	VISTA 138 kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDIAIR 138 Ckt. 1	C	N-1-1	12%	14%	14%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-5	VISTA 138 kV	tran_66_PAHRUMP 138/230-kV Tran Bnk 2 + tran_65_PAHRUMP 138/230-kV Tran Bnk 1	C	N-1-1	13%	15%	14%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-6	BEATTY 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	<10%	11%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-7	BEATTY 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	<10%	11%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-8	JOHNNIE 138 kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDIAIR 138 Ckt. 1	C	N-1-1	<10%	13%	13%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-9	JOHNNIE 138 kV	tran_66_PAHRUMP 138/230-kV Tran Bnk 2 + tran_65_PAHRUMP 138/230-kV Tran Bnk 1	C	N-1-1	12%	13%	13%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-10	PAHRUMP 138 kV	tran_66_PAHRUMP 138/230-kV Tran Bnk 2 + tran_65_PAHRUMP 138/230-kV Tran Bnk 1	C	N-1-1	14%	16%	15%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-11	TWEEZER 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	15%	16%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-VD-12	TWEEZER 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	15%	16%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-13	BONDGDP 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	<10%	11%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-14	BONDGDP 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	<10%	11%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-15	CHARLSTN 138 kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDIAIR 138 Ckt. 1	C	N-1-1	13%	16%	16%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-16	CHARLSTN 138 kV	line_14_PAHRUMP -GAMEBIRD 138 Ckt. 1 + line_19_VISTA -CHARLSTN 138 Ckt. 1	C	N-1-1	12%	14%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-17	CHARLSTN 138 kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	13%	15%	14%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-18	GAMEBIRD 138 kV	line_14_PAHRUMP -GAMEBIRD 138 Ckt. 1 + line_19_VISTA -CHARLSTN 138 Ckt. 1	C	N-1-1	11%	12%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-19	GAMEBIRD 138 kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	14%	15%	14%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-20	JACKASSF 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	12%	13%	0%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-21	JACKASSF 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	12%	13%	0%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-22	LTHRPWLS 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	<10%	11%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-VD-23	LTHRPWLS 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	<10%	11%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-24	MERCYSW 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	16%	17%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-25	MERCYSW 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	16%	17%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-26	MERC_DIST 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	16%	17%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-27	MERC_DIST 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	16%	17%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-28	INNOVATION 230 kV	line_8_PAHRUMP -INNOVATION 230 Ckt. 1 + line_1_NWEST -DESERT VIEW -INNOVATION 230-kV Ckt. 1	C	N-1-1	11%	11%	11%	Operational action plan (Radialize the 138kV system in VEA and serve from three separate sources after the first N-1) or rely on UVLS
VEA-SP-VD-29	STOCK_WASH 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	13%	14%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-30	STOCK_WASH 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	13%	14%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-31	VALLEY_NTS 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	14%	16%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-32	VALLEY_NTS 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	14%	16%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-33	FRENCH_FLAT 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	15%	16%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-VD-34	FRENCH_FLAT 138 kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	15%	16%	<10%	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-VD-35	CRAZY EYE SS 230 kV	line_47_LENZIE 500 -NWEST 500 Circuit 1 + line_6_CRAZY EYE SS -BOB SS 230 Ckt. 1	C	N-1-1	<10%	6%	<10%	Congestion management to prevent overload on Mead - Bob 230kV line or Operational action plan

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Off-Peak & Summer Light Load**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
VEA-NP-VD-1	INNOVATION 230 kV	line_8_PAHRUMP -INNOVATION 230 Ckt. 1 + line_1_NWEST -DESERT VIEW -INNOVATION 230-kV Ckt. 1	C	N-1-1	<10%	11%	N/A	Operational action plan (Lock/adjust the 230/138kV and 138/24kV taps after the first N-1) or set the UVLS to monitor HV side

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-V-1	SANDY 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	>0.90	0.90	>0.90	Operational action plan (Radialize the 138kV system in VEA and serve from three separate sources after the first N-1) or rely on UVLS
VEA-SP-V-2	VISTA 138kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDAIR 138 Ckt. 1	C	N-1-1	0.89	0.86	0.86	Operational action plan (Radialize the 138kV system in VEA and serve from three separate sources after the first N-1) or rely on UVLS
VEA-SP-V-3	VISTA 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	0.89	0.87	0.88	Operational action plan (Radialize the 138kV system in VEA and serve from three separate sources after the first N-1) or rely on UVLS
VEA-SP-V-4	BEATTY 138kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-5	BEATTY 138kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-6	CANYON 138kV	line_31_CANYON -SNOW MTN 138 Circuit 1 + line_5_PAHRUMP -CRAZY EYE SS 230 Ckt. 1	C	N-1-1	>0.90	0.88	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-7	CANYON 138kV	line_31_CANYON -SNOW MTN 138 Circuit 1 + line_6_CRAZY EYE SS -BOB SS 230 Ckt. 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-8	IS TAP 138kV	line_22_INNOVATION -MERCYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.76	0.75	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-9	JOHNNIE 138kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDAIR 138 Ckt. 1	C	N-1-1	>0.90	0.87	0.87	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-10	JOHNNIE 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	0.90	0.88	0.89	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-V-11	PAHRUMP 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	0.88	0.86	0.88	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-12	PAHRUMP 230kV	line_47_LENZIE 500 -NWEST 500 Circuit 1 + line_5_PAHRUMP -CRAZY EYE SS 230 Ckt. 1	C	N-1-1	0.90	0.88	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-13	PAHRUMP 230kV	line_47_LENZIE 500 -NWEST 500 Circuit 1 + line_6_CRAZY EYE SS -BOB SS 230 Ckt. 1	C	N-1-1	>0.90	0.88	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-14	TWEEZER 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.83	0.82	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-15	TWEEZER 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.83	0.82	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-16	BONDGDTP 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-17	BONDGDTP 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-18	CHARLSTN 138kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDAIR 138 Ckt. 1	C	N-1-1	0.88	0.85	0.85	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-19	CHARLSTN 138kV	line_14_PAHRUMP -GAMEBIRD 138 Ckt. 1 + line_19_VISTA -CHARLSTN 138 Ckt. 1	C	N-1-1	0.88	0.87	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-20	CHARLSTN 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	0.88	0.87	0.88	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-21	COLDCREK 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.74	0.72	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-V-22	GAMEBIRD 138kV	line_14_PAHRUMP -GAMEBIRD 138 Ckt. 1 + line_19_VISTA -CHARLSTN 138 Ckt. 1	C	N-1-1	0.89	0.88	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-23	GAMEBIRD 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	0.88	0.87	0.88	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-24	JACKASSF 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.87	0.85	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-25	JACKASSF 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.87	0.85	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-26	LTHRPWLS 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-27	LTHRPWLS 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	>0.90	0.89	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-28	MERCERYSW 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.82	0.81	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-29	MERCERYSW 138kV	line_22_INNOVATION -MERCERYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.82	0.81	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-30	THSNDAIR 138kV	line_13_PAHRUMP -VISTA 138 Ckt. 1 + line_20_GAMEBIRD -THSNDAIR 138 Ckt. 1	C	N-1-1	0.87	0.84	0.83	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-31	THSNDAIR 138kV	line_14_PAHRUMP -GAMEBIRD 138 Ckt. 1 + line_19_VISTA -CHARLSTN 138 Ckt. 1	C	N-1-1	0.89	0.88	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-32	THSNDAIR 138kV	tran_65_PAHRUMP 138/230-kV Tran Bnk 1 + tran_66_PAHRUMP 138/230-kV Tran Bnk 2	C	N-1-1	0.88	0.86	0.88	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-V-33	MERC_DIST 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.82	0.81	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-34	MERC_DIST 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.82	0.81	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-35	INNOVATION 230kV	line_47_LENZIE 500 -NWEST 500 Circuit 1 + line_5_PAHRUMP -CRAZY EYE SS 230 Ckt. 1	C	N-1-1	>0.90	0.90	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-36	INNOVATION 230kV	line_47_LENZIE 500 -NWEST 500 Circuit 1 + line_6_CRAZY EYE SS -BOB SS 230 Ckt. 1	C	N-1-1	>0.90	0.90	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-37	STOCK_WASH 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.86	0.85	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-38	STOCK_WASH 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.86	0.85	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-39	VALLEY_NTS 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.84	0.83	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-40	VALLEY_NTS 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.84	0.82	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-41	FRENCH_FLAT 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_31_CANYON -SNOW MTN 138 Circuit 1	C	N-1-1	0.83	0.82	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)
VEA-SP-V-42	FRENCH_FLAT 138kV	line_22_INNOVATION -MERCRYSW 138 Ckt. 1 + line_41_NWEST -SNOW MTN 138 Circuit 1	C	N-1-1	0.83	0.82	>0.90	Operational action plan (Radialize the 138kV system after the first N-1 contingency)

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
VEA-SP-V-43	CRAZY EYE SS 230kV	line_47_LENZIE 500 -NWEST 500 Circuit 1 + line_6_CRAZY EYE SS -BOB SS 230 Ckt. 1	C	N-1-1	>0.90	0.88	>0.90	Operational action plan (Radialize the 138kV system in VEA and serve from three separate sources after the first N-1) or rely on UVLS

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
VEA-NP-V-1	INNOVATION 230 kV	line_8_PAHRUMP -INNOVATION 230 Ckt. 1 + line_1_NWEST -DESERT VIEW - INNOVATION 230-kV Ckt. 1	C	N-1-1	<0.90	0.90		Operational action plan (Lock/adjust the 230/138kV and 138/24kV taps after the first N-1) or set the UVLS to monitor HV side



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No transient stability concerns identified.

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Off-Peak & Summer Light Load**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No transient stability concerns identified.



Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient thermal overload concerns identified.

Post-Transient Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient thermal overload concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No post-transient voltage deviation concerns identified.



Post-Transient Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No post-transient voltage deviation concerns identified.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single contingency resulted in total load drop of more than 250 MW.



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single contingency resulted in total load drop of more than 250 MW.

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Study Area: **Valley Electric Association - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

2014-2015 ISO Reliability Assessment - Study Results

Study Area: **Valley Electric Association - Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-1	22610 OTAYME&1 230 20149 TJI-230 230 1	MSL-5085_ 22930 ECO 500 22468 MIGUEL 500 &1	B	L-1	114%			Prior to the PST at IV in service, as interim solution, develop best practices to address the reliability concerns in the southern California region, such as OP with higher emergency rating, congestion management, bypassing the series cap banks on the NG-IV 500 kV line, SPS including gen tripping at ECO/IV, and/or coordinate with CFE to enable Otay Mesa-Tijuana 230 kV SPS as needed
SD-SP-T-2	22610 OTAYME&1 230 20149 TJI-230 230 1	SL-5011_ 22360 IMPRLVLY 500 22930 ECO 500 1	B	L-1	113%			
SD-SP-T-3	22610 OTAYME&1 230 20149 TJI-230 230 1	SPS1-50185_Line ECO-MIGUEL 500 kV & GenTrip@IV	B	L-1	104%			
SD-SP-T-4	22610 OTAYME&1 230 20149 TJI-230 230 1	'G1-5054_PALOMAR ENERGY CENTER 565 MW' -AND- 'MSL-5085_ 22930 ECO 500 22468 MIGUEL 500 &1'	B	G-1/L-1	112%			
SD-SP-T-5	22610 OTAYME&1 230 20149 TJI-230 230 1	'G1-5055_OTAY MESA Power PLANT 615MW' -AND- 'MSL-5085_ 22930 ECO 500 22468 MIGUEL 500 &1'	B	G-1/L-1	118%			
SD-SP-T-6	22360 IMPRLVLY 500 22930 ECO 500 1	'G1-5055_OTAY MESA Power PLANT 615MW' -AND- 'MSL-5086_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1'	B	G-1/L-1			108%	preferred resources, bypass the series cap banks on Sunrise and Southwest Powerlink (SWPL) 500 kV lines by the completion of the PST at IV, and/or OP for the IV phase shifter with adequate coordination in the region
SD-SP-T-7	23310 OCOTILLO 500 23315 OCOTIL&1 500 1	'G1-5055_OTAY MESA Power PLANT 615MW' -AND- 'SPS1-50285_Line ECO-MIG 500kV & Xtrip Only'	B	G-1/L-1			102%	
SD-SP-T-8	22464 MIGUEL 230 22468 MIGUEL 500 2	T-5074_ 22464 MIGUEL 230 22472 MIGUELMP 500 1	B	T-1		109%	113%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-9	22464 MIGUEL 230 22472 MIGUELMP 500 1	T-5073_ 22464 MIGUEL 230 22468 MIGUEL 500 2	B	T-1		110%	113%	OP with higher emergency rating, SPS to protect 500/230 kV banks at Miguel, SPS to trip generation at IV/ECO, instant back-up bank switched in after contingency, and/or 3rd Bank at Miguel 500/230kV sub,
SD-SP-T-10	22464 MIGUEL 230 22472 MIGUELMP 500 1	'G1-5054_PALOMAR ENERGY CENTER 565 MW' -AND- 'T-5073_ 22464 MIGUEL 230 22468 MIGUEL 500 2'	B	G-1/T-1		109%	122%	
SD-SP-T-11	22464 MIGUEL 230 22472 MIGUELMP 500 1	'G1-5055_OTAY MESA Power PLANT 615MW' -AND- 'T-5073_ 22464 MIGUEL 230 22468 MIGUEL 500 2'	B	G-1/T-1		118%	130%	
SD-SP-T-12	22668 POWAY 69.0 22664 POMERADO 69.0 1	G1-5054_PALOMAR ENERGY CENTER 565 MW' -AND- 'SL-5063_ 22010 ARTESN 230 22832 SYCAMORE 230 1'	B	G-1/L-1	115%	109%	117%	preferred resources, load shedding, and/or build 2nd Poway-Pomerado 69 kV line
SD-SP-T-13	22356 IMPRLVLY 230 22911 IV MP 500 1	IV-8022_IV 8022 50002 & BK81 CB	C1/C2/C5	Breaker		100%	103%	Modify the existing SPS to protect IV 500/230 kV Banks, OP with higher emergency rating, Swap 500 kV bay position between IV BK #80 and #81, and/or upgrade the smaller Bank #80 at IV
SD-SP-T-14	22356 IMPRLVLY 230 22360 IMPRLVLY 500 2	IV-8022_IV 8022 50002 & BK81 CB	C1/C2/C5	Breaker		112%	115%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-15	22468 MIGUEL 500 22472 MIGUELMP 500 1	ML-2T_MIGUEL 230 kV 2T CB	C1/C2/C5	Breaker		111%	114%	OP with higher emergency rating, SPS to protect 500/230 kV banks at Miguel, SPS to trip generation at IV/ECO, instant back-up bank switched in after contingency, and/or 3rd Bank at Miguel 500/230kV sub,
SD-SP-T-16	22464 MIGUEL 230 22472 MIGUELMP 500 1	ML-2T_MIGUEL 230 kV 2T CB	C1/C2/C5	Breaker		109%	112%	
SD-SP-T-17	22464 MIGUEL 230 22461 MIGUEL60 138 1	ML-7T-AB_MIGUEL 230 kV 7T AB CB	C1/C2/C5	Breaker			103%	Preferred Resources, and/or re-arrange 230 kV bay position of Miguel BK80 or TL23042 when necessary
SD-SP-T-18	22500 MISSION 138 22496 MISSION 69.0 3	Bus_MS69S_Mission 69kV S Bus	C1/C2/C5	Bus Section	103%			interim SPS or higher emergency rating allowed to shed load until the new Mission 230/69 kv bank in service
SD-SP-T-19	22841 TA TAP 138 22396 LAGNA NL 138 1	13836/13846_TA- PICO CK 1 & 2	C1/C2/C5	Common Structure	117%			Modify TL13835 SPS to cover the N2 outage until SOCRE project in service
SD-SP-T-20	22400 LASPULGS 69.0 22368 JAP MESA 69.0 1	23007OH1/52OH2_SOMSA-SO 1 + 2 230 kV	C1/C2/C5	Common Structure	101%	150%	109%	Reconductor TL692 to achieve 102MVA, or SPS with dynamic VAR support
SD-SP-T-21	22400 LASPULGS 69.0 22368 JAP MESA 69.0 1	23007OH2/52OH2_SMESA-TA+SMESA-CAP 230	C1/C2/C5	Common Structure		150%	110%	Reconductor TL692 to achieve 102MVA, or SPS with dynamic VAR support
SD-SP-T-22	22668 POWAY 69.0 22664 POMERADO 69.0 1	23051/6920_SX-AR 230 kV + SX-AR 69 kV	C1/C2/C5	Common Structure	109%		103%	Build 2nd Poway-Pomerado 69 kV line, load shedding, and/or preferred resources

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-23	22668 POWAY 69.0 22664 POMERADO 69.0 1	6939/6974_AR - BE ckt 1 & 2	C1/C2/C5	Common Structure	106%		101%	preferred resources, load shedding, or build 2nd Poway-Pomerado 69 kV line
SD-SP-T-24	22668 POWAY 69.0 22664 POMERADO 69.0 1	SX-PQ/23051_SX-AR + SX-PEN 230 kV	C1/C2/C5	Breaker		101%	109%	
SD-SP-T-25	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1	662/6905_PQ-TP + PQ-GE	C1/C2/C5	Common Structure	102%	109%	109%	preferred resources, operation procedure with higher emergency rating
SD-SP-T-26	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1	662/6905_PQ-TP + PQ-GE	C1/C2/C5	Common Structure	102%	109%	109%	
SD-SP-T-27	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1	662/6905_PQ-TP + PQ-GE	C1/C2/C5	Common Structure		109%	109%	
SD-SP-T-28	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	662/6905_PQ-TP + PQ-GE	C1/C2/C5	Common Structure	108%	115%	115%	
SD-SP-T-29	22306 GARFIELD 69.0 22208 EL CAJON 69.0 1	Bus_MS69S_Mission 69kV S Bus	C1/C2/C5	Bus Section		113%	120%	preferred resources, operation procedure with higher emergency rating
SD-SP-T-30	22420 SILVERGT 69.0 22868 URBAN 69.0 1	655/699_SG-CR + SG-B	C1/C2/C5	Common Structure		102%	106%	preferred resources, operation procedure with higher emergency rating,
SD-SP-T-31	22356 IMPRLVLY 230 20118 ROA-230 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &' -AND- 'MSL-5086_ 23310 OCOTILLO 500 22885 SUNCREST 500 &'	C3	L-1-1	128%			

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-32	22356 IMPRLVLY 230 20118 ROA-230 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &' -AND- 'SPS2- 50186_Line OCO-SUNCREST 500 kV & ALL- GenTrip@IV'	C3	L-1-1	115%			Prior to the Phase Shifter Transformers in service at IV, as interim solution, develop best practices to address the reliability concerns in the southern California region along with the existing and proposed SPS gen tripping at IV/ECO/OCC, such as Operation Procedure with higher emergency rating on Otay Mesa-Tijuana 230 kV tie, congestion management process, bypassing the series cap banks on the NG-IV 500 kV line, and/or coordinate with CFE to enable Otay Mesa-Tijuana 230 kV SPS as needed
SD-SP-T-33	22610 OTAYME&1 230 20149 TJI-230 230 1	'SL-5031_22832 SYCAMORE 230 22464 MIGUEL 230 2' -AND- 'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &1'	C3	L-1-1	106%			
SD-SP-T-34	22610 OTAYME&1 230 20149 TJI-230 230 1	'OP1-50185_Line ECO-MIG 500 kV & ALL-Gen Curtailed@IV' -AND- 'G1-5055_OTAY MESA Power PLANT 615MW'	C3	G-1/L-1	106%			
SD-SP-T-35	22610 OTAYME&1 230 20149 TJI-230 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &' -AND- 'L_40084_Line S.ONOFRE 230.0 to SERRANO 230.0 Ckt 1'	C3	L-1-1	107%			
SD-SP-T-36	22610 OTAYME&1 230 20149 TJI-230 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &' -AND- 'L_40106_Line VIEJOSC 230.0 to CHINO 230.0 Ckt 1'	C3	L-1-1	108%			
SD-SP-T-37	22610 OTAYME&1 230 20149 TJI-230 230 1	'L_4502_Line PALOVRDE 500.0 to COLRIVER 500.0 Ckt 1' -AND- 'MSL-5085_ 22930 ECO 500 22468 MIGUEL 500 &1'	C3	L-1-1	111%			
SD-SP-T-38	22610 OTAYME&1 230 20149 TJI-230 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &' -AND- 'ML_5007_L_SUNCREST-50SUNCREST TP1- SYCAMORE TP1-SYCAMORE 230.0 C'	C3	L-1-1	114%			

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-39	22610 OTAYME&1 230 20149 TJI-230 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &'1' -AND- 'SPS2- 50186_Line OCO-SUNCREST 500 kV & ALL- GenTrip@IV'	C3	L-1-1	148%			Prior to the Phase Shifter Transformers in service at IV, bypass the series cap banks on the NG-IV 500 kV line, rely on Operation Procedure and congection management process with higher emergency rating of the Miguel 500/230 kV banks, along with the existing and proposed SPS gen tripping at IV/ECO/OCC
SD-SP-T-40	22610 OTAYME&1 230 20149 TJI-230 230 1	'OP1-50185_Line ECO-MIG 500 kV & ALL-Gen Curtailed@IV' -AND- 'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &'1'	C3	L-1-1	149%			
SD-SP-T-41	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 '1' -AND- 'SPS2- 50386_Line OCO-SUNCREST 500kV & All- GenTrip@IV+Xtrip'	C3	T-1/L-1	130%	N/A	N/A	
SD-SP-T-42	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5075_22468 MIGUEL 500 22472 MIGUELMP 500 '1' -AND- 'SPS2- 50286_Line OCO-SUNCREST 500kV & Xtrip Only'	C3	T-1/L-1	145%	N/A	N/A	
SD-SP-T-43	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 '1' -AND- 'SPS2- 50286_Line OCO-SUNCREST 500kV & Xtrip Only'	C3	T-1/L-1	145%	N/A	N/A	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-44	22464 MIGUEL 230 22472 MIGUELMP 500 1	'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'-AND- 'SPS2-50386_Line OCO-SUNCREST 500kV & All- GenTrip@IV+Xtrip'	C3	T-1/L-1	133%	N/A	N/A	Prior to the Phase Shifter Transformers in service at IV, bypass the series cap banks on the NG-IV 500 kV line, rely on Operation Procedure and congestion management process along with the existing and proposed SPS gen
SD-SP-T-45	22885 SUNCREST 500 22888 SNCRSMP1 500 1	'T-5077_22885 SUNCREST 500 22889 SNCRSMP2 500 1'-AND- 'SPS1- 50385_Line ECO-MIG 500kV & ALL- GenTrip@IV+Xtrip'	C3	T-1/L-1	119%	N/A	N/A	
SD-SP-T-46	22885 SUNCREST 500 22889 SNCRSMP2 500 1	'T-5076_22885 SUNCREST 500 22888 SNCRSMP1 500 1'-AND- 'SPS1- 50385_Line ECO-MIG 500kV & ALL- GenTrip@IV+Xtrip'	C3	T-1/L-1	119%	N/A	N/A	
SD-SP-T-47	22886 SUNCREST 230 22888 SNCRSMP1 500 1	'T-5077_22885 SUNCREST 500 22889 SNCRSMP2 500 1'-AND- 'SPS1- 50285_Line ECO-MIG 500kV & Xtrip Only'	C3	T-1/L-1	130%	N/A	N/A	
SD-SP-T-48	22886 SUNCREST 230 22889 SNCRSMP2 500 1	'T-5076_22885 SUNCREST 500 22888 SNCRSMP1 500 1'-AND- 'SPS1- 50285_Line ECO-MIG 500kV & Xtrip Only'	C3	T-1/L-1	130%	N/A	N/A	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-49	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'ML_5008_L_SUNCREST-50SUNCREST TP2-SYCAMORE TP2-SYCAMORE 230.0 C' -AND- 'SPS1-50285_Line ECO-MIG 500kV & Xtrip Only'	C3	L-1-1	142%	N/A	N/A	tripping at IV/ECO/OCC
SD-SP-T-50	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'ML_5008_L_SUNCREST-50SUNCREST TP2-SYCAMORE TP2-SYCAMORE 230.0 C' -AND- 'SPS1-50385_Line ECO-MIG 500kV & ALL-GenTrip@IV+Xtrip'	C3	L-1-1	127%	N/A	N/A	
SD-SP-T-51	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'ML_5007_L_SUNCREST-50SUNCREST TP1-SYCAMORE TP1-SYCAMORE 230.0 C' -AND- 'SPS1-50285_Line ECO-MIG 500kV & Xtrip Only'	C3	L-1-1	142%	N/A	N/A	
SD-SP-T-52	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'ML_5007_L_SUNCREST-50SUNCREST TP1-SYCAMORE TP1-SYCAMORE 230.0 C' -AND- 'SPS1-50385_Line ECO-MIG 500kV & ALL-GenTrip@IV+Xtrip'	C3	L-1-1	127%	N/A	N/A	
SD-SP-T-53	22930 ECO 500 22935 ECO &1 500 1	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'G1-5055_OTAY MESA Power PLANT 615MW'	C	L-1/G-1			110%	By-passing the series caps on TL50001, Operation Procedure with higher emergency rating of the Miguel 500/230 kV banks and the Phase Shifter Transformers at IV, and/or Congestion Management Process

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-54	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &'1' -AND- 'G1-5055_OTAY MESA Power PLANT 615MW'	C	L-1/G-1			109%	By-passing the series caps on TL50003, Operation Procedure with the Phase Shifter Transformers at IV, and/or Congestion Management Process
SD-SP-T-55	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &'1' -AND- 'G1-5055_OTAY MESA Power PLANT 615MW'	C	L-1/G-1			109%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-56	22464 MIGUEL 230 22472 MIGUELMP 500 1	'SL-5012_22360 IMPRLVLY 500 23310 OCOTILLO 500 1' -AND- 'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'	C3	T-1/L-1	110%	155%	175%	By-passing series caps on TL50001, SPS to open 500/230 kV bank for the other bank outage at Miguel, instand back-up bank that can be switched in for Miguel T-1 outage quickly in order to minimize generation curtailment at ECO/COC/IV/HDWSH , Operation Procedure with with higher emergency rating of the Miguel 500/230 kV banksand the Phase Shifter Transformers at IV, Congection Management Process, and/or 3rd Bank at Miguel 500/230kV sub
SD-SP-T-57	22468 MIGUEL 500 22472 MIGUELMP 500 1	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'	C3	T-1/L-1	111%	156%	173%	
SD-SP-T-58	22464 MIGUEL 230 22472 MIGUELMP 500 1	'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2' -AND- 'SPS2-50186_Line OCO-SUNCREST 500 kV & ALL-GenTrip@IV'	C3	T-1/L-1	100%	140%	156%	
SD-SP-T-59	22464 MIGUEL 230 22468 MIGUEL 500 2	'OP2-50186_Line OCO-SUNCREST 500 kV & ALL-Gen Curtailed@IV' -AND- 'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 1'	C3	T-1/L-1		137%	155%	
SD-SP-T-60	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 1' -AND- 'SPS2- 50186_Line OCO-SUNCREST 500 kV & ALL- GenTrip@IV'	C3	T-1/L-1		137%	154%	
SD-SP-T-61	22464 MIGUEL 230 22472 MIGUELMP 500 1	'OP2-50186_Line OCO-SUNCREST 500 kV & ALL-Gen Curtailed@IV' -AND- 'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'	C3	T-1/L-1		139%	158%	
SD-SP-T-62	22885 SUNCREST 500 22888 SNCRSMP1 500 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &1' -AND- 'T-5077_22885 SUNCREST 500 22889 SNCRSMP2 500 1'	C3	T-1/L-1		144%	162%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-63	22885 SUNCREST 500 22889 SNCRSMP2 500 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &'1'-AND- 'T-5076_22885 SUNCREST 500 22888 SNCRSMP1 500 1'	C3	T-1/L-1		144%	162%	By-passing series caps on TL50003, SPS to open 500/230 kV bank for the other bank outage at Suncrest, instand back-up bank that can be switched in quickly for Suncrest T-1 outage in order to minimize generation curtailment at ECO/COC/IV/HDWSH, Operation Procedure with higher emergency rating of the Suncrest 500/230 kV banks and the Phase Shifter Transformers at IV, and/or Congestion Management Process
SD-SP-T-64	22886 SUNCREST 230 22888 SNCRSMP1 500 1	'OP1-50185_Line ECO-MIG 500 kV & ALL-Gen Curtailed@IV' -AND- 'T-5077_22885 SUNCREST 500 22889 SNCRSMP2 500 1'	C3	T-1/L-1		130%	148%	
SD-SP-T-65	22886 SUNCREST 230 22888 SNCRSMP1 500 1	'T-5079_22886 SUNCREST 230 22889 SNCRSMP2 500 1'-AND- 'SPS1- 50185_Line ECO-MIG 500 kV & ALL- GenTrip@IV'	C3	T-1/L-1		123%	139%	
SD-SP-T-66	22886 SUNCREST 230 22889 SNCRSMP2 500 1	'OP1-50185_Line ECO-MIG 500 kV & ALL-Gen Curtailed@IV' -AND- 'T-5078_22886 SUNCREST 230 22888 SNCRSMP1 500 1'	C3	T-1/L-1		130%	148%	
SD-SP-T-67	22886 SUNCREST 230 22889 SNCRSMP2 500 1	'T-5078_22886 SUNCREST 230 22888 SNCRSMP1 500 1'-AND- 'SPS1- 50185_Line ECO-MIG 500 kV & ALL- GenTrip@IV'	C3	T-1/L-1		123%	139%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-68	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'ML_5008_L_SUNCREST-50SUNCREST TP2-SYCAMORE TP2-SYCAMORE 230.0 C' -AND- 'SPS1-50185_Line ECO-MIG 500 kV & ALL-GenTrip@IV'	C3	L-1-1		127%	144%	Bypass series caps on TL50003, SPS to open Suncrest-Sycamore 230 kV line for the other Suncrest-Sycamore 230 kV line outage, Operation Procedure with the Phase Shifter Transformers at IV, and/or Congestion Management Process
SD-SP-T-69	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &1' -AND- 'ML_5008_L_SUNCREST-50SUNCREST TP2-SYCAMORE TP2-SYCAMORE 230.0 C'	C3	L-1-1		150%	170%	
SD-SP-T-70	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'OP1-50185_Line ECO-MIG 500 kV & ALL-Gen Curtailed@IV' -AND- 'ML_5008_L_SUNCREST-50SUNCREST TP2-SYCAMORE TP2-SYCAMORE 230.0 C'	C3	L-1-1		134%	152%	
SD-SP-T-71	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &1' -AND- 'ML_5007_L_SUNCREST-50SUNCREST TP1-SYCAMORE TP1-SYCAMORE 230.0 C'	C3	L-1-1		150%	170%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-72	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'OP1-50185_Line ECO-MIG 500 kV & ALL-Gen Curtailed@IV' -AND- 'ML_5007_L_SUNCREST-50SUNCREST TP1-SYCAMORE TP1-SYCAMORE 230.0 C'	C3	L-1-1		134%	152%	Modify the existing SPS to protect IV 500/230 kV banks by tripping generation at IV, and/or upgrade the smaller Bank #80 at IV
SD-SP-T-73	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'ML_5007_L_SUNCREST-50SUNCREST TP1-SYCAMORE TP1-SYCAMORE 230.0 C' -AND- 'SPS1-50185_Line ECO-MIG 500 kV & ALL-GenTrip@IV'	C3	L-1-1		127%	144%	
SD-SP-T-74	22356 IMPRLVLY 230 22360 IMPRLVLY 500 2	'MSL-5084_22536 N.GILA 500 22360 IMPRLVLY 500 &1' -AND- 'T-5070_22356 IMPRLVLY 230 22360 IMPRLVLY 500 3'	C3	T-1/L-1		105%	113%	
SD-SP-T-75	22356 IMPRLVLY 230 22360 IMPRLVLY 500 2	'T-5070_22356 IMPRLVLY 230 22360 IMPRLVLY 500 3' -AND- 'T-5071_22356 IMPRLVLY 230 22911 IV MP 500 1'	C3	T-1-1		179%	173%	
SD-SP-T-76	22356 IMPRLVLY 230 22360 IMPRLVLY 500 3	'MSL-5084_22536 N.GILA 500 22360 IMPRLVLY 500 &1' -AND- 'T-5071_22356 IMPRLVLY 230 22911 IV MP 500 1'	C3	T-1/L-1			105%	
SD-SP-T-77	22356 IMPRLVLY 230 22360 IMPRLVLY 500 3	'T-5071_22356 IMPRLVLY 230 22911 IV MP 500 1' -AND- 'T-5069_22356 IMPRLVLY 230 22360 IMPRLVLY 500 2'	C3	T-1-1		113%	110%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-78	22430 SILVERGT 230 22597 OLDTWNTP 230 1	'SL-5013_22430 SILVERGT 230 22596 OLD TOWN 230 1'-AND-'SL-5016_22464 MIGUEL 230 22504 MISSION 230 1'	C3	L-1-1	103%			As interim solution, develop higher emergency rating, operation procedure, or interim SPS to shed load until the Bay Boulevard 230 kV substation in service
SD-SP-T-79	22430 SILVERGT 230 22597 OLDTWNTP 230 1	'SL-5013_22430 SILVERGT 230 22596 OLD TOWN 230 1'-AND-'SL-5017_22464 MIGUEL 230 22504 MISSION 230 2'	C3	L-1-1	103%			
SD-SP-T-80	22430 SILVERGT 230 22596 OLD TOWN 230 1	'ML_5005_L_OLD TOWN-OLDTWNTP- MISSION-SILVERGT 230.0 Ckt 1'-AND-'SL- 5016_22464 MIGUEL 230 22504 MISSION 230 1'	C3	L-1-1	103%			
SD-SP-T-81	22430 SILVERGT 230 22596 OLD TOWN 230 1	'SL-5017_22464 MIGUEL 230 22504 MISSION 230 2'-AND-'ML_5005_L_OLD TOWN-OLDTWNTP-MISSION-SILVERGT 230.0 Ckt 1'	C3	L-1-1	102%			
SD-SP-T-82	22464 MIGUEL 230 22504 MISSION 230 1	'SL-5029_22771 BAY BLVD 230 22464 MIGUEL 230 1'-AND-'SL-5017_22464 MIGUEL 230 22504 MISSION 230 2'	C3	L-1-1			103%	
SD-SP-T-83	22464 MIGUEL 230 22504 MISSION 230 2	'SL-5029_22771 BAY BLVD 230 22464 MIGUEL 230 1'-AND-'SL-5016_22464 MIGUEL 230 22504 MISSION 230 1'	C3	L-1-1			103%	Preferred resources, and/or upgrade TL23022/TL23023 when necessary

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-84	22596 OLD TOWN 230 22504 MISSION 230 1	'SL-5029_22771 BAY BLVD 230 22464 MIGUEL 230 1'-AND-'ML_5005_L_OLD TOWN-OLDTWNTP-MISSION-SILVERGT 230.0 Ckt 1'	C3	L-1-1			101%	Prefered resources, and the overload can be mitigated is a new Mission-Penasquitos 230 kV line is approved
SD-SP-T-85	22056 BERNARDO 69.0 22009 ARTESN 69.0 1	'SL-1017_22056 BERNARDO 69 22009 ARTESN 69 2'-AND-'SL-10192_22668 POWAY 69 22676 R.CARMEL 69 1'	C3	L-1-1	114%	109%	112%	Operation Procedure to shed loads with higher emergency rating, and DG/DR/Energy Storage
SD-SP-T-86	22056 BERNARDO 69.0 22009 ARTESN 69.0 2	'SL-1016_22056 BERNARDO 69 22009 ARTESN 69 1'-AND-'SL-10192_22668 POWAY 69 22676 R.CARMEL 69 1'	C3	L-1-1	114%	109%	112%	
SD-SP-T-87	22056 BERNARDO 69.0 22284 FELCTATP 69.0 1	'SL-10192_22668 POWAY 69 22676 R.CARMEL 69 1'-AND-'T-10421_22010 ARTESN 230 22009 ARTESN 69 1'	C3	L-1-1	102%	106%	105%	
SD-SP-T-88	22136 CLAIMNT 69.0 22140 CLARMTTP 69.0 1	'SL-10124_22448 MESAHTS 69 22496 MISSION 69 1'-AND-'SL-1099_22372 KEARNY 69 22496 MISSION 69 1'	C3	L-1-1	119%	117%	109%	
SD-SP-T-89	22160 DEL MAR 69.0 22644 PENSQTOS 69.0 1	'SL-10158_22581 NORTHCTY 69 22644 PENSQTOS 69 1'-AND-'SL-1050_22160 DEL MAR 69 22644 PENSQTOS 69 2'	C3	L-1-1	113%	118%	118%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-90	22160 DEL MAR 69.0 22644 PENSQTOS 69.0 2	'SL-10158_22581 NORTHCTY 69 22644 PENSQTOS 69 1'-AND-'SL-1049_22160 DEL MAR 69 22644 PENSQTOS 69 1'	C3	L-1-1	115%	120%	120%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-91	22064 BLDCKRTP 69.0 22736 SANTYSBL 69.0 1	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C3	L-1-1		112%	118%	DG/DR/Energy Storage, and Operation Procedure
SD-SP-T-92	SDGE BackCountry Area	'SL-10106_22408 LOSCOCHS 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C3	L-1-1	Diverged	Diverged	Diverged	Operation Procedure to shed up to 70 MW loads in broad area of the back country for the 2nd contingency, or build a new transmission 69 kV source in the area
SD-SP-T-93	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	112%	118%	118%	DG/DR/Energy Storage, and Operation Procedure
SD-SP-T-94	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND-'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	107%	113%	113%	
SD-SP-T-95	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1090_22316 GENESEE 69 22864 UCM 69 1'	C3	L-1-1	106%	110%	111%	
SD-SP-T-96	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'	C3	L-1-1	103%	108%	109%	

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-97	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1	100%	106%	107%	
SD-SP-T-98	22192 DOUBLTTP 138 22300 FRIARS 138 1	'SL-5026_22652 PENSQTOS 230 22596 OLD TOWN 230 1'-AND- 'ML_5006_L_SYCAMORE-SYCAMORE TP3- PENSQTOS TP1-PENSQTOS 230.0 Ckt'	C3	L-1-1		102%	115%	DG/DR/Energy Storage, Build new Mission-Penasquitos 230 kV line by using the abandoned 230 kV line, and/or upgrade Friars-DoubleTap 138 kV line
SD-SP-T-99	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	112%	118%	118%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-100	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND- 'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	107%	113%	113%	
SD-SP-T-101	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1090_22316 GENESEE 69 22864 UCM 69 1'	C3	L-1-1	106%	110%	111%	
SD-SP-T-102	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'	C3	L-1-1	103%	108%	109%	

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-103	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1	100%	106%	107%	
SD-SP-T-104	22256 ESCNDIDO 69.0 22272 ESCO 69.0 1	SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'-AND-'SL-10191_22668 POWAY 69 22664 POMERADO 69 1'	C3	L-1-1	138%	144%	141%	2nd Poway-Pomerado 69 kV line, preferred resources, and/or load shedding
SD-SP-T-105	22272 ESCO 69.0 22876 WARCYNTP 69.0 1	'SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'-AND-'SL-10191_22668 POWAY 69 22664 POMERADO 69 1'	C3	L-1-1	149%	155%	152%	
SD-SP-T-106	22316 GENESEE 69.0 22644 PENSQTOS 69.0 2	'SL-10239_22856 TOREYPNS 69 22864 UCM 69 1'-AND-'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	136%	144%	145%	
SD-SP-T-107	22316 GENESEE 69.0 22644 PENSQTOS 69.0 2	'SL-10239_22856 TOREYPNS 69 22864 UCM 69 1'-AND-'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1	111%	118%	120%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-108	22331 MIRASNT0 69.0 22316 GENESEE 69.0 1	'SL-10239_22856 TOREYPNS 69 22864 UCM 69 1'-AND-'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'	C3	L-1-1		113%	115%	
SD-SP-T-109	22331 MIRASNT0 69.0 22644 PENSQTOS 69.0 1	'SL-10239_22856 TOREYPNS 69 22864 UCM 69 1'-AND-'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'	C3	L-1-1	128%	136%	137%	

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-110	22372 KEARNY 69.0 22140 CLARMTTP 69.0 1	'SL-10124_22448 MESAHTGS 69 22496 MISSION 69 1'-AND-'SL-1099_22372 KEARNY 69 22496 MISSION 69 1'	C3	L-1-1	148%	154%	152%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-111	22420 SILVERGT 69.0 22548 NATNLCTY 69.0 1	'SL-10155_22556 NAVSTMTR 69 22820 SWEETWTR 69 1'-AND-'SL-10164_22592 OLD TOWN 69 22380 KETTNER 69 1'	C3	L-1-1		100%	106%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-112	22420 SILVERGT 69.0 22548 NATNLCTY 69.0 1	'SL-10155_22556 NAVSTMTR 69 22820 SWEETWTR 69 1'-AND-'T-10305_22430 SILVERGT 230 22420 SILVERGT 69 1'	C3	L-1-1		104%	112%	
SD-SP-T-113	22420 SILVERGT 69.0 22548 NATNLCTY 69.0 1	'SL-10155_22556 NAVSTMTR 69 22820 SWEETWTR 69 1'-AND-'T-10306_22430 SILVERGT 230 22420 SILVERGT 69 2'	C3	L-1-1		104%	112%	
SD-SP-T-114	22420 SILVERGT 69.0 22868 URBAN 69.0 1	'SL-10114_22420 SILVERGT 69 22144 CORONADO 69 1'-AND-'SL-107_22024 B 69 22420 SILVERGT 69 2'	C3	L-1-1		102%	106%	
SD-SP-T-115	22420 SILVERGT 69.0 22868 URBAN 69.0 1	'T-10318_22592 OLD TOWN 69 22596 OLD TOWN 230 1'-AND-'T-10319_22592 OLD TOWN 69 22596 OLD TOWN 230 2'	C3	L-1-1		104%	108%	
SD-SP-T-116	22420 SILVERGT 69.0 22868 URBAN 69.0 1	'SL-106_22024 B 69 22420 SILVERGT 69 1'-AND-'SL-107_22024 B 69 22420 SILVERGT 69 2'	C3	L-1-1		115%	119%	

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-117	22500 MISSION 138 22496 MISSION 69.0 1	'T-10315_22504 MISSION 230 22496 MISSION 69 1'-AND-'T-10422_22504 MISSION 230 22496 MISSION 69 2'	C3	T-1/L-1		108%	108%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-118	22532 MURRAY 69.0 22306 GARFIELD 69.0 1	'SL-10142_22496 MISSION 69 22532 MURRAY 69 1'-AND-'SL-10143_22496 MISSION 69 22532 MURRAY 69 2'	C3	L-1-1		119%	118%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-119	22548 NATNLCTY 69.0 22820 SWEETWTR 69.0 1	'SL-10155_22556 NAVSTMTR 69 22820 SWEETWTR 69 1'-AND-'T-10305_22430 SILVERGT 230 22420 SILVERGT 69 1'	C3	L-1-1		104%	111%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-120	22548 NATNLCTY 69.0 22820 SWEETWTR 69.0 1	'SL-10155_22556 NAVSTMTR 69 22820 SWEETWTR 69 1'-AND-'T-10306_22430 SILVERGT 230 22420 SILVERGT 69 2'	C3	L-1-1		104%	111%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-121	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1		106%	107%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-122	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'	C3	L-1-1		108%	109%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-123	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1090_22316 GENESEE 69 22864 UCM 69 1'	C3	L-1-1		110%	111%	Operation Procedure, and DG/DR/Energy Storage

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-124	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND- 'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1		113%	113%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-125	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1		118%	118%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-126	22664 POMERADO 69.0 22828 SYCAMORE 69.0 1	'T-10421_22010 ARTESN 230 22009 ARTESN 69 1'-AND- 'SL-10190_22664 POMERADO 69 22828 SYCAMORE 69 2'	C3	T-1/L-1	105%	102%	104%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-127	22664 POMERADO 69.0 22828 SYCAMORE 69.0 2	'T-10421_22010 ARTESN 230 22009 ARTESN 69 1'-AND- 'SL-10189_22664 POMERADO 69 22828 SYCAMORE 69 1'	C3	G-1/L-1	105%	102%	104%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-128	22668 POWAY 69.0 22664 POMERADO 69.0 1	'SL-506_22261 PEN 230 22010 ARTESN 230 1'-AND- 'SL-5063_22010 ARTESN 230 22832 SYCAMORE 230 1'	C3	L-1-1	102%			Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-129	22668 POWAY 69.0 22664 POMERADO 69.0 1	'T-10421_22010 ARTESN 230 22009 ARTESN 69 1'-AND- 'SL-102_22009 ARTESN 69 22828 SYCAMORE 69 1'	C3	T-1/L-1	112%	107%	110%	Operation Procedure, and DG/DR/Energy Storage

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-130	22668 POWAY 69.0 22664 POMERADO 69.0 1	'SL-5063_22010 ARTESN 230 22832 SYCAMORE 230 1'-AND- 'ML_5006_L_SYCAMORE-SYCAMORE TP3- PENSQTOS TP1-PENSQTOS 230.0 Ckt'	C3	L-1-1			109%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-131	22668 POWAY 69.0 22876 WARCYNTP 69.0 1	'SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'-AND- 'SL-10191_22668 POWAY 69 22664 POMERADO 69 1'	C3	L-1-1	121%	126%	123%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-132	22768 BAY BLVD 69.0 22520 MONTGYTP 69.0 1	'SL-10215_22768 BAY BLVD 69 22516 MONTGMRY 69 1'-AND- 'SL-10219_22768 BAY BLVD 69 22820 SWEETWTR 69 1'	C3	L-1-1		106%	109%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-133	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	119%	125%	125%	
SD-SP-T-134	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND- 'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	114%	120%	120%	
SD-SP-T-135	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND- 'SL-1090_22316 GENESEE 69 22864 UCM 69 1'	C3	L-1-1	113%	117%	118%	

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-136	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'	C3	L-1-1	109%	115%	115%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-137	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	'SL-10188_22644 PENSQTOS 69 22856 TOREYPNS 69 1'-AND-'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1	106%	113%	113%	
SD-SP-T-138	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND-'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1		106%	107%	
SD-SP-T-139	22856 TOREYPNS 69.0 22864 UCM 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND-'SL-1093_22331 MIRASNT0 69 22644 PENSQTOS 69 1'	C3	L-1-1	136%	144%	145%	
SD-SP-T-140	22856 TOREYPNS 69.0 22864 UCM 69.0 1	'SL-1089_22316 GENESEE 69 22644 PENSQTOS 69 2'-AND-'SL-1092_22331 MIRASNT0 69 22316 GENESEE 69 1'	C3	L-1-1	111%	118%	120%	
SD-SP-T-141	22736 SANTYSBL 69.0 22152 CREELMAN 69.0 1	'SL-1045_22152 CREELMAN 69 22408 LOSCOCHS 69 1'-AND-'SL-1046_22152 CREELMAN 69 22828 SYCAMORE 69 1'	C3	L-1-1	147%	170%	153%	
SD-SP-T-142	22064 BLDCKRTP 69.0 22168 DESCANSO 69.0 1	'SL-1045_22152 CREELMAN 69 22408 LOSCOCHS 69 1'-AND-'SL-1046_22152 CREELMAN 69 22828 SYCAMORE 69 1'	C3	L-1-1	106%	138%	126%	Operation Procedure, and DG/DR/Energy Storage

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Study Area: **San Diego Area - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-T-143	22064 BLDCRKTP 69.0 22736 SANTYSBL 69.0 1	'SL-1045_22152 CREELMAN 69 22408 LOSCOCHS 69 1'-AND- 'SL-1046_22152 CREELMAN 69 22828 SYCAMORE 69 1'	C3	L-1-1	106%	138%	126%	Operation Procedure, and DG/DR/Energy Storage
SD-SP-T-144	22884 WARNERS 69.0 22688 RINCON 69.0 1	'SL-1045_22152 CREELMAN 69 22408 LOSCOCHS 69 1'-AND- 'SL-1046_22152 CREELMAN 69 22828 SYCAMORE 69 1'	C3	L-1-1	146%	137%	128%	Operation Procedure, and DG/DR/Energy Storage

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Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-T-1	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 1' -AND- 'SPS2- 50386_Line OCO-SUNCREST 500kV & All-	C3	L-1-1	113%		N/A	Prior to the Phase Shifter Transformers in service at IV, bypass the series cap banks on the NG-IV 500 kV line, rely on Operation Procedure and congection management process with higher emergency rating of the Miguel 500/230 kV banks, along with the existing and proposed SPS gen tripping at IV/ECO/OCC
SD-NP-T-2	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5075_22468 MIGUEL 500 22472 MIGUELMP 500 1' -AND- 'SPS2- 50286_Line OCO-SUNCREST 500kV & Xtrip Only'	C3	L-1-1	132%		N/A	
SD-NP-T-3	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 1' -AND- 'SPS2- 50286_Line OCO-SUNCREST 500kV & Xtrip Only'	C3	L-1-1	132%		N/A	
SD-NP-T-4	22464 MIGUEL 230 22472 MIGUELMP 500 1	'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2' -AND- 'SPS2-50386_Line OCO-SUNCREST 500kV & All- GenTrip@IV+Xtrip'	C3	L-1-1	115%		N/A	
SD-NP-T-5	22464 MIGUEL 230 22468 MIGUEL 500 1	'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2' -AND- 'SPS2-50286_Line OCO-SUNCREST 500kV & Xtrip Only'	C3	L-1-1	135%		N/A	

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Study Area: San Diego Area- Summer Off-Peak & Summer Light Load

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-T-6	22886 SUNCREST 230 22888 SNCRSMP1 500 1	'T-5077_22885 SUNCREST 500 22889 SNCRSMP2 500 1'-AND- 'SPS1- 50285_Line ECO-MIG 500kV & Xtrip Only'	C3	L-1-1	111%		N/A	Prior to the Phase Shifter Transformers in service at IV, bypass the series cap banks on the NG-IV 500 kV line, rely on Operation Procedure and conection management process along with the existing and proposed SPS gen tripping at IV/ECO/OCC
SD-NP-T-7	22886 SUNCREST 230 22889 SNCRSMP2 500 1	'T-5076_22885 SUNCREST 500 22888 SNCRSMP1 500 1'-AND- 'SPS1- 50285_Line ECO-MIG 500kV & Xtrip Only'	C3	L-1-1	111%		N/A	
SD-NP-T-8	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'ML_5008_L_SUNCREST-50SUNCREST TP2- SYCAMORE TP2-SYCAMORE 230.0 C' -AND- 'SPS1-50285_Line ECO-MIG 500kV & Xtrip Only'	C3	L-1-1	121%		N/A	
SD-NP-T-9	22886 SUNCREST 230 228860 SUNCREST TP1 230 1	'ML_5008_L_SUNCREST-50SUNCREST TP2- SYCAMORE TP2-SYCAMORE 230.0 C' -AND- 'SPS1-50385_Line ECO-MIG 500kV & ALL- GenTrip@IV+Xtrip'	C3	L-1-1	103%		N/A	
SD-NP-T-10	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'ML_5007_L_SUNCREST-50SUNCREST TP1- SYCAMORE TP1-SYCAMORE 230.0 C' -AND- 'SPS1-50285_Line ECO-MIG 500kV & Xtrip Only'	C3	L-1-1	121%		N/A	
SD-NP-T-11	22886 SUNCREST 230 228861 SUNCREST TP2 230 2	'ML_5007_L_SUNCREST-50SUNCREST TP1- SYCAMORE TP1-SYCAMORE 230.0 C' -AND- 'SPS1-50385_Line ECO-MIG 500kV & ALL- GenTrip@IV+Xtrip'	C3	L-1-1	103%		N/A	
SD-NP-T-12	22464 MIGUEL 230 22472 MIGUELMP 500 1	'SL-5072_22360 IMPRELVLY 500 23310 OCOTILLO 500 1'-AND- 'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'	C3	L-1-1	114%		N/A	

2014-2015 ISO Reliability Assessment - Preliminary Study Results

Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-T-13	22468 MIGUEL 500 22472 MIGUELMP 500 1	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'	C3	L-1-1	123%		N/A	Prior to the Phase Shifter Transformers in service at IV, bypass the series cap banks on the NG-IV 500 kV line, rely on Operation Procedure and congection management process with higher emergency rating of the Miguel 500/230 kV banks, along with the existing and proposed SPS gen tripping at IV/ECO/OCC
SD-NP-T-14	22464 MIGUEL 230 22472 MIGUELMP 500 1	'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2' -AND- 'SPS2-50186_Line OCO-SUNCREST 500 kV & ALL-GenTrip@IV'	C3	L-1-1	107%		N/A	
SD-NP-T-15	22464 MIGUEL 230 22468 MIGUEL 500 2	'OP2-50186_Line OCO-SUNCREST 500 kV & ALL-Gen Curtailed@IV' -AND- 'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 1'	C3	L-1-1	105%		N/A	
SD-NP-T-16	22464 MIGUEL 230 22468 MIGUEL 500 2	'T-5074_22464 MIGUEL 230 22472 MIGUELMP 500 1' -AND- 'SPS2- 50186_Line OCO-SUNCREST 500 kV & ALL- GenTrip@IV'	C3	L-1-1	105%		N/A	
SD-NP-T-17	22464 MIGUEL 230 22472 MIGUELMP 500 1	'OP2-50186_Line OCO-SUNCREST 500 kV & ALL-Gen Curtailed@IV' -AND- 'T-5073_22464 MIGUEL 230 22468 MIGUEL 500 2'	C3	L-1-1	108%		N/A	

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Study Area: **San Diego Area - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-VD-1	SUNCREST 500 KV	SL-5012_22360 IMPRLVLY 500 23310 OCOTILLO 500 1	B	L-1			-5%	voltage deviation within SDG&E's acceptable operational voltage limits
SD-SP-VD-2	SUNCREST 500 KV	SPS1-50285_Line ECO-MIGUEL 500kV & Xtrip Only	B	L-1	6%			voltage deviation within SDG&E's acceptable operational voltage limits
SD-SP-VD-3	SUNCREST 230 KV	SPS1-50285_Line ECO-MIGUEL 500kV & Xtrip Only	B	L-1	7%			voltage deviation within SDG&E's acceptable operational voltage limits
SD-SP-VD-4	SYCAMORE 230 KV	SPS1-50285_Line ECO-MIGUEL 500kV & Xtrip Only	B	L-1	6%			voltage deviation within SDG&E's acceptable operational voltage limits
SD-SP-VD-5	BARRETT 69 KV	SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		6%	7%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-6	CAMERON 69 KV	SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		5%	6%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-7	CRSTNTS 69 KV	T-10347_22836 TALEGA 69 22840 TALEGA 138 1	B	T-1		7%	6%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-8	PENDLETN 69 KV	SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1	B	L-1	6%			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-9	ENCNITAS 69 KV	SL-1070_22252 ENCNITAS 69 22160 DEL MAR 69 1	B	L-1	7%	6%	7%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-10	JAP MESA 69 KV	T-10347_22836 TALEGA 69 22840 TALEGA 138 1	B	T-1		6%		Reconductor TL692 or SPS with dynamic VAR support
SD-SP-VD-11	BASILONE 69 KV	T-10347_22836 TALEGA 69 22840 TALEGA 138 1	B	T-1		6%		Reconductor TL692 or SPS with dynamic VAR support
SD-SP-VD-12	LASPULGS 69 KV	ML_1022_L_OCNSDETP-OCEANSDE- SANLUSRY-STUARTTP-LASPULGS-STUART 6	B	L-1			7%	Reconductor TL692 or SPS with dynamic VAR support
SD-SP-VD-13	KUMEYAAY 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		10.908		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-14	CRESTWD 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		10.909		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-15	CAMERON 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		11.896	11.032	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-16	BARRETT 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		12.543	12.147	Reply on distribution VAR support, OP to manage voltage issue as needed,

2014-2015 ISO Reliability Assessment - Preliminary Study Results

Study Area: **San Diego Area - Summer Peak**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-VD-17	BOULEVRD 69 KV	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'SPS1-50385_Line ECO-MIG 500kV & ALL-GenTrip@IV+Xtrip'	C	L-1-1	-7%	N/A	N/A	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-18	BOULEVRD 69 KV	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'SPS1-50185_Line ECO-MIG 500 kV & ALL-GenTrip@IV'	C	L-1-1	-5%	-8%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-19	BOULEVRD 69 KV	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'SPS1-50285_Line ECO-MIG 500kV & Xtrip Only'	C	L-1-1	-6%			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-20	BOULEVRD 69 KV	'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1' -AND- 'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &1'	C	L-1-1	-5%			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-21	POWAY 69 KV	'SL-10191_22668 POWAY 69 22664 POMERADO 69 1' -AND- 'SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'	C	L-1-1	11%	13%	13%	2nd Poway-Pomerado 69 kV line or OP to shed load
SD-SP-VD-22	RINCON 69 KV	'ML_1024_Line ASH-ASHTP-FELICITA_VALCNTR 69 Ckt 1' -AND- 'SL-10197_22688 RINCON 69 22404 LILAC 69 1'	C	L-1-1			13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-23	AVOCADO 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	13%	12%	12%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-24	AVOCADO 69 KV	'ML_1025_Line AVOCADO-MNSRATTP-MONSRATE-PALA 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	15%	11%	11%	Reply on distribution VAR support, OP to manage voltage issue as needed,

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-VD-25	BARRETT 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		12%	12%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-26	BARRETT 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		15%	13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-27	CAMERON 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		12%	11%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-28	CAMERON 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		15%	13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-29	CRESTWD 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		11%	10%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-30	CRESTWD 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		15%	13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-31	VALCNTR 69 KV	'ML_1024_Line ASH-ASHTP- FELICITA_VALCNTR 69 Ckt 1'-AND-'SL- 10197_22688 RINCON 69 22404 LILAC 69 1'	C	L-1-1			13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-32	CREELMAN 69 KV	'SL-1046_22152 CREELMAN 69 22828 SYCAMORE 69 1'-AND-'SL-1045_22152 CREELMAN 69 22408 LOSCOCHS 69 1'	C	L-1-1		24%	11%	Reply on distribution VAR support, OP to manage voltage issue as needed,

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Study Area: **San Diego Area - Summer Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-VD-33	DESCANSO 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		14%	12%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-34	GLENCLIF 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		15%	13%	Reply on distribution VAR support, OP to manage voltage issue as needed
SD-SP-VD-35	LOVELAND 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		15%	13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-36	MONSRATE 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1'-AND-'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	12%	12%	12%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-37	MONSRATE 69 KV	'ML_1025_Line AVOCADO-MNSRATTP-MONSRATE-PALA 69 Ckt 1'-AND-'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	14%	10%	11%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-38	PENDLETN 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1'-AND-'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	16%	14%	14%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-39	PENDLETN 69 KV	'ML_1025_Line AVOCADO-MNSRATTP-MONSRATE-PALA 69 Ckt 1'-AND-'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	18%	13%	13%	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-VD-40	R.CARMEL 69 KV	'SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'-AND-'SL-10191_22668 POWAY 69 22664 POMERADO 69 1'	C	L-1-1	12%	15%	14%	2nd Poway-Pomerado 69 kV line or OP to shed load

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Study Area: **San Diego Area - Summer Peak**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-VD-41	BackCountry Area 69 KV	'SL-10106_22408 LOSCOCHS 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1	Diverged	Diverged	Diverged	Operation Procedure to shed up to 70 MW loads in broad area of the back country for the 2nd contingency, or build a new transmission 69 kV source in the area
SD-SP-VD-42	WARENCYN 69 KV	'SL-10191_22668 POWAY 69 22664 POMERADO 69 1'-AND-'SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'	C	L-1-1		11%	11%	2nd Poway-Pomerado 69 kV line or load shedding

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Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-VD-1	CRESTWD 69 KV	G1-1022_ 22915 KUMEYAAY 0.69 1	B	L-1	6%			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-2	BARRETT 69 KV	SL-1010_ 22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		-9%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-3	CAMERON 69 KV	SL-1010_ 22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		-8%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-4	CRESTWD 69 KV	SL-1010_ 22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		-6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-5	CRESTWD 69 KV	SL-10248_ 22902 CRESTWD 69 22903 KUMEYAAY 69 1	B	L-1	6%			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-6	CAMERON 69 KV	SL-109_ 22040 BARRETT 69 22104 CAMERON 69 1	B	L-1	-6%	-8%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-7	CRESTWD 69 KV	SL-109_ 22040 BARRETT 69 22104 CAMERON 69 1	B	L-1		-6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-8	CRSTNTS 69 KV	T-10347_ 22836 TALEGA 69 22840 TALEGA 138 1	B	T-1		6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-9	KUMEYAAY 69 KV	SL-1010_ 22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		-6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-10	KUMEYAAY 69 KV	SL-109_ 22040 BARRETT 69 22104 CAMERON 69 1	B	L-1		-6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-11	KUMEYAAY 69 KV	Bus_BAR69_Barrett 69kV Bus	B	L-1		-6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-12	CAMERON 69 KV	Bus_BAR69_Barrett 69kV Bus	C1/C2/C5	Bus Section	-6%	-8%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-13	CRESTWD 69 KV	Bus_CN69_Cameron 69kV Bus	C1/C2/C5	Bus Section	-5%	-7%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-14	CRESTWD 69 KV	Bus_BAR69_Barrett 69kV Bus	C1/C2/C5	Bus Section		-6%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-15	CRESTWD 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		-9%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-16	GLENCLIF 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		-7%		Reply on distribution VAR support, OP to manage voltage issue as needed,

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Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-VD-17	CAMERON 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		-11%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-18	BARRETT 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		-12%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-19	AVOCADO 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	14%	10%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-20	BARRETT 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND- 'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		-12%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-21	CAMERON 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND- 'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		-11%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-22	CRESTWD 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND- 'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		-10%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-23	MONSRATE 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	14%	10%		Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-VD-24	PENDLETN 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	16%	12%		Reply on distribution VAR support, OP to manage voltage issue as needed,

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Study Area: **San Diego Area - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-V-1	AVOCADO 69 KV	'ML_1025_Line AVOCADO-MNSRATTP-MONSRATE-PALA 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	N-1-1	0.81	0.88	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-2	AVOCADO 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MORO HILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	N-1-1	0.86	0.89	0.89	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-3	BARRETT 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.87	0.89	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-4	CAMERON 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.87	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-5	CRESTWD 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.87	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-6	BOULEVRD 69 KV	'MSL-5085_22930 ECO 500 22468 MIGUEL 500 &1' -AND- 'MSL-5086_23310 OCOTILLO 500 22885 SUNCREST 500 &1'	C	N-1-1	1.11			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-7	CAMERNTP 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.87	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,

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Study Area: **San Diego Area - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-V-8	CREELMAN 69 KV	'SL-1045_22152 CREELMAN 69 22408 LOSCOCHS 69 1' -AND- 'SL-1046_22152 CREELMAN 69 22828 SYCAMORE 69 1'	C	N-1-1		0.79		Operation Procedure to shed up to 70 MW loads in broad area of the back country for the 2nd contingency, or build a new transmission 69 kV source in the area
SD-SP-V-9	GLENCLIF 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.87	0.89	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-10	GLNCLFTP 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.88	0.89	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-11	KUMEYAAY 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.87	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-12	LOVELAND 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1' -AND- 'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1		0.88	0.89	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-13	PENDLETN 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	N-1-1	0.84	0.88	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-SP-V-14	PENDLETN 69 KV	'ML_1025_Line AVOCADO-MNSRATTP-MONSRATE-PALA 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	N-1-1	0.81	0.89	0.88	Reply on distribution VAR support, OP to manage voltage issue as needed,

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Study Area: **San Diego Area - Summer Peak**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-V-15	POWAY 69 KV	'SL-1019_22056 BERNARDO 69 22676 R.CARMEL 69 1'-AND-'SL-10191_22668 POWAY 69 22664 POMERADO 69 1'	C	N-1-1	0.90	0.87	0.88	2nd Poway-Pomerado 69 kV line or OP to shed load
SD-SP-V-16	BackCountry Area 69 KV	'SL-10106_22408 LOSCOCHS 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	N-1-1	Diverged	Diverged	Diverged	Operation Procedure to shed up to 70 MW loads in broad area of the back country for the 2nd contingency, or build a new transmission 69 kV source in the area

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Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-V-1	CAPSTRNO 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-2	TRABUCO 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-3	LAGNA NL 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-4	MARGARTA 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-5	R.MSNVJO 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-6	PICO 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-7	SANMATEO 138 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-8	CRESTWD 69 KV	Base Case	A	N-0	1.08	1.09		voltage within SDG&E's acceptable operational limits
SD-NP-V-9	OTAY 69 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-10	IMPRLBCH 69 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-11	MONTGMRY 69 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-12	SANYSDRO 69 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-13	GLENCLIF 69 KV	Base Case	A	N-0	1.05	1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-14	OTAYLAKE 69 KV	Base Case	A	N-0		1.06		voltage within SDG&E's acceptable operational limits
SD-NP-V-15	ECO MP 500 KV	SL-5011_ 22360 IMPRLVLY 500 22930 ECO 500 1	B	L-1		1.11		voltage within SDG&E's acceptable operational limits
SD-NP-V-16	BARRETT 69 KV	SL-1010_ 22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		1.13		OP to manage voltage issue as needed,

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Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-V-17	CAMERON 69 KV	SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		1.13		OP to manage voltage issue as needed,
SD-NP-V-18	CAMERON 69 KV	SL-109_22040 BARRETT 69 22104 CAMERON 69 1	B	L-1	1.11	1.13		OP to manage voltage issue as needed,
SD-NP-V-19	CRESTWD 69 KV	SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		1.15		OP to manage voltage issue as needed,
SD-NP-V-20	CRESTWD 69 KV	SL-109_22040 BARRETT 69 22104 CAMERON 69 1	B	L-1	1.12	1.15		OP to manage voltage issue as needed,
SD-NP-V-21	KUMEYAAY 69 KV	SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1	B	L-1		1.15		OP to manage voltage issue as needed,
SD-NP-V-22	KUMEYAAY 69 KV	SL-109_22040 BARRETT 69 22104 CAMERON 69 1	B	L-1	1.13	1.15		OP to manage voltage issue as needed,
SD-NP-V-23	ECO MP 500 KV	IV-8032_IV 8032 50004 & BK82 CB	C1/C2/C5	Breaker		1.11		OP to manage voltage issue as needed,
SD-NP-V-24	BARRETT 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		1.16		OP to manage voltage issue as needed,
SD-NP-V-25	CAMERON 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		1.16		OP to manage voltage issue as needed,
SD-NP-V-26	CAMERON 69 KV	Bus_BAR69_Barrett 69kV Bus	C1/C2/C5	Bus Section	1.11	1.13		OP to manage voltage issue as needed,
SD-NP-V-27	CRESTWD 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section	1.11	1.18		OP to manage voltage issue as needed,
SD-NP-V-28	CRESTWD 69 KV	Bus_CN69_Cameron 69kV Bus	C1/C2/C5	Bus Section	1.13	1.15		OP to manage voltage issue as needed,
SD-NP-V-29	CRESTWD 69 KV	Bus_BAR69_Barrett 69kV Bus	C1/C2/C5	Bus Section	1.13	1.15		OP to manage voltage issue as needed,
SD-NP-V-30	GLENCLIF 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section		1.13		OP to manage voltage issue as needed,
SD-NP-V-31	KUMEYAAY 69 KV	Bus_LL69_Loveland 69kV Bus	C1/C2/C5	Bus Section	1.11			OP to manage voltage issue as needed,
SD-NP-V-32	KUMEYAAY 69 KV	Bus_CN69_Cameron 69kV Bus	C1/C2/C5	Bus Section	1.13	1.15		OP to manage voltage issue as needed,

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Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-V-33	KUMEYAAY 69 KV	Bus_BAR69_Barrett 69kV Bus	C1/C2/C5	Bus Section	1.13	1.15		OP to manage voltage issue as needed,
SD-NP-V-34	AVOCADO 69 KV	'ML_1021_Line MONSRATE-MORHILTP-MOROHILL-MELROSE 69 Ckt 1' -AND- 'SL-10182_22640 PENDLETN 69 22708 SANLUSRY 69 1'	C	L-1-1	0.86			Reply on distribution VAR support, OP to manage voltage issue as needed,
SD-NP-V-35	BARRETT 69 KV	'SL-10111_22412 LOSCOCHS 138 23322 JAMUL 138 1' -AND- 'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.14		OP to manage voltage issue as needed,
SD-NP-V-36	BARRETT 69 KV	'ML_1017_Line ML60 TAP-MIGUEL60-TELECYN-JAMUL 138.0 Ckt 1' -AND- 'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.13		OP to manage voltage issue as needed,
SD-NP-V-37	CAMERON 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1' -AND- 'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.16		OP to manage voltage issue as needed,
SD-NP-V-38	CAMERON 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1' -AND- 'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.16		OP to manage voltage issue as needed,
SD-NP-V-39	CAMERON 69 KV	'SL-10111_22412 LOSCOCHS 138 23322 JAMUL 138 1' -AND- 'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.14		OP to manage voltage issue as needed,
SD-NP-V-40	CAMERON 69 KV	'ML_1017_Line ML60 TAP-MIGUEL60-TELECYN-JAMUL 138.0 Ckt 1' -AND- 'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.14		OP to manage voltage issue as needed,

2014-2015 ISO Reliability Assessment - Preliminary Study Results

Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-V-41	CAMERON 69 KV	'SL-1028_22084 BORREGO 69 22083 BR GEN HV 69 1'-AND-'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.14		OP to manage voltage issue as needed,
SD-NP-V-42	CAMERON 69 KV	'SL-10111_22412 LOSCOCHS 138 23322 JAMUL 138 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.14		OP to manage voltage issue as needed,
SD-NP-V-43	CAMERON 69 KV	'ML_1017_Line ML60 TAP-MIGUEL60-TELECYN-JAMUL 138.0 Ckt 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.14		OP to manage voltage issue as needed,
SD-NP-V-44	CRESTWD 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		1.13		OP to manage voltage issue as needed,
SD-NP-V-45	CRESTWD 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.18		OP to manage voltage issue as needed,
SD-NP-V-46	CRESTWD 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND-'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.18		OP to manage voltage issue as needed,
SD-NP-V-47	CRESTWD 69 KV	'SL-10111_22412 LOSCOCHS 138 23322 JAMUL 138 1'-AND-'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.15		OP to manage voltage issue as needed,
SD-NP-V-48	CRESTWD 69 KV	'ML_1017_Line ML60 TAP-MIGUEL60-TELECYN-JAMUL 138.0 Ckt 1'-AND-'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.15		OP to manage voltage issue as needed,

2014-2015 ISO Reliability Assessment - Preliminary Study Results

Study Area: **San Diego Area- Summer Off-Peak & Summer Light Load**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
SD-NP-V-49	CRESTWD 69 KV	'SL-1028_22084 BORREGO 69 22083 BR GEN HV 69 1'-AND-'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.15		OP to manage voltage issue as needed,
SD-NP-V-50	CRESTWD 69 KV	'SL-10111_22412 LOSCOCHS 138 23322 JAMUL 138 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.15		OP to manage voltage issue as needed,
SD-NP-V-51	CRESTWD 69 KV	'ML_1017_Line ML60 TAP-MIGUEL60-TELECYN-JAMUL 138.0 Ckt 1'-AND-'SL-1010_22040 BARRETT 69 22416 LOVELAND 69 1'	C	L-1-1		1.15		OP to manage voltage issue as needed,
SD-NP-V-52	CAMERNTP 69 KV	'SL-10112_22416 LOVELAND 69 22004 ALPINE 69 1'-AND-'SL-10109_22408 LOSCOCHS 69 22416 LOVELAND 69 1'	C	L-1-1		1.12		OP to manage voltage issue as needed,
SD-NP-V-53	GLENCLIF 69 KV	'SL-10113_22416 LOVELAND 69 22168 DESCANSO 69 1'-AND-'SL-109_22040 BARRETT 69 22104 CAMERON 69 1'	C	L-1-1		1.13		OP to manage voltage issue as needed,

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
SD-SP-PTVD-1	SDGE and LA Basin Areas	ECO-Miguel 500 kV Line (SWPL) outage followed by OCO-Suncrest 500 kV line (Sunrise) outage if the 230 kV tie with CFE is cross tripped by the CFE's SPS to protect its 230 kV system from La Rosita to Tijuana	C	L-1-1				<p>voltage instability concern</p> <p>With the Phase Shifter Transformers in-service at IV, develop an Operation Procedure and Congestion Management Process for the Phase Shifters in coordination with CFE in order to eliminate potential overloads in the SDGE 500/230 kV and the CFE 230 kV systems under Category C outage and ultimately modify/eliminate the CFE SPS accordingly, adjust system operation in SDGE/LA Basin/CFE to prepare for the 2nd 500 kV contingency, and take advantage of Preferred Resources including Demand Response and Distributed Generation, and Energy Storage in the SDGE and LA Basin areas</p>