

Appendix A – Reliability Assessment Results

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APPENDIX A-1: Reliability Assessment Results for PG&E Area – Humboldt

Table A-1.1: Summary of thermal overloads for summer peak conditions – PG&E Area – Humboldt

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-S-T-001	Humboldt Bay-Humboldt 60 kV Line #1 Between HUMBOLDT and HMBLT JT	Humboldt-Humboldt Bay 60 kV #2	B	L-1	95%	95%	93%	94%	118%	123%	Develop SPS to trip some of the Humboldt Bay Power Plant 60 kV generators
		Eureka-Humboldt Bay 60 kV #1	B	L-1	86%	86%	85%	85%	104%	109%	
		Humboldt-Humboldt Bay 60 kV #2 and LP Samoa gen 1 12.47 KV or FAIRHAVEN 13.8 KV	B	G-1/L-1	98%	98%	96%	96%	117%	125%	
		Humboldt-Humboldt Bay 60 kV #2 and any one unit of Humboldt Bay on 115 kV	B	G-1/L-1	97%	96%	95%	96%	116%	125%	
		Eureka-Humboldt Bay 60 kV # 1 and Fairhaven gen 1 13.80 or LP Samoa 12.47 kV	B	G-1/L-1	88%	88%	87%	87%	104%	111%	
		Eureka-Humboldt Bay 60 kV and any one unit of Humboldt Bay on 115 kV	B	G-1/L-1	90%	90%	90%	90%	106%	113%	
		L-1 Humboldt-Humboldt Bay 60 kV #2 & Humboldt-Humboldt Bay PP 115 kV #1	C	L-2	100%	100%	100%	100%	124%	129%	
		Humboldt-Humboldt Bay 60 kV #2 60 KV and Humboldt Bay-Eureka 60 KV (nine more L-1-1 overloads)	C	L-1-1	187%	187%	185%	185%	220%	236%	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-S-T-002	Humboldt Bay-Humboldt 60 kV line # 1 between HMBLT JC and HUMBOLDT BAY	Humboldt-Humboldt Bay 60 kV #2 60 KV and Humboldt Bay-Eureka 60 KV (two more L-1-1 overloads)	C	L-1-1	130%	129%	128%	128%	152%	163%	
HUMB-S-T-003	Humboldt-Humboldt Bay 60 kV #2	Humboldt-Humboldt Bay 60 kV #1 60 KV and Humboldt Bay-Eureka 60 KV (three more L-1-1 overloads)	C	L-1-1	116%	116%	115%	115%	137%	147%	Develop SPS to trip some of the Humboldt Bay Power Plant 60 kV generators
HUMB-S-T-004	Humboldt-Eureka 60 kV between Haris and Eureka 60 kV	Humboldt-Humboldt Bay 60 kV # 1 and 2	C	L-1-1	130%	130%	127%	128%	160%	173%	
HUMB-S-T-005	Humboldt Bay - Eureka 60 kV Line #1	Humboldt-Humboldt Bay 60 kV #2	B	L-1	85%	85%	84%	84%	100%	104%	Install SPS to trip new gen Q212 for overload. Implement operating procedure to reduce output from Humboldt Bay 60 kV generation following first contingency for Category C contingencies
		Humboldt-Humboldt Bay 60 kV #2 and any one unit of Humboldt Bay on 115 kV, Fairhavn 13.8 kV, or LP Samoa 12.47 kV	B	G-1/L-1	86%	86%	85%	86%	100%	106%	
		L-1 Humboldt-Humboldt Bay 60 kV #2 & Humboldt-Humboldt Bay PP 115 kV #1	C	L-2	88%	88%	88%	88%	104%	108%	
		Humboldt-Humboldt Bay #1 and # 2 60 KV (six more L-1-1 overloads)	C	L-1-1	153%	152%	151%	151%	179%	192%	
HUMB-S-T-006	Humboldt Bay - Rio Dell Jct 60 kV #1 between Newburg-Rio Dell Tap	Carlotta - Bridgville 60 KV	B	L-1	45%	45%	45%	45%	117%	134%	Install SPS to trip new gen Q212 for overload.
		Humboldt 60 kV Bus	C	BUS	124%	123%	122%	121%	118%	112%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project
HUMB-S-T-007	Humboldt Bay-Rio Dell Jct 60 kV between Newburg - Eel River 60 kV #1	Humboldt 60 kV Bus	C	BUS	111%	110%	109%	109%	107%	105%	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-S-T-008	Humboldt Bay-Rio Dell JCT 60 kV between Humboldt Bay - Eel River 60 kV #1	Humboldt 60 kV Bus	C	BUS	128%	128%	127%	127%	126%	125%	
HUMB-S-T-009	Rio Dell Jct-Bridgeville 60 kV between Carlotta-Rio Dell Tap 60 kV	Humboldt- Bridgeville 115 kV	B	L-1	72%	71%	69%	68%	104%	104%	Install SPS to trip new gen Q212 for overload.
		Humboldt Bay-Rio Dell Jct 60 KV (Humboldt Bay - Eel River)	B	L-1	45%	45%	45%	45%	118%	134%	
		Humboldt 60 kV Bus	C	BUS	165%	163%	160%	159%	228%	240%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project
		Humboldt Bay 60 kV Bus	C	BUS	45%	45%	45%	45%	117%	135%	Install SPS to trip new gen Q212 for overload.
		Humboldt-Bridgeville 115 kV and Humboldt- Trinity 115 kV (five more L-1-1 overloads)	C	L-1-1	107%	104%	100%	98%	138%	132%	
HUMB-S-T-010	Rio Dell Jct-Bridgeville 60 kV between Carlotta-Swms Flat - Bridgeville 60 kV	Humboldt Bay-Rio Dell Jct 60 KV (Humboldt Bay - Eel River)	B	L-1	41%	41%	41%	40%	112%	129%	Install SPS to trip new gen Q212 for overload.
		Humboldt 60 kV Bus	C	BUS	160%	158%	155%	154%	222%	233%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project
		Humboldt Bay 60 kV Bus	C	BUS	41%	41%	41%	40%	112%	129%	Install SPS to trip new gen Q212 for overload.
		Humboldt-Bridgeville 115 kV and Humboldt- Trinity 115 kV (four more L-1-1 overloads)	C	L-1-1	102%	99%	93%	91%	133%	126%	
HUMB-S-T-011	Bridgeville-Garberville 60 kV between Bridgville-Frut Ld Jct 60	Humboldt 60 kV Bus	C	BUS	95%	89%	94%	87%	103%	106%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	kV	Humboldt- Trinity 115 kV and Bridgeville-Cottonwood 115 kV (one more L-1-1 and one T-1/L-1 overloads)	C	L-1-1	97%	94%	91%	87%	114%	109%	Install SPS to trip new gen Q212 for overload.
HUMB-S-T-012	Bridgeville-Garberville 60 kV between Frut Ld Jct and Fort Seward Jct	Humboldt 60 kV Bus	C	BUS	96%	88%	94%	86%	103%	105%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project
		Humboldt Bay-Rio Dell Jct 60 KV and Bridgeville 115/60 KV transformer (two more L-1-1 overloads)	C	L-1/T-1	30%	29%	29%	28%	104%	126%	Install SPS to trip new gen Q212 for overload.
HUMB-S-T-013	Bridgeville-Garberville 60 kV between FTSWRDJT-Garberville 60 kV	Humboldt 60 kV Bus	C	BUS	94%	86%	92%	84%	101%	103%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project
		Humboldt Bay-Rio Dell Jct 60 KV and Bridgeville 115/60 KV transformer (two more L-1-1 overloads)	C	L-1/T-1	28%	27%	27%	26%	102%	123%	Install SPS to trip new gen Q212 for overload.
HUMB-S-T-014	Bridgeville 115/60 kV Bank #1	Humboldt 60 kV Bus	C	BUS	72%	96%	83%	94%	122%	129%	PG&E maintenace project to replace Bridgeville bank in 2011. New rating will be 90 MVA
		Humboldt Bay-Rio Dell Jct 60 KV and Bridgeville-Garberville 60 KV	C	L-1-1	46%	46%	45%	45%	119%	145%	

Table A-1.2: Summary of low voltages for summer peak conditions – PG&E Area – Humboldt

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-S-V-001	BRIDGEVILLE 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	Utilize PG&E Operating Procedure to open CB 42 at Bridgeville 60 kV bus for Bridgeville bank outage
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	0.99	0.98	0.99	0.98	0.91	0.82	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-S-V-002	FORT SEWARD 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	0.99	0.98	0.98	0.98	0.90	0.78	
HUMB-S-V-003	FRUIT LAND 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	0.98	0.98	0.98	0.97	0.89	0.77	
HUMB-S-V-004	GARBERVILLE 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	0.99	0.98	0.99	0.98	0.92	0.80	
HUMB-S-V-005	KEKAWAKA 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	1.00	0.99	0.99	0.99	0.93	0.83	
HUMB-S-V-006	PACIFIC LUMBER 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
HUMB-S-V-007	SWNS FLAT 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	0.99	0.99	0.99	0.98	0.92	0.85	

Table A-1.3: Summary voltage deviations for summer peak conditions – PG&E Area - Humboldt

ID	Substation	Worst Contingency	Category	Category	Post Contingency Voltage Deviation (%)	ISO Proposed Mitigation
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		Description	2011	2012	2013	2014	2015	2020		
HUMB-S-VD-001	BRIDGEVILLE 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	9.6%	diverged
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	5.3%	5.7%	5.6%	5.6%	12.3%	21.0%
HUMB-S-VD-002	CARLOTTA 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	8.9%	diverged
HUMB-S-VD-003	FORT SEWARD 60 kV	Carlota-Pacific Lumber 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	<10	10.4%
		Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	7.3%	diverged
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	11.5%	24.1%
HUMB-S-VD-004	FRUIT LAND 60 kV	Carlota-Pacific Lumber 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	<10	10.6%
		Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	7.7%	diverged
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	2.4%	2.8%	2.9%	3.1%	12.1%	24.6%
HUMB-S-VD-005	GARBERVILLE 60 kV	Carlota-Pacific Lumber 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	<10	10.3%
		Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	7.3%	diverged
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	1.1%	1.5%	1.8%	2.0%	10.3%	22.2%
HUMB-S-VD-006	KEKAWAKA 60 kV	Carlota-Pacific Lumber 60 KV and Bridgeville 115/60 KV	C	L-1/T-1	<10	<10	<10	<10	<10	10.6%

Utilize PG&E Operating Procedure to open CB 42 at Bridgeville 60 kV bus for Bridgeville bank outage

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		transformer									
		Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	7.9%	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	0.8%	1.2%	1.5%	1.7%	9.2%	19.5%	
HUMB-S-VD-007	PACIFIC LUMBER 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	8.9%	diverged	
HUMB-S-VD-008	SWNS FLAT 60 kV	Rio Dell Tap -Scotia Tap 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	9.3%	diverged	
		Humb Bay-Eel Rvr 60 KV and Bridgeville 115/60 KV transformer	C	L-1/T-1	<10	<10	<10	<10	10.6%	18.3%	

Table A- 1.4: Summary of thermal overloads for winter -peak conditions – PG&E Area Humboldt

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-W-T-001	Humboldt Bay - Humboldt 60 kV #1 Between HUMBOLDT - HMBLT JT	L-1 Humboldt-Humboldt Bay 60 kV #1 & L-1 Humboldt Bay-Eureka 60 kV #1	C	L-1-1	147%	148%	145%	146%	147%	159%	Develop SPS to trip some of the Humboldt Bay Power Plant 60 kV generators
HUMB-W-T-002	Humboldt Bay - Eureka 60 kV #1	Humboldt-Humboldt Bay 60 kV # 1 and 2 (two more L-1-1 overloads)	C	L-1-1	144%	144%	142%	143%	144%	155%	Develop SPS to trip some of the Humboldt Bay Power Plant 60 kV generators
HUMB-W-T-003	Essex Jct - Arcata-Fairhaven 60 kV #1 between ARCTAJT2-FAIRHAVN	Humboldt #1 60 kV & Humboldt-Arcata 60 kV #1	C	L-2	<90	99%	102%	105%	109%	130%	Disable Janes Creek load transfer (PG&E Operating Procedure)
HUMB-W-T-004	Essex Jct-Arcata-Fairhaven 60 kV between ArcataJct-Janes Crk Tap60 kV		C	L-2	<90	<90	<90	<90	94%	112%	
HUMB-W-T-005	Fair Haven - Humboldt 60 kV #1 between ARCTA_J2 - HUMBOLDT		C	L-2	<90	<90	<90	<90	81%	103%	
HUMB-W-T-006	Humboldt-Eureka 60 kV between Haris and Eureka 60 kV	Humboldt-Humboldt Bay 60 kV # 1 and 2	C	L-1-1	92%	92%	89%	89%	90%	100%	Implement operating procedure to reduce output from Humboldt Bay Power Plant 60 kV generators for Category C contingencies
HUMB-W-T-007	Bridgeville 115/60 kV Bank #1	T-1 Humboldt 115/60 kV Bank #1 & T-1 Humboldt 115/60 kV Bank #2	C	T-1-1	111%	114%	116%	119%	126%	145%	PG&E maintenace project to replace Bridgeville bank in 2011. New rating will be 90 MVA
		Humboldt 115 kV bus	C	BUS	88%	92%	92%	98%	98%	111%	
HUMB-W-T-008	Humboldt 115/ 60 kV bank # 1	Humboldt Bay PP - Humboldt Bay 60 kV # 1 and 2	C	L-1-1	98%	100%	25%	25%	26%	27%	upgrade of Humboldt x-formers from 38 MVA to 200 MVA modeled starting from 2013, trip generation from Humboldt Power plant 115 kV prior to upgrade
		Humboldt Bay PP - Humboldt Bay 60 kV # 1 or 2 and Humboldt 115/60 kV Transformer No. 2	C	L-1/T-1	97%	103%	31%	32%	34%	36%	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-W-T-009	Humboldt 115/ 60 kV bank # 2	Humboldt Bay PP - Humboldt Bay 60 kV # 1 and 2	C	L-1-1	98%	100%	25%	25%	26%	27%	
		Humboldt Bay PP - Humboldt Bay 60 kV # 1 or 2 and Humboldt 115/60 kV Transformer No. 1	C	L-1/T-1	98%	102%	31%	32%	34%	36%	
HUMB-W-T-010	Rio Dell Jct-Bridgeville 60 kV Between Carlotta-Rio Dell Tap 60 kV	Humboldt 60 kV Bus	C	BUS	112%	113%	113%	113%	118%	134%	Upgrade Humboldt 60 kV bus to a breaker-and-a-half, PG&E maintenance project
HUMB-W-T-011	Rio Dell Jct-Bridgeville 60 kV Between Carlotta-Swns Flat 60 kV	Humboldt 60 kV Bus	C	BUS	107%	108%	108%	108%	113%	130%	
HUMB-W-T-012	Rio Dell Jct-Bridgeville 60 kV Between Bridgeville-Swns Flat 60 kV	Humboldt 60 kV Bus	C	BUS	106%	108%	108%	108%	113%	129%	

Table A-1.5: Summary of low voltages for winter peak conditions – PG&E Area – Humboldt

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-W-V-001	BRIDGEVILLE 60 kV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	0.89	0.68	Utilize PG&E Operating Procedure to open CB 42 at Bridgeville 60 kV bus for Bridgeville bank outage
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.97	1.02	0.99	0.96	0.89	diverged	
HUMB-W-V-002	CARLOTTA 60 KV	L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.96	1.01	0.98	0.95	0.88	diverged	
HUMB-W-V-003	COVELO6 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.83	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.97	0.98	0.96	0.95	0.92	diverged	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-W-V-004	FORT SEWARD 60 KV	Carlotta-PC Lumber-Bridgville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	0.90	0.69	
		L-1 Garberville-Kekawaka 60 kV #1 & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.98	1.03	1.00	0.97	0.91	diverged	
HUMB-W-V-005	FRUIT LAND 60 KV	Carlotta-PC Lumber-Bridgville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	0.89	0.68	
		L-1 Garberville-Kekawaka 60 kV #1 & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.98	1.03	0.99	0.96	0.90	diverged	
HUMB-W-V-006	GARBERVILLE 60 KV	Carlotta-PC Lumber-Bridgville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	0.91	0.70	
		L-1 Garberville-Kekawaka 60 kV #1 & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	diverged	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	1.00	1.04	1.01	0.98	0.92	diverged	
HUMB-W-V-007	KEKAWAKA 60 KV	Carlotta-PC Lumber-Bridgville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.73	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.99	1.03	1.01	0.98	0.92	diverged	
HUMB-W-V-008	LAYTON VILLE 60.00 KV	Carlotta-PC Lumber-Bridgville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.98	0.99	0.97	0.96	0.93	diverged	
HUMB-W-V-	PACIFIC LUMBER 60 KV	L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	0.96	1.01	0.98	0.95	0.88	diverged	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
009											
HUMB-W-V-010	SWNS FLT 60 KV		C	L-1/T-1	0.97	1.01	0.99	0.95	0.89	diverged	

Table A-1.6: Summary voltage deviations for winter peak conditions – PG&E Area - Humboldt

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
HUMB-W-VD-001	BRIDGEVILLE 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	14.4%	34.7%	Utilize PG&E Operating Procedure to open CB 42 at Bridgeville 60 kV bus for Bridgeville bank outage
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	8.7%	14.8%	diverged	
HUMB-W-VD-002	CARLOTTA 60 kV	L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	7.3%	14.4%	diverged	
HUMB-W-VD-003	COVELO6 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	10.5%	18.7%	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	6.9%	9.6%	diverged	
HUMB-W-VD-004	FORT SEWARD 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	12.3%	33.0%	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	5.9%	11.5%	diverged	
HUMB-W-VD-005	FRUIT LAND 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	12.9%	33.8%	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	6.4%	12.2%	diverged	
HUMB-W-VD-006	GARBERVILLE 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	11.8%	31.9%	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	5.3%	10.7%	diverged	
HUMB-W-VD-007	KEKAWAKA 60 KV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	12.2%	29.8%	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	6.1%	11.0%	diverged	
HUMB-W-VD-008	LAYTON VILLE 60 kV	Carlotta-PC Lumber-Bridgeville 60 kV & Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	<10	11.2%	18.3%	

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	6.8%	9.4%	diverged	
HUMB-W-VD-009	PACIFIC LUMBER 60 kV	L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	7.3%	14.4%	diverged	
HUMB-W-VD-010	SWINS FLAT 60 kV	L-1 Rio Dell 60kV Tap & T-1 Bridgeville 115/60 kV Bank #1	C	L-1/T-1	<10	<10	<10	8.3%	14.6%	diverged	

APPENDIX A-2: Reliability Assessment Results for PG&E Area – North Coast and North Bay

Table A-2.1: Summary of thermal overloads for summer peak conditions – PG&E Area – North Coast and North Bay

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-T-001	Ignacio-San Rafael 115 kV	Ignacio - San Rafael No.3 115 kV (Ignacio - Las Gallinas)	B	L-1	90%	91%	92%	92%	93%	102%	upgrade the line (previously approved project)
		L-1 Ignacio - San Rafael No.3 115 kV (Ignacio - Las Gallinas) & T-1 Ignacio 230/115.00 bank # 4 or # 6	C	L-1/T-1	92%	92%	93%	94%	94%	103%	
NCNB-S-T-002	Hopland 115/60 kV Bank #2	Mendocino 115/60 kV Banks # 1 and 3	C	T-1-1	95%	96%	98%	100%	106%	106%	trip Geo Energy and P0706 generation
NCNB-S-T-003	Bridgeville - Garberville 60 kV Line #1 Between BRDGVLL - FRUTLDJT	NORMAL CONDITIONS	A		<90%	<90%	<90%	<90%	96%	99%	re-rate the line
		L-1 Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap)	B	L-1	91%	88%	92%	89%	96%	100%	
		Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines (two more L-2 overloads)	C	L-2	97%	98%	104%	105%	106%	107%	Implement 2010 summer operating plan to open CB 42 at Garberville
		L-1 Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & L-1 Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) (58 more L-1-1 overloads)	C	L-1-1	103%	104%	108%	110%	111%	113%	
NCNB-S-T-004	Bridgeville - Garberville 60 kV Line #1 Between FRUTLDJT-FTSWRDJ	NORMAL CONDITIONS	A		<90%	<90%	<90%	<90%	95%	98%	re-rate the line
		L-1 Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap)	B	L-1	<90%	<90%	<90%	<90%	97%	101%	
		Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines (three more L-2 overloads)	C	L-2	97%	100%	107%	107%	108%	109%	Implement 2010 summer operating plan to open CB 42 at Garberville
		L-1 Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & L-1 Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) (63 more L-1-1 overloads)	C	L-1-1	106%	107%	111%	113%	113%	114%	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-T-005	Bridgeville - Garberville 60 kV Line #1 Between GRBRVLL - FTSWRDJT	NORMAL CONDITIONS	A		<90%	<90%	<90%	<90%	96%	97%	re-rate the line
		Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines (two more L-1-1 overloads)	C	L-2	96%	98%	106%	106%	107%	107%	Implement 2010 summer operating plan to open CB 42 at Garberville
		L-1 Geyser # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & L-1 Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern)	C	L-1-1	104%	105%	110%	111%	112%	113%	
		L-1 Geyser # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & L-1 Eagle Rock-Cortina #1 115 kV (40 more L-1-1 overloads)	C	L-1-1	106%	107%	107%	107%	111%	111%	
NCNB-S-T-006	Mendocino - Redbud 115 kV #1 Between REDBUD - REDBUDJ1	L-1 Western Geo-Cloverdale 115 kV #1 & L-1 Mendocino-Cortina 115 kV #1	C	L-1-1	101%	102%	103%	103%	103%	95%	Middletown 115 kV project in 2016, line re-rate in short - term. Or trip Redbud load
NCNB-S-T-007	Eagle Rock - Redbud 115 kV #1 Between REDBUD - REDBUDJ2	L-1Geyser #3-Cloverdale 115 kV #1 & L-1 Mendocino-Cortina 115 kV #1 (One more L-1-1 overload)	C	L-1-1	114%	115%	116%	116%	116%	108%	Trip Redbud load for 2nd contingency
NCNB-S-T-008	Eagle Rock - Redbud 115 kV #1 Between REDBUDJ2 - CACHE J2	L-1Geyser #3-Cloverdale 115 kV #1 & L-1 Mendocino-Cortina 115 kV #1 (One more L-1-1 overload)	C	L-1-1	103%	106%	106%	106%	106%	98%	Middletown 115 kV project in 2016, line re-rate in short - term. Or trip Redbud load
NCNB-S-T-009	Eagle Rock - Redbud 115 kV #1 Between HGHLNDJ1 - LWRLAKEJ	L-1Geyser #3-Cloverdale 115 kV #1 & L-1 Mendocino-Cortina 115 kV #1 (One more L-1-1 overload)	C	L-1-1	114%	116%	116%	116%	115%	108%	Trip Redbud load for 2nd contingency
NCNB-S-T-010	Geysers 3 - Cloverdale 115 kV Line #1 Between CLOVRDLE - MPE TAP	Geyser #3 - Eagle Rock 115 kV	B	L-1	78%	78%	78%	78%	101%	102%	trip P706 generation
		EAGLE ROCK 115 kV bus	C	BUS	78%	78%	78%	78%	102%	102%	
		Mendocino-Redbud & Cortina-Mendocino 115kV Lines	C	L-2	<90%	<90%	99%	100%	100%	93%	trip Geyser generation
		Eagle Rock-Redbud & Cortina-Mendocino 115kV Lines	C	L-2	114%	116%	117%	117%	118%	112%	trip Geyser generation and load at Ukiah

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Geyser #3 - Eagle Rock 115 kV & Geyser 12-Fulton 230 kV	C	L-1-1	<90%	<90%	<90%	<90%	100%	103%	trip P706 generation
		Geyser #9 - Lakeville 230 kV (Lakeville - SMUD GEO) & Geyser #3 - Eagle Rock 115 kV	C	L-1-1	<90%	<90%	<90%	<90%	101%	103%	
NCNB-S-T-011	Fulton - Santa Rosa 115 kV Line #1 Between FULTON - MONROE1	L-1 Fulton-Santa Rosa 115 kV #2 & L-1 Corona-Lakeville 115 kV #1 (one more L-1-1 overload)	C	L-1-1	107%	108%	109%	110%	112%	120%	trip load at Monroe 2 115 kV
NCNB-S-T-012	Fulton - Santa Rosa 115 kV Line #2 Between FULTON - MONROE2	L-1 Fulton-Santa Rosa 115 kV #1 & L-1 Corona-Lakeville 115 kV #1 (one more L-1-1 overload)	C	L-1-1	107%	108%	109%	110%	112%	120%	trip load at Monroe 1 115 kV
NCNB-S-T-013	Santa Rosa - Corona 115 kV Line #1 between BELLVUE - PENNGRVE	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	116%	118%	122%	123%	120%	126%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-T-014	Santa Rosa - Corona 115 kV Line #1 between PENNGRVE-CORONA				119%	122%	125%	127%	124%	129%	
NCNB-S-T-015	Corona - Lakeville 115 kV Line #1				112%	114%	117%	119%	116%	122%	
NCNB-S-T-016	Sonoma - Pueblo 115 kV Line #1				110%	112%	115%	116%	114%	118%	
NCNB-S-T-017	Santa Rosa - Corona 115 kV Between Bellevue-Stony Point Tap				94%	96%	97%	98%	99%	100%	
NCNB-S-T-018	Fulton - Pueblo 115 kV Line #1 Between PUEBLO - PUEBLOJT				L-1 Lakeville-Sonoma 115 kV #1 & L-1 Lakeville-Sonoma 115 kV #2	C	L-2	98%	99%	101%	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-T-019	Mendocino - Clear Lake 60 kV Line #1 Between MENDOCNO - UPPR LKE	T-1 Eagle Rock 115/60 kV & L-1 Clear Lake-Hopland Jct 60 kV #1	C	L-1/T-1	151%	154%	145%	153%	160%	67%	Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
NCNB-S-T-020	Mendocino - Clear Lake 60 kV Line #1 Between Upper Lake-Hartley		C	L-1/T-1	142%	145%	137%	144%	151%	58%	
NCNB-S-T-021	Mendocino - Clear Lake 60 kV Between Hartley-Clear Lake		C	L-1/T-1	103%	105%	99%	104%	109%	22%	
NCNB-S-T-022	Mendocino -Philo - Hopland 60 kV Between Mendocino-Ukiah Jct	L-1 Mendocno-Ukiah 115 kV (Mendocino - CALPELLA) & L-1 Geysers # 3-Cloverdale 115kV (Cloverdale - MPE Tap)	C	L-1-1	115%	119%	112%	108%	106%	92%	Existing SPS opens Hopland 115/60 kV bank and trips Ukiah and Cloverdale load 115 kV
NCNB-S-T-023	Mendocino -Philo - Hopland 60 kV Between Ukiah Jct-Philo Jct		C	L-1-1	115%	119%	112%	108%	106%	91%	
NCNB-S-T-024	Mendocino -Philo - Hopland 60 kV Between Philo Jct-Hopland Jct		C	L-1-1	102%	104%	103%	96%	92%	70%	
NCNB-S-T-025	Clear Lake - Eagle Rock 60 kV Line #1 Between CLER LKE - KONOCTI6	L-1 Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & L-1 Eagle Rock-Red Bud #1 115 kV (five more L-1-1 overloads)	C	L-1-1	125%	127%	129%	129%	127%	141%	Reconductor Clear Lake-Eagle Rock 60 kV line as part of Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
NCNB-S-T-026	Clear Lake - Eagle Rock 60 kV Line #1 Between KONOCTI6 - EGLE RCK	Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & Eagle Rock Cortina 115 kV (nine more L-1-1 overloads)	C	L-1-1	125%	126%	126%	126%	128%	<90%	
NCNB-S-T-027	Ignacio - Alto 60 kV Line #1 Between IG JCT - SAN RFLJ - GREENBRE 60 kV	L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-2	116%	117%	118%	119%	120%	132%	Reconductor the line or install SPS to trip load at Alto 60 kV

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-T-028	Ignacio - Alto- Sausalito 60 kV # 1 Between IGNACO A - HMLTNBFD	L-1 Ignacio-Alto 60 kV (Ignacio A - Ignacio Jct) & L-1 Ignacio - Alto - Sausalito # 2 60 kV (IGNACO A - HMLTN F)	C	L-1-1	133%	134%	135%	136%	137%	153%	Replace limiting switch, in interim, trip load at Alto 60 kV
NCNB-S-T-029	Ignacio - Alto -Sausalito 60 kV # 2 Between IGNACO A - HMLTN F	L-1 Ignacio-Alto 60 kV (Ignacio A - Ignacio Jct) & L-1 Ignacio - Alto - Sausalito # 1 60 kV (IGNACO A - HMLTBFD)	C	L-1-1	108%	108%	110%	110%	111%	122%	Replace limiting switch, in interim, trip load at Alto 60 kV
NCNB-S-T-030	Middletwn-Calistoga 60 kV Line #1	Eagle Rock-Fulton-Silverado (Rincon) 115kV & Geysers #9-Lakeville 230kV Lines	C	L-2	N/A	N/A	N/A	N/A	N/A	103%	Keep Middletown- Calistoga 60 kV normally open with Middletown Project
NCNB-S-T-031	Eagle Rock 115/60 kV Bank #1	L-1 Geysers # 3-Cloverdale 115kV (Cloverdale - MPE Tap) & L-1 Eagle Rock-Cortina 115 kV (Eagle Rock- Red Bud)	C	L-1-1	103%	103%	104%	104%	104%	76%	Middletown 115 kV project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
NCNB-S-T-032	Lakeville #2 60kV Line #1 between Lakevl_JCT - PETLMA A	L-1 Fulton-Molino-Cotati 60 kV #1 & L-1 Petaluma C-Lakeville 60 kV #1	C	L-1-1	111%	115%	117%	119%	121%	131%	trip load at Petaluma A or C 60 kV (Existing SPS)
NCNB-S-T-033	Lakeville #2 60kV Line #1 between PetalumaJCT - PETLMA A		C	L-1-1	107%	110%	112%	113%	116%	126%	
NCNB-S-T-034	Lakeville #2 60kV Line #1 t between Lakevl_JCT - Lakeville		C	L-1-1	105%	108%	110%	111%	130%	123%	
	Diverged outage	Fulton 115/60 kV banks # 1 and 2									trip load at Fitch mtn , Heldersberg, Laguna, Mirabel, Cotati, Sonoma Lndfill, Geyserville 60 kV

Table A-2.2: Summary of low voltages for summer peak conditions – PG&E Area – North Coast and North Bay

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-V-001	ALTO 60 kV	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60 kV #.2	C	L-2	0.89	0.89	0.89	0.89	0.89	0.86	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60 kV #1	C	L-1-1	0.89	0.89	0.89	0.89	0.89	0.86	
NCNB-S-V-002	ANNAPOLIS 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.89	0.90	0.88	0.88	0.88	0.85	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-V-003	CALISTOGA 60 kV		C	T-1-1	0.90	0.90	0.90	0.89	0.89	0.84	
NCNB-S-V-004	CLEAR LAKE 60 kV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank (one more L-1-1 outage)	C	L-1/T-1	0.86	0.85	0.84	0.80	0.77	0.95	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-S-V-005	CLOVERDALE 115 KV	L-1 Geysers # 3-Cloverdale 115kV (Cloverdale- MPE Tap) #1 & L-1 Mendocino-Ukiah 115 kV #1	C	L-1-1	0.83	0.82	0.82	0.81	0.82	0.87	trip Cloverdale load 115 kV (existign SPS)
NCNB-S-V-006	COTATI 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.92	0.92	0.91	0.91	0.91	0.89	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-V-007	EAGLE ROCK 60 KV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1-1	0.83	0.82	0.81	0.77	0.74	0.97	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-S-V-008	FITCH MOUNTAIN 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.91	0.90	0.90	0.89	0.90	0.88	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-V-009	FORT ROSS 60 kV		C	T-1-1	0.90	0.90	0.89	0.89	0.89	0.86	first contingency
NCNB-S-V-010	FULTON 115 kV		C	T-1-1	0.90	0.90	0.90	0.89	0.90	0.88	
NCNB-S-V-011	GEYSER 1-2 60 kV		C	T-1-1	0.90	0.90	0.90	0.89	0.90	0.87	
NCNB-S-V-012	GEYSERS VILLE 60 kV		C	T-1-1	0.90	0.90	0.89	0.89	0.89	0.87	
NCNB-S-V-013	GREENBRAE 60 kV	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60 kV No.2	C	L-2	0.88	0.88	0.88	0.88	0.88	0.85	Install reactive support ir SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-1-1	0.88	0.88	0.88	0.88	0.88	0.85	
NCNB-S-V-014	GUALALA 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.87	0.87	0.87	0.86	0.86	0.83	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-V-015	HARTLEY 60 kV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	0.88	0.87	0.86	0.83	0.80	0.96	Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-S-V-016	HEALDSBURG 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.90	0.90	0.90	0.90	0.89	0.87	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-V-017	KONOCI6 60 kV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	0.83	0.82	0.81	0.77	0.74	0.97	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
												persists.
NCNB-S-V-018	LAGUNA 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.93	0.93	0.93	0.92	0.92	0.90		Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-V-019	LOWER LAKE 60 kV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	0.83	0.82	0.81	0.77	0.74	0.98	1.038	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-S-V-020	MIDDLE TOWN 60 kV		C	L-1-1	0.83	0.82	0.81	0.77	0.75			
NCNB-S-V-021	MONROE1 115 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.90	0.90	0.90	0.89	0.90	0.88	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency	
NCNB-S-V-022	MONROE2 115 kV		C	T-1-1	0.90	0.90	0.90	0.89	0.90	0.88		
NCNB-S-V-023	MONTE CILLO 115 kV		C	T-1-1	0.91	0.91	0.90	0.90	0.90	0.89		
NCNB-S-V-024	MONTE RIO 60 kV		C	T-1-1	0.92	0.92	0.91	0.91	0.90	0.89		
NCNB-S-V-025	RINCON 115 kV		C	T-1-1	0.92	0.92	0.91	0.91	0.91	0.90		
NCNB-S-V-026	SALMON CREEK 60 kV		C	T-1-1	0.90	0.90	0.90	0.89	0.89	0.87		
NCNB-S-V-027	SANTA ROSA 115 kV		C	T-1-1	0.90	0.90	0.90	0.90	0.90	0.89		

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-V-028	SAUSALTO 60 kV	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausalito 60kV #2	C	L-2	0.88	0.88	0.88	0.88	0.88	0.85	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L--1-1	0.88	0.88	0.88	0.88	0.88	0.85	
NCNB-S-V-029	SILVERDO 115 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	0.91	0.91	0.90	0.90	0.90	0.89	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-V-030	SONOMA LANDFILL 60 kV		C	T-1-1	0.92	0.92	0.91	0.91	0.91	0.89	
NCNB-S-V-031	STONY POINT 115 kV		C	T-1-1	0.91	0.91	0.91	0.91	0.91	0.90	
NCNB-S-V-032	UPPER LAKE 60 KV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	0.92	0.91	0.91	0.88	0.85	0.98	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.

Table A-2.3: Summary voltage deviations for summer peak conditions – PG&E Area - North Coast and North Bay

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-VD-001	ALTO 60 KV	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60kV #2	C	L-2	10.9%	11.0%	11.2%	11.3%	11.3%	13.5%	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60kV #1	C	L-1-1	10.9%	11.0%	11.2%	11.3%	11.3%	13.5%	
NCNB-S-VD-002	ANNAPOLS 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	10.8%	10.8%	11.0%	11.9%	11.2%	13.8%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first
NCNB-S-VD-003	BELLVUE 115 kV		C	T-1-1	11.0%	11.1%	11.6%	11.8%	11.6%	12.4%	

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											contingency
NCNB-S-VD-004	CALISTOGA 60 kV	Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake)	B	L-1	0.1%	0.2%	0.2%	0.2%	0.2%	5.5%	open Calistoga-Middle town 60 kV line to feed Calistoga from Fulton
		Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake) and Fulton-Calistoga 60 kV (One more L-1/T-1 outage)	C	L-1-1	<10	<10	<10	<10	<10	19.4%	
		T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	10.4%	10.4%	10.5%	11.4%	10.7%	4.7%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-005	CLEAR LAKE 60 KV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	15.8%	16.7%	18.0%	21.5%	24.2%	6.0%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
		Clear Lake- Hopland 60 KV and Clear Lake-Eagle Rock 60 KV	C	L-1-1	<10	<10	<10	8.1%	8.2%	12.3%	
NCNB-S-VD-006	COTATI 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	10.0%	10.0%	10.1%	10.9%	10.3%	12.5%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-007	EAGLE ROCK 60 KV	Garberville-Laytonville 60 KV and Eagle Rock 115/60 KV bank	C	L-1-1	<10	<10	<10	<10	10.2%	<10	open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage
		Mendocino-Philo Jct 60 KV and Eagle Rock 115/60 KV bank	C	L-1-1	<10	<10	<10	10.2%	10.8%	<10	
		Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1-1	21.2%	22.2%	22.9%	26.0%	28.8%	7.6%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
												close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-S-VD-008	FITCH MOUNTAIN 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	10.3%	10.4%	10.4%	11.3%	10.6%	13.0%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency	
NCNB-S-VD-009	FORT ROSS 60 kV		C	T-1-1	10.6%	10.6%	10.7%	11.6%	11.0%	13.4%		
NCNB-S-VD-010	FULTON 115.00 kV		C	T-1-1	14.4%	14.6%	14.8%	15.1%	15.0%	15.9%		
NCNB-S-VD-011	FULTON 60 kV		C	T-1-1	9.3%	9.3%	9.5%	10.1%	9.5%	11.4%		
NCNB-S-VD-012	GEYSER 1-2 60 kV		C	T-1-1	10.4%	10.4%	10.5%	11.3%	10.7%	13.1%		
NCNB-S-VD-013	GEYSER VILLE 60.00 kV		C	T-1-1	10.5%	10.5%	10.6%	11.5%	10.8%	13.2%		
NCNB-S-VD-014	GREENBRE 60 kV	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60kV #2	C	L-2	11.7%	11.8%	12.0%	12.1%	12.1%	14.4%	Install reactive support or SPS to trip load, open CB 32 at Alto to trip load at Greenbrae	
		L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60kV #1	C	L-2	11.7%	11.8%	12.0%	12.1%	12.1%	14.4%		
NCNB-S-VD-015	GUALALA 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	11.2%	11.2%	11.3%	12.3%	11.6%	14.3%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency	
NCNB-S-VD-016	HARTLEY 60 kV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	13.8%	14.7%	15.1%	18.5%	21.1%	5.1%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if	

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											low voltage persists.
NCNB-S-VD-017	HELDSBURG 60.00 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	10.4%	10.4%	10.4%	11.3%	10.7%	13.0%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-018	KONOCTI6 60 kV	EAGLE RK 115/60 kV bank	B	T-1	5.8%	5.9%	6.0%	5.5%	5.5%	3.8%	open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage
		Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	19.3%	20.3%	20.9%	24.3%	27.2%	6.5%	
		Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake) and Eagle Rock 115/60 kV bank	C	L-1/T-1	<10	<10	<10	<10	<10	12.0%	
NCNB-S-VD-019	LAGUNA 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	9.1%	9.9%	9.9%	10.8%	10.1%	12.3%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-020	LOWER LAKE 60 KV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	17.8%	18.8%	19.5%	22.9%	25.8%	5.9%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
		Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake) and Eagle Rock 115/60 kV bank	C	L-1/T-1	<10	<10	<10	<10	<10	13.1%	open Calistoga-Middle town 60 kV line to feed Calistoga from Fulton
NCNB-S-VD-021	MIDDLE TOWN 115 kV	Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake)	B	L-1	N/A	N/A	N/A	N/A	N/A	12.5%	open Middletown x-former for any outage of

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines	C	L-2	N/A	N/A	N/A	N/A	N/A	12.4%	Middletown-Homestake tap 115 kV
		Eagle Rock-Redbud & Eagle Rock-Cortina 115kV Lines	C	L-2	N/A	N/A	N/A	N/A	N/A	11.8%	
		Eagle Rock 115 kV bus	C	BUS	n/a	n/a	n/a	n/a	n/a	13.4%	
NCNB-S-VD-022	MIDDLE TOWN 60 KV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1-1	15.4%	16.4%	17.0%	20.5%	23.5%	1.2%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
		Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake) and Eagle Rock 115/60 kV bank	C	L-1/T-1	<10	<10	<10	<10	<10	14.8%	open Calistoga-Middle town 60 kV line to feed Calistoga from Fulton
		Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake)	B	L-1	0.1%	0.2%	0.1%	0.2%	0.1%	7.5%	
NCNB-S-VD-023	MIRABEL 60 KV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	9.6%	9.6%	9.8%	10.5%	9.9%	11.9%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-024	MOLINO 60kV		C	T-1-1	9.7%	9.7%	9.8%	10.6%	9.9%	12.1%	
NCNB-S-VD-025	MONROE1 115 kV		C	T-1-1	13.2%	13.5%	14.0%	14.2%	14.1%	14.9%	
NCNB-S-VD-026	MONROE2 115 kV		C	T-1-1	13.2%	13.5%	14.0%	14.2%	14.1%	15.0%	
NCNB-S-VD-027	MONTCILO PH 60 KV		C	T-1-1	11.9%	12.1%	12.3%	12.5%	12.5%	13.3%	
NCNB-S-VD-028	MONTE CILLO 115 kV		C	T-1-1	12.0%	12.0%	12.3%	12.6%	12.5%	13.3%	
NCNB-S-VD-029	MONTE RIO 60 kV		C	T-1-1	10.2%	10.2%	10.3%	11.1%	10.5%	12.8%	
NCNB-S-VD-030	PENNGROVE 115kV		C	T-1-1	9.0%	9.0%	9.4%	9.5%	9.3%	10.0%	

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-S-VD-031	RINCON 115 kV		C	T-1-1	12.1%	12.7%	13.2%	13.4%	13.4%	14.1%	
NCNB-S-VD-032	SALMON CREEK 60 kV		C	T-1-1	10.5%	10.5%	10.6%	11.5%	10.9%	13.3%	
NCNB-S-VD-033	SANTA ROSA 115 kV		C	T-1-1	13.1%	13.3%	13.6%	13.8%	13.6%	14.5%	
NCNB-S-VD-034	SAUSALITO 60kV	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60kV #2	C	L-2	10.9%	11.0%	11.2%	11.3%	11.3%	13.6%	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausilito 60kV #1	C	L-2	10.9%	11.0%	11.2%	11.3%	11.3%	13.6%	
NCNB-S-VD-035	SILVERADO 115 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	12.0%	12.1%	12.3%	12.6%	12.5%	13.3%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-036	SONOMA 115 kV	Lakeville-Sonoma 115 kV #1 & Lakeville-Sonoma 115 kV #2	C	L-2	9.2%	9.5%	10.0%	10.3%	10.4%	10.9%	trip load at Pueblo by existing SPS
NCNB-S-VD-037	SONOMA LANDFIL 60kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	10.0%	10.0%	10.0%	10.9%	10.3%	12.5%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-S-VD-038	ST.HELENA 600 kV		C	T-1-1	9.9%	9.9%	9.9%	10.8%	10.2%	7.8%	
NCNB-S-VD-039	STONY POINT 115 kV		C	T-1-1	11.8%	12.0%	12.3%	12.5%	12.3%	13.1%	
NCNB-S-VD-040	TRINITY JCT 60 kV		C	T-1-1	9.5%	9.5%	9.7%	10.3%	9.7%	11.8%	
NCNB-S-VD-041	UPPER LAKE 60 KV	Clear Lake- Hopland 60 KV and Eagle Rock 115/60 KV bank	C	L-1/T-1	10.7%	11.5%	11.8%	15.0%	17.3%	4.0%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
												low voltage persists.
NCNB-S-VD-042	WOHLER 60 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	9.5%	9.5%	9.7%	10.3%	9.7%	11.8%		Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency

Table A- 2.4: Summary of thermal overloads for winter -peak conditions – PG&E Area North Coast and North Bay

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-T-001	Geysers 3 - Cloverdale 115 kV Line #1 Between CLOVRDLE - MPE TAP	Geyser #3 - Eagle Rock 115 kv)	B	L-1	<90%	<90%	<90%	<90%	<90%	101%	trip P706 generation
		EAGLE ROCK 115 kV bus	C	BUS	<90%	<90%	<90%	<90%	<90%	101%	
		Eagle Rock-Redbud & Cortina-Mendocino 115kV Lines	C	L-2	106%	107%	108%	108%	108%	108%	trip Geyser generation
		Geyser # 9 - Lakeville 230 kV and Geyser #3 - Eagle Rock 115 kV	C	L-1-1	<90%	<90%	<90%	<90%	<90%	104%	trip P706 generation
NCNB-W-T-002	Ignacio - Alto 60 kV Line #1 Between IG JCT - SAN RFLJ - GREENBRE 60 kV	L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-2	133%	135%	139%	140%	144%	158%	Reconductor the line or SPS to trip load. In interim, trip load at Alto or Greenbrae 60 kV
NCNB-W-T-003	IGNACIO-SAN RAFL 115 kV	Ignacio - San Rafael No.3 115 kV (Ignacio 115 kv to Las Gallinas	B	L-1	102%	103%	105%	106%	108%	116%	upgrade the line in 2011
		Ignacio - San Rafael No.3 115 kV & Ignacio 230/115 kV bank #4 (three more L-1-1 overloads)	C	L-1-1	103%	104%	106%	107%	110%	118%	
NCNB-W-T-004	Ignacio - Alto 60 kV Line #1 between IGNACO A-IG JCT	L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-1-1	91%	92%	94%	95%	97%	106%	Replace the limiting switch. IN interim, trip load at Alto or Greenbrae

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-T-005	Ignacio - Alto - Sausalito 60 kV Line #1 Between IGNACO A - HMLTN FD	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-1-1	148%	150%	154%	155%	159%	175%	
NCNB-W-T-006	Ignacio - Alto - Sausalito 60 kV Line #2 Between IGNACO A - HMLTNB FD	L-1 Ignacio-Alto 60kV #1 & L-1 Ignacio-Alto-Sausalito 60kV #2	C	L-1-1	153%	155%	159%	161%	165%	183%	
NCNB-W-T-007	Lakeville #2 60kV Line #1 between Lakevl_JCT - PETLMA A	L-1 Fulton-Molino-Cotati 60 kV #1 & L-1 Petaluma C-Lakeville 60 kV #1	C	L-1-1	101%	104%	105%	106%	107%	115%	trip load at Petaluma A or C 60 kV by existing SPS
NCNB-W-T-008	Clear Lake – Eagle Rock 60 kV Line #1 Between CLER LKE - KONOCTI6	L-1 Geyser # 3-Cloverdale 115kV (Cloverdale- MPE Tap) #1 & L-1 Eagle Rock-Cortina (Red Bud) 115 kV #1 (One more L-1-1 overload)	C	L-1-1	105%	107%	109%	110%	107%	119%	Reconductor Clear Lake-Eagle Rock 60 kV line as part of Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
		L-1 Geyser # 3-Cloverdale 115kV (Cloverdale- MPE Tap) & Cortina - Mendocino No.1 115 kV (One more L-1-1 overload)	C	L-1-1	<90%	<90%	<90%	<90%	<90%	107%	Keep Middletown- Calistoga 60 kV normally open with Middletown project
NCNB-W-T-009	Clear Lake - Eagle Rock 60 kV Line #1 Between KONOCTI6 - EGGLE RCK	L-1 Geyser # 3-Cloverdale 115kV (Cloverdale- MPE Tap) #1 & L-1 Eagle Rock-Cortina (Red Bud) 115 kV #1 (two more L-1-1 overloads)	C	L-1-1	110%	110%	112%	113%	112%	<90%	Reconductor Clear Lake-Eagle Rock 60 kV line as part of Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
		Eagle Rock Fulton Silverado 115 kV & Eagle Rock- Cortina 115 kV	C	L-1-1	<90%	<90%	<90%	<90%	<90%	101%	Open Middletown- Calistoga 60 kV

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-T-010	Mendocino - Clear Lake 60 kV Line #1 Between MENDOCNO - UPPR LKE	T-1 Eagle Rock 115/60 kV & L-1 Clear Lake-Hopland Jct 60 kV #1	C	L-1/T-1	<90%	<90%	<90%	100%	102%	<90%	Reconductor Clear Lake-Eagle Rock 60 kV line as part of Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency
NCNB-W-T-011	Mendocino - Hopland 60 kV Between Philo Jct-Hopland Jct	Mendocino 115/60 kV banks # 1 and 3	C	T-1-1	<90%	<90%	<90%	<90%	92%	108%	rerate the line
NCNB-W-T-012	Hopland 115/60 kV Bank #2	Mendocino 115/60 kV banks # 1 and 3	C	T-1-1	116%	117%	120%	122%	125%	133%	trip Geo Energy and P706 gen
	diverged	Fulton 115/60 kV banks # 1 and 2	C	T-1-1							trip load at Fitch mtn , Heldersberg, Laguna, Mirabel, Cotati, Sonoma Lndfill, Geyserville 60 kV

Table A-2.5: Summary of low voltages for winter peak conditions – PG&E Area – North Coast and North Bay

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-V-001	ALTO 60kV	L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-2	0.86	0.86	0.85	0.85	0.84	0.81	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		Ignacio -Alto 60 kV and Ignacio - Alto - Sausalito # 2 60 kV	C	L-1-1	0.86	0.86	0.85	0.85	0.84	0.81	
		Ignacio -Alto 60 kV and Ignacio - Alto - Sausalito # 1 60 kV	C	L-1-1	0.87	0.87	0.86	0.86	0.85	0.81	
NCNB-W-V-002	CLEAR LAKE 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake -Granite) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	0.85	0.85	0.84	0.84	0.83	0.97	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-W-V-003	EAGLE ROCK 60 kV		C	L-1/T-1	0.83	0.83	0.82	0.82	0.81	0.98	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-V-004	GREENBRAE 60 kV	L-1 Ignacio -Alto 60 kV & L-1 Ignacio - Alto - Sausalito # 2 60 kV	C	L-1-1	0.85	0.85	0.84	0.84	0.83	0.80	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio -Alto 60 kV & L-1 Ignacio - Alto - Sausalito # 1 60 kV	C	L-1-1	0.86	0.86	0.85	0.85	0.84	0.80	
		L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-2	0.87	0.87	0.87	0.87	0.86	0.83	
NCNB-W-V-005	HARTLEY 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake -Granite) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	0.87	0.87	0.87	0.87	0.86	0.98	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-W-V-006	KONOCTI6 60.00 kV		C	L-1/T-1	0.83	0.83	0.82	0.82	0.81	0.98	
NCNB-W-V-007	LOWER LAKE 60.00 kV		C	L-1/T-1	0.83	0.83	0.82	0.82	0.81	1.00	
NCNB-W-V-008	MIDDLETOWN 60.00 kV		C	L-1/T-1	0.83	0.83	0.82	0.82	0.81	1.04	
NCNB-W-V-009	MIDDLETOWN 115.00 kV	L-1 Eagle Rock Cortina 115 kV (Eagle Rock - Homestake) & L-1 Fulton -Calistoga 60 kV (Fulton - St. Helena Jct)	C	L-1-1	N/A	N/A	N/A	N/A	N/A	0.86	Trip Xfmr Middletown 115/60 kV #1
NCNB-W-V-010	SAUSALITO 60 kV	L-1 Ignacio-Alto 60 kV & L-1 Ignacio - Alto - Sausalito # 2 60 kV	C	L-1-1	0.86	0.86	0.85	0.85	0.84	0.81	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio-Alto 60 kV & L-1 Ignacio - Alto - Sausalito # 1 60 kV	C	L-1-1	0.86	0.86	0.85	0.85	0.84	0.81	

Table A-2.6: Summary voltage deviations for winter peak conditions – PG&E Area - North Coast and North Bay

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-VD-001	ALTO 60 kV	L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-2	14.0%	14.2%	14.9%	14.8%	15.7%	18.4%	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		Ignacio -Alto 60 kV and Ignacio -Alto - Sausalito # 2 60 kV	C	L-1-1	13.8%	14.0%	14.7%	14.7%	15.5%	18.4%	
		Ignacio -Alto 60 kV and Ignacio -Alto - Sausalito # 1 60 kV	C	L-1-1	12.9%	13.2%	13.7%	13.7%	14.5%	18.3%	
NCNB-W-VD-003	CALISTOGA 60 kV	L-1 Eagle Rock -Cortina 115 kV (Eagle Rock -Homestake) & L-1 Fulton -Calistoga 60 kV (Fulton - St. Helena Jct)	C	L-1-1	<10%	<10%	<10%	<10%	<10%	13.7%	Trip Xfmr Middletown 115/60 kV #1
NCNB-W-VD-004	CLEAR LAKE 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake -Granite) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	17.3%	17.7%	18.1%	18.4%	18.9%	5.3%	Reconductor Clear Lake-Eagle Rock 60 kV line as a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-W-VD-005	EAGLE ROCK 60 kV		C	L-1/T-1	20.7%	21.4%	21.9%	22.1%	22.7%	6.8%	
NCNB-W-VD-006	FULTON 115 kV	T-1 Fulton 230/115 kV #4 & T-1 Fulton 230/115 kV #9	C	T-1-1	<10%	<10%	8.6%	8.6%	8.8%	10.4%	Add third Fulton 230/115 kV bank or SPS to trip load. In interim, implement PG&E action plan after first contingency
NCNB-W-VD-007	GREENBRAE 60 kV	L-1 Ignacio -Alto 60 kV & L-1 Ignacio - Alto - Sausalito # 2 60 kV	C	L-1-1	14.8%	15.0%	15.7%	15.7%	16.6%	19.6%	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		L-1 Ignacio -Alto 60 kV & L-1 Ignacio - Alto - Sausalito # 1 60 kV	C	L-1-1	13.9%	14.2%	14.8%	14.7%	15.6%	19.6%	
		L-1 Ignacio-Alto-Sausalito 60kV #2 & L-1 Ignacio-Alto-Sausalito 60kV #1	C	L-2	12.5%	12.7%	13.3%	13.2%	14.1%	16.6%	
NCNB-W-VD-008	HARTLEY 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake 60 KV Sub to Granite	C	L-1/T-1	14.9%	15.3%	15.6%	15.9%	16.3%	4.4%	Reconductor Clear Lake-Eagle Rock 60 kV line as

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Sub 60 kV) & T-1 Eagle Rock 115/60 kV Bank #1									a part of Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
NCNB-W-VD-009	KONOC16 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake 60 KV Sub to Granite Sub 60 kV) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	20.1%	20.7%	21.2%	21.5%	22.0%	6.0%	
		EAGLE RK 115/60 kV bank	B	T-1	5.3%	5.9%	5.9%	5.9%	6.0%	3.3%	
NCNB-W-VD-010	LOWER LAKE 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake-Granite-) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	19.1%	19.8%	20.2%	20.5%	21.0%	4.3%	
NCNB-W-VD-011	MIDDLE TOWN 115 kV	L-1 Eagle Rock Cortina 115 kV (Eagle Rock -Homestake) & L-1 Fulton -Calistoga 60 kV (Fulton-St. Helena Jct 60 kV)	C	L-1-1	N/A	N/A	N/A	N/A	N/A	18.2%	Trip load at Calistga and Open Xfmr Middletown 115/60 kV #1
		Eagle Rock - Cortina 115 kV (Eagle Rock to Homestake)	B	L-1	N/A	N/A	N/A	N/A	N/A	11.4%	Open Xfmr Middletown 115/60 kV #1
		Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines	C	L-2	N/A	N/A	N/A	N/A	N/A	11.7%	
		Eagle Rock-Redbud & Eagle Rock-Cortina 115kV Lines	C	L-2	N/A	N/A	N/A	N/A	N/A	11.3%	
		Eagle Rock 115 kV bus	C	BUS	N/A	N/A	N/A	N/A	N/A	12.5%	
NCNB-W-VD-012	MIDDLE TOWN 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake 60 KV Sub to Granite Sub 60 kV) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	17.6%	18.2%	18.6%	18.9%	19.4%	1.4%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.
		L-1 Eagle Rock Cortina 115 kV (Eagle Rock -Homestake) & L-1 Fulton -Calistoga 60 kV (Fulton-St. Helena Jct 60 kV)	C	L-1-1	<10%	<10%	<10%	<10%	<10%	12.3%	Open Xfmr Middletown 115/60 kV #1

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
NCNB-W-VD-013	SAUSALITO 60 kV	Ignacio -Alto 60 kV and Ignacio -Alto - Sausalito # 2 60 kV	C	L-1-1	13.7%	14.0%	14.6%	14.8%	15.4%	18.2%	Install reactive support or SPS to trip load. In interim, open CB 32 at Alto to trip load at Greenbrae
		Ignacio -Alto 60 kV and Ignacio -Alto - Sausalito # 1 60 kV	C	L-1-1	13.7%	14.0%	14.6%	14.8%	15.4%	18.2%	
NCNB-W-VD-014	UPPER LAKE 60 kV	L-1 Clear Lake-Hopland 60 kV (Clear Lake-Granite-) & T-1 Eagle Rock 115/60 kV Bank #1	C	L-1/T-1	12.2%	12.5%	12.7%	13.0%	13.3%	3.5%	Middle town 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists.

APPENDIX A-3: Reliability Assessment Results for North Valley

Table A-3.1: Summary of thermal overloads for summer peak conditions – North Valley (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-T-01	Coleman-Red Bluff 60 kV line	Cottonwood-Red Bluff 60 kV Line	B	L-1	143%	146%	148%	151%	153%	172%	Red Bluff 230/60 kV substation
Nvly-T-02	Cottonwood-Red Bluff 60 kV line	Coleman-Red Bluff 60 kV Line	B	L-1	93%	94%	95%	97%	98%	109%	Red Bluff 230/60 kV substation

Table A-3.2: Summary of thermal overloads for summer peak conditions – North Valley (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-T-03	Coleman-Red Bluff 60 kV line	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	149%	152%	154%	157%	160%	179%	Red Bluff 230/60 kV substation
Nvly-T-04	Cottonwood-Benton No.1 60 kV Line	Cottonwood-Benton No.2 60 kV Line _Cascade No.1 115/60/13.8 kV Transformer	C	N-1-1	115%	118%	121%	126%	132%	144%	Second Cascade 115/60 kV bank
Nvly-T-05	Cottonwood-Red Bluff 60 kV line	Cascade-Benton-Deschutes 60 kV Line _Coleman-Cottonwood 60 kV Line	C	N-1-1	96%	99%	103%	107%	113%	143%	Red Bluff area reinforcement
Nvly-T-06	Keswick-Cascade 60 kV Line	Bridgeville-Cottonwood 115 kV Line _Trinity-Cottonwood 115 kV Line	C	N-1-1	88%	85%	90%	87%	117%	112%	Operating solution to reduce Humboldt area generation following the first contingency

Table A-3.3: Summary of thermal overloads for summer peak conditions – North Valley (Category C) (cont'd)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-T-07	Keswick-Trinity-Weaverville 60 kV line	Bridgeville-Cottonwood 115 kV Line _Trinity-Cottonwood 115 kV Line	C	N-1-1	86%	85%	89%	86%	112%	109%	Operating solution to reduce Humboldt area generation following the first contingency
Nvly-T-08	Paradise-Table Mountain 115 kV Line	Table Mountain 115 kV Bus	C	Bus Outage	100%	101%	102%	103%	104%	110%	New Table Mountain-Sycamore 115 kV line
Nvly-T-09	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	Table Mountain 115 kV Bus	C	Bus Outage	131%	133%	134%	135%	136%	144%	New Table Mountain-Sycamore 115 kV line
Nvly-T-10	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	Table Mountain-Butte No.1 115 kV Line _Table Mountain-Butte No.2 115 kV Line	C	N-1-1	116%	119%	119%	119%	120%	128%	New Table Mountain-Sycamore 115 kV line
Nvly-T-11	Table Mountain-Butte No.1 115 kV Line	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	C	DCTL	138%	139%	141%	141%	143%	151%	New Table Mountain-Sycamore 115 kV line
Nvly-T-12	Table Mountain-Butte No.2 115 kV Line	Sycamore Creek-Notre Dame-Table Mouna_Table Mountain-Butte No.1 115 kV Line	C	N-1-1	120%	122%	123%	123%	124%	132%	New Table Mountain-Sycamore 115 kV line
Nvly-T-13	Volta-South 60 kV line	Coleman-Cottonwood 60 kV Line _Coleman-Red Bluff 60 kV Line	C	N-1-1	101%	101%	101%	101%	101%	101%	Red Bluff area reinforcement

Table A-3.4: Summary of low voltages for summer peak conditions – North Valley (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-V-01	DIRYVLL 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.92	0.92	0.92	0.92	0.91	0.88	Red Bluff 230/60 kV substation
Nvly-V-02	RED BLFF 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.90	0.90	0.90	0.89	0.89	0.86	Red Bluff 230/60 kV substation
Nvly-V-03	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.91	0.91	0.91	0.90	0.90	0.87	Red Bluff 230/60 kV substation

Table A-3.5: Summary of low voltages for summer peak conditions – North Valley (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-V-04	DIRYVLL 60 kV	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	0.89	0.88	0.88	0.88	0.88	0.85	Red Bluff 230/60 kV substation
Nvly-V-05	RED BLFF 60 kV	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	0.87	0.86	0.86	0.86	0.86	0.83	Red Bluff 230/60 kV substation
Nvly-V-06	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	0.88	0.87	0.87	0.87	0.87	0.84	Red Bluff 230/60 kV substation
Nvly-V-07		Cottonwood No.2 230/60 kV Transformer & Cottonwood No.3 230/60 kV Transformer	C	N-1-1	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Red Bluff 230/60 kV substation
Nvly-V-08		Coleman-Cottonwood 60 kV line & Coleman-Red Bluff 60 kV Line	C	N-1-1	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Red Bluff 230/60 kV substation
Nvly-V-09		Cascade-Benton-Deschutes 60 kV line & Cascade 115/60 kV Bank	C	N-1-1	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Secone Cascade 115/60 kV bank

Table A-3.6: Summary of voltage deviations for summer peak conditions – North Valley (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-V-01	CEDR CRK 60 kV	KILRC1-2 2 & Cascade-Benton-Deschutes 60 kV Line	B	G-1/L-1	-7%	-8%	-7%	-7%	-8%	-9%	Second Cascade-Benton 60 kV line
Nvly-V-02	DESCHUTS 60 kV	Cascade-Benton-Deschutes 60 kV Line	B	L-1	-5%	-5%	-5%	-5%	-5%	-6%	Second Cascade-Benton 60 kV line
Nvly-V-03	DIRYVLLLE 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	-7%	-8%	-8%	-8%	-8%	-10%	Red Bluff 230/60 kV substation
Nvly-V-04	LS MLNSJ 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	-7%	-8%	-8%	-8%	-8%	-10%	Red Bluff 230/60 kV substation
Nvly-V-05	RED BLFF 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	-10%	-11%	-11%	-11%	-12%	-13%	Red Bluff 230/60 kV substation
Nvly-V-06	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	-7%	-8%	-8%	-8%	-8%	-10%	Red Bluff 230/60 kV substation
Nvly-V-07	WHITMORE 60 kV	Cascade-Benton-Deschutes 60 kV Line	B	L-1	-5%	-5%	-5%	-5%	-5%	-6%	Second Cascade-Benton 60 kV line
Nvly-V-08	WHITMORE 60 kV	KILRC1-2 2 & Cascade-Benton-Deschutes 60 kV Line	B	G-1/L-1	-7%	-7%	-7%	-7%	-8%	-9%	Second Cascade-Benton 60 kV line

Table A-3.7: Summary of voltage deviations for summer peak conditions – North Valley (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Nvly-V-09	CEDR CRK 60 kV	Cascade-Benton-Deschutes 60 kV Line _Kilarc PH No.1 60/9.11 kV Transformer	C	N-1-1	-10%	-10%	-10%	-10%	-11%	-12%	Second Cascade-Benton 60 kV line
Nvly-V-10	DIRYVLE 60 kV	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	-11%	-11%	-11%	-11%	-12%	-13%	Red Bluff 230/60 kV substation
Nvly-V-11	RED BLFF 60 kV	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	-14%	-14%	-14%	-15%	-15%	-17%	Red Bluff 230/60 kV substation
Nvly-V-12	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line _Cottonwood No.2 230/60 kV Transformer	C	N-1-1	-11%	-11%	-11%	-12%	-12%	-13%	Red Bluff 230/60 kV substation
Nvly-V-13	WHITMORE 60 kV	Cascade-Benton-Deschutes 60 kV Line _Kilarc PH No.1 60/9.11 kV Transformer	C	N-1-1	-9%	-9%	-9%	-9%	-10%	-11%	Second Cascade-Benton 60 kV line

APPENDIX A-4: Reliability Assessment Results for Central Valley

Table A-4.1: Summary of thermal overloads for summer peak conditions – Central Valley / Sacramento Division (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-T-01	Brighton-Davis 115 kV line	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	99%	99%	101%	105%	107%	125%	Woodland-Davis-West Sacramento Long-Term
Sac-T-02	Brighton-Davis 115 kV line	West Sacramento-Brighton 115 kV Line	B	L-1	92%	93%	96%	98%	102%	116%	Woodland-Davis-West Sacramento Long-Term
Sac-T-03	Cortina 230/60 kV Bank No. 1	Wadham gen out	B	G-1	107%	107%	109%	109%	110%	117%	Cortina 230/60 kV Reinforcement
Sac-T-04	Cortina 60 kV Line No. 3	WADHAM & Cortina 60 kV Line No. 4	B	G-1/L-1	109%	110%	111%	112%	112%	118%	Reconductor
Sac-T-05	Vaca Dixon 115/60 kV Bank No. 5	Vaca Dixon 115/60 kV Transformer No. 9	B	T-1	104%	104%	105%	106%	106%	113%	Replace bank
Sac-T-06	Vaca-Suisun-Jameson 115 kV line	Vaca-Suisun 115 kV Line	B	L-1	90%	92%	93%	94%	95%	102%	Reconductor

Table A-4.2: Summary of thermal overloads for summer peak conditions – Central Valley / Sacramento Division (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-T-07	Brighton 230/115 kV Bank #9	Woodland-Davis 115 kV Line _Brighton 230/115 kV Transformer No. 10	C	N-1-1	98%	99%	101%	103%	105%	116%	Woodland-Davis-West Sacramento Long-Term
Sac-T-08	Brighton-Davis 115 kV line	Woodland-Davis 115 kV Line _West Sacramento-Brighton 115 kV Line	C	N-1-1	140%	143%	147%	150%	154%	177%	Woodland-Davis-West Sacramento Long-Term
Sac-T-09	Brighton-Davis 115 kV line	Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	C	DCTL	98%	100%	103%	105%	107%	117%	Woodland-Davis-West Sacramento Long-Term
Sac-T-10	Rio Oso-West Sacramento 115 kV Line	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	125%	127%	131%	135%	140%	Diverge	Woodland-Davis-West Sacramento Long-Term

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-T-11	Rio Oso-West Sacramento 115 kV line	Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	C	DCTL	93%	96%	97%	97%	97%	102%	Woodland-Davis-West Sacramento Long-Term
Sac-T-12	Vaca Dixon 115/60 kV Bank #5	Dixon-Vaca No. 2 60 kV Line _Vaca Dixon 115/60 kV Transformer No. 9	C	N-1-1	105%	106%	106%	107%	108%	114%	Replace bank
Sac-T-13	Vaca Dixon 230/115 kV Bank #2	Vaca Dixon 230/115 kV Transformer No. 3_Vaca Dixon 230/115 kV Transformer No. 4	C	N-1-1	134%	136%	138%	140%	158%	147%	Replace bank
Sac-T-14	Vaca Dixon 230/115 kV Bank #2A	Vaca Dixon 230/115 kV Transformer No. 3_Vaca Dixon 230/115 kV Transformer No. 4	C	N-1-1	158%	161%	163%	164%	186%	174%	Replace bank
Sac-T-15	Vaca-Suisun-Jameson 115 kV line	Vaca-Vacaville-Jameson-North Tower 115_Vaca-Suisun 115 kV Line	C	N-1-1	95%	96%	98%	99%	101%	109%	Reconductor
Sac-T-16	West Sacramento-Brighton 115 kV Line	Woodland-Davis 115 kV Line _Brighton-Davis 115 kV Line	C	N-1-1	84%	85%	87%	89%	90%	101%	Woodland-Davis-West Sacramento Long-Term
Sac-T-17	West Sacramento-Davis 115 kV Line	Woodland-Davis 115 kV Line _Brighton-Davis 115 kV Line	C	N-1-1	98%	100%	101%	102%	104%	111%	Woodland-Davis-West Sacramento Long-Term
Sac-T-18	Woodland-Davis 115 kV line	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	176%	180%	185%	190%	197%	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-T-19	Woodland-Davis 115 kV line	Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	C	DCTL	93%	95%	97%	99%	101%	112%	Woodland-Davis-West Sacramento Long-Term

Table A-4.3: Summary of low voltages for summer peak conditions – Central Valley / Sacramento Division (Category A)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-V-01	BRIGHTON 230 kV	Normal	A	N-0	0.96	0.96	0.96	0.96	0.96	0.94	Voltage support
Sac-V-02	PLAINFLD 60 kV	Normal	A	N-0	0.95	0.95	0.95	0.95	0.96	0.94	Voltage support

Table A-4.4: Summary of low voltages for summer peak conditions – Central Valley / Sacramento Division (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-V-03	ARBUCKLE 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.80	0.80	0.79	0.79	0.83	0.81	Cortina 230/60 kV Reinforcement
Sac-V-04	BRIGHTN 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.87	0.87	0.86	0.84	0.83	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-V-05	BRIGHTON 230 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.76	0.76	0.75	0.74	0.72	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-V-06	BRKR SLG 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.88	0.87	0.86	0.85	0.83	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-V-07	CAMPUS 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.87	0.87	0.86	0.85	0.83	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-V-08	COLUSA 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.76	0.76	0.75	0.75	0.80	0.78	Cortina 230/60 kV Reinforcement
Sac-V-09	CORTINA 230 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.81	0.81	0.81	0.81	0.84	0.83	Cortina 230/60 kV Reinforcement
Sac-V-10	CORTINA 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.85	0.85	0.84	0.84	0.88	0.87	Cortina 230/60 kV Reinforcement
Sac-V-11	DAVIS 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.88	0.87	0.86	0.85	0.84	Diverge	Woodland-Davis-West Sacramento Long-Term

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-V-12	DEEPWATR 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.87	0.87	0.86	0.85	0.83	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-V-13	DRAKE 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.79	0.79	0.78	0.78	0.82	0.80	Cortina 230/60 kV Reinforcement
Sac-V-14	DUNNIGAN 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.77	0.77	0.76	0.76	0.80	0.78	Cortina 230/60 kV Reinforcement
Sac-V-15	GRAND IS 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.84	0.84	0.83	0.81	0.79	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-V-16	HARINTON 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.80	0.79	0.78	0.78	0.83	0.81	Cortina 230/60 kV Reinforcement
Sac-V-17	KNIGHTLD 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.94	0.93	0.93	0.92	0.91	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-V-18	MAXWELL 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.79	0.78	0.77	0.77	0.82	0.80	Cortina 230/60 kV Reinforcement
Sac-V-19	MERIDIAN 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.82	0.82	0.81	0.81	0.85	0.83	Cortina 230/60 kV Reinforcement
Sac-V-20	MOBILCHE 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.91	0.91	0.90	0.90	0.88	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-V-21	POST 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.88	0.87	0.86	0.85	0.83	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-V-22	W.SCRMNO 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.88	0.88	0.86	0.85	0.83	Diverge	Woodland-Davis- West Sacramento Long-Term

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-V-23	WILKINS 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.80	0.80	0.79	0.79	0.83	0.81	Cortina 230/60 kV Reinforcement
Sac-V-24	WILLIAMS 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	0.85	0.84	0.84	0.84	0.88	0.86	Cortina 230/60 kV Reinforcement
Sac-V-25	WOODLD 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.91	0.91	0.90	0.89	0.88	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-V-26	ZAMORA 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	0.93	0.93	0.92	0.92	0.91	Diverge	Woodland-Davis-West Sacramento Long-Term

Table A-4.5: Summary of voltage deviations for summer peak conditions – Central Valley / Sacramento Division (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-DV-01	BRKR SLG 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-4%	-4%	-4%	-4%	-4%	-6%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-02	CAMPUS 115 kV	West Sacramento-Brighton 115 kV Line	B	L-1	-4%	-4%	-4%	-4%	-4%	-6%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-03	CAMPUS 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-5%	-5%	-5%	-5%	-5%	-7%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-04	CORT_D 115 kV	WADHAM 1 & Delevan-Cortina 230 kV Line	B	G-1/L-1	-5%	-6%	-5%	-5%	-5%	-5%	Cortina 230/60 kV Reinforcement
Sac-DV-05	CORTINA 230 kV	WADHAM 1 & Delevan-Cortina 230 kV Line	B	G-1/L-1	-5%	-5%	-5%	-5%	-5%	-5%	Cortina 230/60 kV Reinforcement
Sac-DV-06	DAVIS 115 kV	West Sacramento-Brighton 115 kV Line	B	L-1	-4%	-4%	-4%	-4%	-4%	-6%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-07	DAVIS 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-5%	-5%	-5%	-5%	-5%	-7%	Woodland-Davis-West Sacramento Long-Term

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-DV-08	DEEPWATR 115 kV	West Sacramento-Brighton 115 kV Line	B	L-1	-6%	-6%	-6%	-6%	-6%	-8%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-09	DEEPWATR 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-7%	-7%	-7%	-7%	-7%	-10%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-10	DUNNIGAN 60 kV	Cortina 230/115/60 kV Transformer No. 1	B	T-1	4%	5%	5%	5%	5%	4%	Cortina 230/60 kV Reinforcement
Sac-DV-11	MERIDIAN 60 kV	WADHAM 1 & Delevan-Cortina 230 kV Line	B	G-1/L-1	-5%	-4%	-4%	-4%	-3%	-5%	Cortina 230/60 kV Reinforcement
Sac-DV-12	MOBILCHE 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-3%	-4%	-4%	-4%	-4%	-6%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-13	POST 115 kV	West Sacramento-Brighton 115 kV Line	B	L-1	-5%	-5%	-6%	-6%	-6%	-8%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-14	POST 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-6%	-6%	-7%	-7%	-7%	-9%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-15	W.SCRMNO 115 kV	West Sacramento-Brighton 115 kV Line	B	L-1	-5%	-5%	-6%	-6%	-6%	-8%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-16	W.SCRMNO 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-6%	-6%	-7%	-7%	-7%	-9%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-17	WILKINS 60 kV	Cortina 230/115/60 kV Transformer No. 1	B	T-1	5%	6%	6%	6%	5%	5%	Cortina 230/60 kV Reinforcement
Sac-DV-18	WILLIAMS 60 kV	WADHAM 1 & Delevan-Cortina 230 kV Line	B	G-1/L-1	-5%	-4%	-4%	-4%	-3%	-5%	Cortina 230/60 kV Reinforcement
Sac-DV-19	WOODLD 115 kV	WOODLAND 1 & West Sacramento-Brighton 115 kV Line	B	G-1/L-1	-4%	-4%	-4%	-4%	-4%	-6%	Woodland-Davis-West Sacramento Long-Term

Table A-4.6: Summary of voltage deviations for summer peak conditions – Central Valley / Sacramento Division (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-DV-21	ARBUCKLE 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-20%	-19%	-20%	-20%	-16%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-22	BRIGHTN 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-26%	-27%	-30%	-37%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-23	BRIGHTON 230 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-29%	-29%	-32%	-35%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-24	BRKR SLG 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-23%	-23%	-26%	-33%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-25	CAMPUS 115 kV	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	C	DCTL	-6%	-7%	-7%	-7%	-7%	-10%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-26	CAMPUS 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-22%	-22%	-25%	-32%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-27	COLUSA 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-21%	-20%	-21%	-21%	-17%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-28	CORTINA 115 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-12%	-12%	-12%	-12%	-8%	-10%	Cortina 230/60 kV Reinforcement
Sac-DV-29	CORTINA 230 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-20%	-20%	-20%	-21%	-18%	-18%	Cortina 230/60 kV Reinforcement
Sac-DV-30	CORTINA 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-18%	-18%	-19%	-19%	-15%	-17%	Cortina 230/60 kV Reinforcement
Sac-DV-31	DAVIS 115 kV	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	C	DCTL	-6%	-7%	-7%	-7%	-7%	-10%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-32	DAVIS 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-22%	-22%	-25%	-32%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Sac-DV-33	DEEPWATR 115 kV	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	C	DCTL	-8%	-8%	-9%	-9%	-10%	-13%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-34	DEEPWATR 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-25%	-25%	-28%	-36%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-35	DRAKE 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-20%	-20%	-20%	-20%	-16%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-36	DUNNIGAN 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-20%	-20%	-20%	-21%	-17%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-37	GRAND IS 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-27%	-28%	-31%	-39%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-38	HARINTON 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-20%	-19%	-19%	-20%	-16%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-39	KNIGHTLD 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-13%	-13%	-15%	-19%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-40	MAXWELL 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-20%	-20%	-20%	-20%	-16%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-41	MERIDIAN 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-17%	-17%	-17%	-17%	-14%	-16%	Cortina 230/60 kV Reinforcement
Sac-DV-42	MOBILCHE 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-17%	-17%	-19%	-24%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-43	POST 115 kV	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	C	DCTL	-8%	-8%	-9%	-9%	-9%	-13%	Woodland-Davis-West Sacramento Long-Term
Sac-DV-44	POST 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-24%	-25%	-28%	-35%	Diverge	Diverge	Woodland-Davis-West Sacramento Long-Term
Sac-DV-45	W.SCRMNO 115 kV	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV	C	DCTL	-8%	-8%	-8%	-9%	-9%	-13%	Woodland-Davis-West Sacramento Long-Term

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Line									
Sac-DV-46	W.SCRMNO 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-25%	-25%	-28%	-35%	Diverge	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-DV-47	WILKINS 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-19%	-19%	-19%	-20%	-16%	-19%	Cortina 230/60 kV Reinforcement
Sac-DV-48	WILLIAMS 60 kV	Delevan-Cortina 230 kV Line _Cortina-Vaca 230 kV Line	C	N-1-1	-17%	-16%	-16%	-17%	-13%	-16%	Cortina 230/60 kV Reinforcement
Sac-DV-49	WOODLD 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-17%	-17%	-19%	-25%	Diverge	Diverge	Woodland-Davis- West Sacramento Long-Term
Sac-DV-50	ZAMORA 115 kV	Rio Oso-Brighton 230 kV Line _Brighton-Bellota 230 kV Line	C	N-1-1	-14%	-14%	-16%	-20%	Diverge	Diverge	Woodland-Davis- West Sacramento Long-Term

Table A-4.7: Summary of thermal overloads for summer peak conditions – Central Valley / Sierra Division (Category A)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-T-01	Pease-Rio Oso 115 kV line	Normal	A	N-0	105%	106%	107%	108%	< 90%	118%	South of Palermo reconductor
Siera-T-02	Placer 115/60 Bank #1	Normal	A	N-0	85%	85%	88%	89%	92%	107%	Upgrade Atlantic-Placer corridor to 115 kV operation

Table A-4.8: Summary of thermal overloads for summer peak conditions – Central Valley / Sierra Division (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-T-03	Bogue-Rio Oso 115 kV Line	DRUM 5 1 & Colgate-Rio Oso 230 kV Line	B	G-1/L-1	< 90%	98%	99%	100%	96%	103%	South of Palermo reconductor
Siera-T-04	Drum-Bell 115 kV Line	CHICAGO PARK & Placer-Gold Hill 115 kV Line No. 1	B	G-1/L-1	93%	94%	95%	96%	113%	111%	Reconductor
Siera-T-05	Drum-Grass Valley-Weimar 60 kV line	ROLLINSF 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	102%	110%	114%	116%	119%	137%	Reconductor
Siera-T-06	Palermo - Bogue 115 kV Line (Palermo - Honcut Section)	Pease-Rio Oso 115 kV Line & FREC	B	G-1/L-1	113%	< 90%	< 90%	< 90%	< 90%	< 90%	South of Palermo reconductor
Siera-T-07	Palermo - Bogue 115 kV Line (Olivehurst - Bogue Section)	Colgate - Rio Oso 230 kV Line & FREC	B	G-1/L-1	< 90%	< 90%	< 90%	< 90%	< 90%	101%	South of Palermo reconductor
Siera-T-08	Palermo-Nicolaus 115 kV Line	Pease-Rio Oso 115 kV Line	B	L-1	108%	47%	47%	49%	47%	55%	South of Palermo reconductor
Siera-T-09	Palermo-Pease 115 kV Line	YCEC & Pease-Harter 60 kV Line	B	G-1/L-1	91%	92%	94%	95%	96%	110%	South of Palermo reconductor
Siera-T-10	Pease-Rio Oso 115 kV Line	Table Mountain-Rio Oso 230 kV Line	B	L-1	109%	108%	110%	111%	96%	121%	South of Palermo reconductor
Siera-T-11	Pease-Rio Oso 115 kV line	DRUM 5 1 & Table Mountain-Rio Oso 230 kV Line	B	G-1/L-1	112%	111%	113%	114%	92%	123%	South of Palermo reconductor
Siera-T-12	Rio Oso-Atlantic 230 kV Line	RALSTON & Rio Oso-Gold Hill 230 kV Line	B	G-1/L-1	97%	96%	97%	99%	98%	110%	New Rio Oso-Atlantic 230kV line

Table A-4.9: Summary of thermal overloads for summer peak conditions – Central Valley / Sierra Division (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-T-13	Bogue-Rio Oso 115 kV line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	109%	119%	121%	122%	118%	129%	South of Palermo reconductor
Siera-T-14	Bogue-Rio Oso 115 kV line	Rio Oso 230 kV Bus 1	C	Bus Outage	96%	105%	106%	107%	104%	112%	South of Palermo reconductor
Siera-T-15	Bogue-Rio Oso 115 kV line	Table Mountain-Rio Oso 230 kV Line _Colgate-Rio Oso 230 kV Line	C	N-1-1	109%	119%	121%	122%	118%	129%	South of Palermo reconductor
Siera-T-16	Del Mar-Atlantic 60 kV line #1	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	93%	91%	97%	104%	114%	Diverge	Upgrade Atlantic-Placer corridor to 115 kV operation
Siera-T-17	Drum-Higgins 115 kV line	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C	DCTL	109%	111%	118%	123%	126%	Diverge	Upgrade Atlantic-Placer corridor to 115 kV operation
Siera-T-18	Drum-Rio Oso 115 kV line # 1	Drum-Rio Oso No. 2 115 kV Line _Drum-Bell 115 kV Line (Drum-Higgins)	C	N-1-1	173%	170%	169%	168%	138%	< 95%	Operating solution to curtail generation and/or reconductor
Siera-T-19	Drum-Rio Oso 115 kV line # 2	Drum-Rio Oso No. 1 115 kV Line _Drum-Bell 115 kV Line (Drum-Higgins)	C	N-1-1	141%	137%	136%	135%	127%	< 95%	Operating solution to curtail generation and/or reconductor
Siera-T-20	Gold Hil-Horseshoe 115 kV line # 1	Placer-Gold Hill No. 2 115 kV Line _Drum-Bell 115 kV Line (Drum-Higgins)	C	N-1-1	116%	78%	80%	82%	84%	107%	Upgrade Atlantic-Placer corridor to 115 kV operation
Siera-T-21	Gold Hil-Horseshoe 115 kV line # 2	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	131%	88%	91%	93%	95%	122%	Upgrade Atlantic-Placer corridor to 115 kV operation
Siera-T-22	Gold Hill 230/115 kV Bank # 1	Drum-Bell 115 kV Line (Drum-Higgins) _Gold Hill 230/115 kV Transformer No. 2	C	N-1-1	96%	98%	101%	104%	106%	124%	Third Gold Hill 230/115 kV bank
Siera-T-23	Gold Hill 230/115 kV Bank # 2	Drum-Bell 115 kV Line (Drum-Higgins) _Gold Hill 230/115 kV Transformer No. 1	C	N-1-1	96%	98%	101%	104%	106%	124%	Third Gold Hill 230/115 kV bank

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-T-24	Atlantic-Lincoln 115 kV line	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	125%	123%	130%	137%	147%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-T-25	Rio Oso-Lincoln 115 kV line	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	113%	116%	123%	129%	140%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-T-26	Missouri Flat-Gold Hill 115 kV line # 1	Gold Hill-Clarksville 115 kV Line _Missouri Flat-Gold Hill No. 2 115 kV Lin	C	N-1-1	142%	112%	115%	119%	123%	144%	Clarksville Area reinforcement
Siera-T-27	Palermo-Bogue 115 kV line (Palermo - Honcut Section)	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	113%	< 90%	< 90%	< 90%	< 90%	< 90%	Operating solution for 2011
Siera-T-28	Palermo-Bogue 115 kV line (Olivehurst-Bogue Section)	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	97%	87%	90%	92%	90%	111%	South of Palermo reconductor
Siera-T-29	Palermo-Bogue 115 kV line	Colgate-Rio Oso 230 kV Line _Pease-Rio Oso 115 kV Line	C	N-1-1	101%	43%	44%	46%	43%	55%	Operating solution for 2011
Siera-T-30	Palermo-Nicolaus 115 kV Line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	137%	< 90%	< 90%	< 90%	< 90%	< 90%	Operating solution for 2011
Siera-T-31	Palermo-Nicolaus 115 kV Line	Rio Oso 230 kV Bus 1	C	Bus Outage	117%	< 90%	< 90%	< 90%	< 90%	< 90%	Operating solution for 2011
Siera-T-32	Palermo-Pease 115 kV Line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	92%	90%	93%	95%	111%	111%	South of Palermo reconductor
Siera-T-33	Palermo-Pease 115 kV Line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	N-1-1	< 95%	90%	93%	95%	111%	111%	South of Palermo reconductor
Siera-T-34	Pease-Rio Oso 115 kV line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	139%	135%	137%	139%	117%	152%	South of Palermo reconductor

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-T-35	Pease-Rio Oso 115 kV line	Rio Oso 230 kV Bus 1	C	Bus Outage	120%	118%	120%	121%	99%	132%	South of Palermo reconductor
Siera-T-36	Pleasant Grove-Formica 115 kV line	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	125%	122%	129%	136%	147%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-T-37	Rio Oso-Atlantic 230 kV line	Rio Oso-Gold Hill 230 kV Line _Middle Fork-Gold Hill 230 kV Line	C	N-1-1	107%	107%	108%	109%	109%	122%	New Rio Oso-Atlantic 230kV line
Siera-T-38	Rio Oso-Lincoln 115 kV line	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	113%	116%	123%	129%	139%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-T-39	Rio Oso-Nicolaus 115 kV line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C	DCTL	101%	93%	94%	94%	< 90%	103%	South of Palermo reconductor
Siera-T-40	Table Mountain-Rio Oso 230 kV line	Poe-Rio Oso 230 kV Line _Colgate-Rio Oso 230 kV Line	C	N-1-1	110%	84%	85%	88%	87%	100%	Operating solution for 2011

Table A-4.10: Summary of low voltages for summer peak conditions – Central Valley / Sierra Division (Category A)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-V-01	ATLANTC 230 kV	Normal	A	N-0	0.95	0.95	0.96	0.95	0.95	0.93	Rio Oso/Gold Hill area voltage support
Siera-V-02	ATLANTI 60 kV	Normal	A	N-0	0.97	0.98	0.98	0.97	0.97	0.94	Atlantic Placer 115 kV conversion
Siera-V-03	DEL MAR 60 kV	Normal	A	N-0	0.96	0.96	0.96	0.96	0.95	0.92	Atlantic Placer 115 kV conversion
Siera-V-04	GOLDHILL 230 kV	Normal	A	N-0	0.96	0.96	0.96	0.96	0.96	0.94	Rio Oso/Gold Hill area voltage support
Siera-V-05	RIO OSO 230 kV	Normal	A	N-0	0.96	0.96	0.96	0.96	0.96	0.94	Rio Oso/Gold Hill area voltage support
Siera-V-06	ROCKLIN 60 kV	Normal	A	N-0	0.97	0.97	0.97	0.97	0.97	0.93	Atlantic Placer 115 kV conversion

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-V-07	SIERRAPI 60 kV	Normal	A	N-0	0.96	0.96	0.96	0.96	0.95	0.92	Atlantic Placer 115 kV conversion
Siera-V-08	TAYLOR 60 kV	Normal	A	N-0	0.97	0.98	0.97	0.97	0.97	0.93	Atlantic Placer 115 kV conversion

Table A-4.11: Summary of low voltages for summer peak conditions – Central Valley / Sierra Division (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-V-09	DEL MAR 60 kV	Atlantic-Gold Hill 230 kV Line	B	L-1	0.94	0.94	0.94	0.94	0.93	0.89	Atlantic Placer 115 kV conversion
Siera-V-10	FORST HL 60 kV	OXBOW F 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	0.93	0.93	0.92	0.92	0.92	0.89	Drum area voltage support
Siera-V-11	OXBOW 60 kV	OXBOW F 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	0.93	0.93	0.92	0.92	0.92	0.89	Drum area voltage support
Siera-V-12	SIERRAPI 60 kV	Atlantic-Gold Hill 230 kV Line	B	L-1	0.94	0.94	0.94	0.94	0.93	0.89	Atlantic Placer 115 kV conversion

Table A-4.12: Summary of low voltages for summer peak conditions – Central Valley / Sierra Division (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-V-13	ALLEGHNY 60kV	Palermo-Colgate 230 kV Line & Colgate-Rio Oso 230 kV Line	C	DCTL	0.91	0.90	0.89	0.89	0.88	0.89	Colgate area voltage support
Siera-V-14	ATLANTC 230kV	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	C	DCTL	0.93	0.93	0.93	0.93	0.92	0.89	New Rio Oso-Atlantic 230kV line
Siera-V-15	ATLANTI 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.75	0.76	0.74	0.71	0.68	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-16	ATLANTIC 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.86	0.87	0.85	0.84	0.81	Diverge	New Rio Oso-Atlantic 230kV line

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-V-17	BEALE_1 60kV	Palermo-Colgate 230 kV Line & Colgate-Rio Oso 230 kV Line	C	DCTL	0.91	0.90	0.89	0.89	0.88	0.88	Smartville area voltage support
Siera-V-18	BELL PGE 115 kV	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	0.94	0.93	0.93	0.93	0.91	0.84	Atlantic Placer 115 kV conversion
Siera-V-19	DEL MAR 60kV	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	C	DCTL	0.94	0.94	0.93	0.93	0.92	0.87	New Rio Oso-Atlantic 230kV line
Siera-V-20	FLINT 115 kV	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	0.95	0.94	0.94	0.93	0.93	0.85	Atlantic Placer 115 kV conversion
Siera-V-21	FORMICA 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.88	0.89	0.87	0.85	0.83	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-22	FORST HL 60 kV	ROLLINSF 1 & OXBOW F 1	C	N-1-1	0.91	0.92	0.90	0.90	0.90	0.88	Drum area voltage support
Siera-V-23	GRSS VLY 60kV	Palermo-Colgate 230 kV Line & Colgate-Rio Oso 230 kV Line	C	DCTL	0.90	0.89	0.89	0.88	0.87	0.88	Drum area voltage support
Siera-V-24	LINCLN 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.91	0.92	0.91	0.89	0.87	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-25	OXBOW 60 kV	ROLLINSF 1 & OXBOW F 1	C	N-1-1	0.91	0.92	0.90	0.90	0.90	0.88	Drum area voltage support
Siera-V-26	PLACER 115 kV	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	0.94	0.94	0.93	0.93	0.90	0.85	Atlantic Placer 115 kV conversion
Siera-V-27	PLSNT GR 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.88	0.88	0.87	0.85	0.82	Diverge	New Rio Oso-Atlantic 230kV line

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-V-28	ROCKLIN 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.75	0.76	0.73	0.71	0.67	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-29	ROCKLIN 60kV	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	C	DCTL	0.95	0.95	0.95	0.94	0.93	0.89	New Rio Oso-Atlantic 230kV line
Siera-V-30	SIERRAPI 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.73	0.74	0.71	0.69	0.65	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-31	SIERRAPI 60kV	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	C	DCTL	0.94	0.94	0.93	0.93	0.92	0.87	New Rio Oso-Atlantic 230kV line
Siera-V-32	SPI-LINC 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.91	0.92	0.91	0.89	0.87	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-33	TAYLOR 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.75	0.76	0.74	0.71	0.67	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-34	TAYLOR 60kV	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	C	DCTL	0.95	0.95	0.95	0.94	0.93	0.89	New Rio Oso-Atlantic 230kV line
Siera-V-35	ULTR-RCK 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	0.88	0.89	0.88	0.86	0.83	Diverge	New Rio Oso-Atlantic 230kV line
Siera-V-36		Gold Hill 230/115 kV Transformer Nos. 1 & 2	C	N-1-1	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Third Gold Hill 230/115 kV bank

Table A-4.13: Summary of voltage deviations for summer peak conditions – Central Valley / Sierra Division (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-DV-01	CAPEHORN 60 kV	ROLLINSF 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	-5%	-5%	-6%	-6%	-6%	-8%	Drum area voltage support
Siera-DV-02	FORST HL 60 kV	OXBOW F 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	-6%	-6%	-7%	-7%	-7%	-9%	Drum area voltage support

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-DV-03	OXBOW 60 kV	OXBOW F 1	B	G-1	-5%	-5%	-5%	-5%	-5%	-5%	Drum area voltage support
Siera-DV-04	OXBOW 60 kV	OXBOW F 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	-6%	-7%	-8%	-8%	-8%	-9%	Drum area voltage support
Siera-DV-05	ROLLINS 60 kV	ROLLINSF 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	-5%	-6%	-6%	-7%	-7%	-8%	Drum area voltage support
Siera-DV-06	SHADYGLN 60 kV	ROLLINSF 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	-5%	-5%	-6%	-6%	-6%	-8%	Drum area voltage support
Siera-DV-07	WEMR SWS 60 kV	ROLLINSF 1 & Colgate-Grass Valley 60 kV Line	B	G-1/L-1	-5%	-5%	-6%	-6%	-6%	-8%	Drum area voltage support

Table A-4.14: Summary of voltage deviations for summer peak conditions – Central Valley / Sierra Division (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-DV-08	ATLANTC 230 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-20%	-19%	-21%	-22%	-25%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-09	ATLANTI 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-22%	-22%	-24%	-26%	-29%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-10	ATLANTIC 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-17%	-17%	-18%	-20%	-23%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-11	BELL PGE 115 kV	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	-5%	-6%	-6%	-6%	-8%	-13%	Atlantic Placer 115 kV conversion
Siera-DV-12	DEL MAR 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-23%	-22%	-25%	-27%	-31%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-13	FLINT 115 kV	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	-5%	-6%	-6%	-6%	-6%	-12%	Atlantic Placer 115 kV conversion

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Siera-DV-14	FORMICA 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-15%	-15%	-16%	-18%	-20%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-15	LINCLN 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-10%	-10%	-11%	-12%	-14%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-16	OXBOW 60 kV	ROLLINSF 1 & OXBOW F 1 9.11	C	N-1-1	-8%	-8%	-9%	-10%	-10%	-10%	Drum area voltage support
Siera-DV-17	PLACER 115 kV	Placer-Gold Hill No. 1 115 kV Line _Drum-Bell 115 kV Line (Higgins-Bell)	C	N-1-1	-5%	-6%	-6%	-6%	-8%	-12%	Atlantic Placer 115 kV conversion
Siera-DV-18	PLSNT GR 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-15%	-15%	-16%	-18%	-21%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-19	ROCKLIN 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-22%	-22%	-24%	-26%	-30%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-20	SIERRAPI 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-23%	-22%	-25%	-27%	-31%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-21	SPI-LINC 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-11%	-10%	-11%	-13%	-14%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-22	TAYLOR 60 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-22%	-22%	-24%	-26%	-30%	Diverge	New Rio Oso-Atlantic 230kV line
Siera-DV-23	ULTR-RCK 115 kV	Rio Oso-Atlantic 230 kV Line _Atlantic-Gold Hill 230 kV Line	C	N-1-1	-14%	-14%	-15%	-17%	-19%	Diverge	New Rio Oso-Atlantic 230kV line

Table A-4.15: Summary of thermal overloads for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category A)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-T-01	Hammer-Country Club 60 kV line	Normal	A	N-0	98%	95%	97%	98%	100%	112%	Hammer-Contry Club 60 kV line switch replacement
Stoc-T-02	Weber-Tesla 230 kV line	Normal	A	N-0	61%	67%	72%	78%	81%	106%	Reconductor

Table A-4.16: Summary of thermal overloads for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-T-03	Eight Mile-Tesla 230 kV line	Stagg 230/60 kV Transformer No. 4	B	T-1	61%	64%	70%	76%	79%	112%	Rerate
Stoc-T-04	Hammer-Country Club 60 kV line	Stagg-Hammer 60 kV Line	B	L-1	183%	180%	183%	187%	189%	210%	Stagg-Hammer new 60 kV line
Stoc-T-05	Lammers-Kasson 115 kV line	Tesla-Tracy 115 kV Line	B	L-1	102%	69%	70%	71%	73%	84%	Tesla 115 kV capacity increased project (Approved)
Stoc-T-06	Lammers-Kasson 115 kV line	STANISLS 1 & Tesla-Tracy 115 kV Line	B	G-1/L-1	117%	79%	80%	81%	83%	92%	Tesla 115 kV capacity increased project (Approved)
Stoc-T-07	Lockeford 60 kV line # 1	Hammer-Country Club 60 kV Line	B	L-1	89%	91%	93%	95%	96%	107%	Mosher area reinforcement
Stoc-T-08	Stagg-Tesla 230 kV line	Eight Mile Road-Tesla 230 kV Line	B	L-1	59%	62%	67%	72%	75%	104%	Rerate
Stoc-T-09	Tesla-Schulte Sw St 115 kV line	Schulte Sw Sta-Lammers 115 kV Line	B	L-1	109%	72%	72%	72%	72%	75%	Tesla 115 kV capacity increased project (Approved)
Stoc-T-12	Valley Springs 60 kV line # 1	Weber-Mormon Jct 60 kV Line	B	L-1	90%	99%	91%	92%	93%	100%	Rerate
Stoc-T-13	Weber-Tesla 230 kV line	Bellota-Tesla 230 kV Line	B	L-1	59%	65%	71%	78%	80%	109%	Reconductor

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-T-14	Weber-Tesla 230 kV line	COLLRVL1 1 & Bellota-Tesla 230 kV Line	B	G-1/L-1	65%	71%	78%	84%	87%	116%	Reconductor
Stoc-T-15	West Point-Valley Springs 60 kV line	WEST PNT 1 Gen	B	G-1	101%	102%	99%	100%	101%	108%	Second West Point-Valley Springs line

Table A-4.17: Summary of thermal overloads for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-T-16	Eight Mile-Tesla 230 kV line	Tesla 230 kV Bus 2-E	C	Bus Outage	65%	69%	75%	82%	85%	119%	Rerate
Stoc-T-17	Eight Mile-Tesla 230 kV line	Weber-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	66%	70%	76%	83%	89%	121%	Rerate
Stoc-T-18	Kasson 115/60 kV Bank	Tesla-Manteca 115 kV Line _Vierra-Tracy-Kasson 115 kV Line	C	N-1-1	83%	85%	87%	89%	92%	106%	Vierra 115 kV looping
Stoc-T-19	Kasson-Louise 60 kV line	Tesla-Manteca 115 kV Line _Vierra-Tracy-Kasson 115 kV Line	C	N-1-1	93%	96%	100%	104%	108%	136%	Vierra 115 kV looping
Stoc-T-20	Lammers-Kasson 115 kV line	Tesla-Manteca 115 kV Line _Tesla-Tracy 115 kV Line	C	N-1-1	136%	92%	94%	96%	99%	115%	Vierra 115 kV looping
Stoc-T-21	Lockeford 60 kV line # 1	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	104%	107%	111%	114%	118%	127%	Mosher area reinforcement
Stoc-T-22	Lockeford-Industrial 60 kV line	Lockeford-Lodi No. 2 60 kV Line _Lodi-Industrial 60 kV Line	C	N-1-1	142%	143%	143%	145%	145%	120%	Industrial area reinforcement
Stoc-T-23	Lockeford-Lodi 60 kV line # 1	Lockeford-Lodi No. 2 60 kV Line _Lockeford-Industrial 60 kV Line	C	N-1-1	142%	143%	144%	146%	147%	127%	Industrial area reinforcement
Stoc-T-24	Lockeford-Lodi 60 kV line # 2	Lockeford-Industrial 60 kV Line _Lodi-Industrial 60 kV Line	C	N-1-1	154%	156%	157%	158%	160%	133%	Industrial area reinforcement

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-T-25	Lockeford-Lodi 60 kV line # 3	Lockeford-Lodi No. 2 60 kV Line _Lockeford-Industrial 60 kV Line	C	N-1-1	176%	178%	180%	182%	186%	157%	Industrial area reinforcement
Stoc-T-26	Lodi-Industrial 60 kV line	Lockeford-Lodi No. 2 60 kV Line _Lockeford-Industrial 60 kV Line	C	N-1-1	223%	225%	226%	228%	186%	152%	Industrial area reinforcement
Stoc-T-27	Manteca-Louise 60 kV line	Tesla-Manteca 115 kV Line _Vierra-Tracy-Kasson 115 kV Line	C	N-1-1	88%	92%	97%	101%	107%	141%	Vierra 115 kV looping
Stoc-T-28	Stanislaus-Manteca 115 kV line # 2	Stanislaus-Melones Sw Sta-Manteca No. 1 _Stanislaus-Melones Sw Sta-Riverbank Jct	C	N-1-1	103%	102%	102%	102%	101%	100%	Reduce Stanislaus PH generation following the first contingency
Stoc-T-29	Stagg-Country Club 60 kV line # 1	Stagg-Country Club No. 2 60 kV Line _Stagg-Hammer 60 kV Line	C	N-1-1	171%	169%	172%	175%	178%	195%	Mosher & Hammer area reinforcement
Stoc-T-30	Stagg-Hammer 60 kV line	Stagg-Country Club No. 1 60 kV Line _Stagg-Country Club No. 2 60 kV Line	C	N-1-1	171%	168%	171%	175%	178%	194%	Mosher & Hammer area reinforcement
Stoc-T-31	Stagg-Tesla 230 kV line	Weber-Tesla 230 kV Line _Eight Mile Road-Tesla 230 kV Line	C	N-1-1	63%	67%	72%	78%	83%	112%	Rerate
Stoc-T-32	Stanislaus-Melones Sw St-Manteca 115 kV line # 1	Stanislaus-Manteca No.2 115 kV & Stanislaus-Melones-Riverbank Jct 115 kV Lines	C	DCTL	107%	107%	107%	107%	107%	106%	Rerate or SPS to reduce Stanislaus PH output following the DCTL outage with STE rating
Stoc-T-33	Stanislaus-Melones -River Bank Jct 115 kV line	Stanislaus-Manteca No.2 115 kV & Stanislaus-Melones Sw St-Manteca 115 kV line # 1 Lines	C	DCTL	107%	107%	107%	107%	107%	106%	Rerate or SPS to reduce Stanislaus PH output following the DCTL outage with STE rating
Stoc-T-34	Stockton 'A'-Lockeford-Bellota 115 kV line # 2	Stockton 'A'-Lockeford-Bellota No. 1 _Gold Hill-Bellota-Lockeford 115 kV Line	C	N-1-1	106%	106%	110%	110%	111%	118%	Rerate or operating solution

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-T-35	Tesla-Kasson-Manteca 115 kV line	Tesla 115 kV Bus 2	C	Bus Outage	77%	81%	85%	89%	93%	121%	Vierra 115 kV looping
Stoc-T-36	Tesla-Kasson-Manteca 115 kV line	Tesla-Tracy 115 kV Line _Schulte Sw Sta-Lammers 115 kV Line	C	N-1-1	125%	128%	131%	135%	139%	163%	Vierra 115 kV looping
Stoc-T-37	Tesla-Salado-Manteca 115 kV line	Kasson 115 kV Bus	C	Bus Outage	78%	81%	84%	87%	90%	116%	Vierra 115 kV looping
Stoc-T-38	Tesla-Schulte Sw St 115 kV line	Tesla-Tracy 115 kV Line _GWF Tracy-Schulte 115 kV Line	C	N-1-1	108%	73%	74%	76%	78%	90%	Tesla 115 kV capacity increased project (Approved)
Stoc-T-39	Tesla-Schulte Sw St 115 kV line	Tesla-Tracy 115 kV Line _GWF Tracy-Schulte 115 kV Line	C	N-1-1	91%	93%	95%	97%	100%	115%	Vierra 115 kV looping
Stoc-T-40	Tesla-Tracy 115 kV line	Tesla-Manteca 115 kV Line _Schulte Sw Sta-Lammers 115 kV Line	C	N-1-1	120%	123%	125%	128%	132%	153%	Vierra 115 kV looping
Stoc-T-41	Vierra-Tracy-Kasson 115 kV line	Tesla-Manteca 115 kV Line _Schulte Sw Sta-Lammers 115 kV Line	C	N-1-1	110%	113%	116%	120%	125%	152%	Vierra 115 kV looping
Stoc-T-42	Weber-Tesla 230 kV line	Tesla 230 kV Bus 2-E	C	Bus Outage	67%	73%	80%	86%	89%	119%	Reconductor
Stoc-T-43	Weber-Tesla 230 kV line	Bellota-Tesla 230 kV Line _Bellota - Warnerville 230 kV Line	C	N-1-1	64%	71%	77%	83%	92%	122%	Reconductor

Table A-4.18: Summary of low voltages for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-V-01	LOCKFORD 230 kV	Lockeford-Bellota 230 kV Line	B	L-1	0.84	0.84	0.84	0.83	0.83	0.84	Lockeford voltage Support

Table A-4.19: Summary of low voltages for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-V-02	COLONY 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.88	0.87	0.87	0.86	0.85	0.88	New Industrial area 230/60 kV substation
Stoc-V-03	EIGHT MI 230 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	0.89	0.89	0.88	0.88	0.89	0.82	Voltage support
Stoc-V-04	LOCKEFRD 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.90	0.89	0.88	0.87	0.87	0.89	New Industrial area 230/60 kV substation
Stoc-V-05	LOCKFORD 230 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	0.83	0.82	0.82	0.81	0.81	0.82	Lockeford voltage Support
Stoc-V-06	LOCKFORD 230 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.80	0.80	0.79	0.78	0.78	0.79	Lockeford voltage Support
Stoc-V-07	LODI 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	0.90	0.89	0.88	0.87	0.87	0.90	New Industrial area 230/60 kV substation
Stoc-V-08	LODI 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.86	0.85	0.85	0.84	0.83	0.86	New Industrial area 230/60 kV substation
Stoc-V-09	MONDAVI 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	0.90	0.89	0.88	0.87	0.87	0.90	New Industrial area 230/60 kV substation
Stoc-V-10	MONDAVI 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.86	0.85	0.85	0.83	0.83	0.86	New Industrial area 230/60 kV substation
Stoc-V-11	MSHR 60V 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.85	0.83	0.83	0.81	0.81	0.83	New Industrial area 230/60 kV substation
Stoc-V-12	STAGG 230 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	0.88	0.88	0.88	0.87	0.87	0.80	Stagg voltage Support

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-V-13	VICTOR 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	0.89	0.88	0.87	0.86	0.85	0.88	New Industrial area 230/60 kV substation

Table A-4.20: Summary of voltage deviations for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category B)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-DV-01	COLONY 60 kV	Lockeford-Bellota 230 kV Line	B	L-1	-8%	-9%	-10%	-10%	-10%	-8%	New Industrial area 230/60 kV substation
Stoc-DV-02	CORRAL 60 kV	WEST PNT 1 11.50 _Weber-Mormon Jct 60 kV Line	B	G-1/L-1	-5%	-5%	-3%	-3%	-3%	-4%	Linden area voltage support
Stoc-DV-03	FROGTOWN 115 kV	STANISLS 1 13.80 _Schulte Sw Sta-Lammers 115 kV Line	B	G-1/L-1	-4%	-5%	-5%	-5%	-5%	-5%	Stanislaus voltage support
Stoc-DV-04	LAMMERS 115 kV	Schulte Sw Sta-Lammers 115 kV Line	B	L-1	-5%	-5%	-5%	-5%	-5%	-6%	Vierra 115 kV looping
Stoc-DV-05	LINDEN 60 kV	Weber-Mormon Jct 60 kV Line	B	L-1	-6%	-8%	-5%	-4%	-4%	-4%	Linden area voltage support
Stoc-DV-06	LOCKEFRD 60 kV	Lockeford-Bellota 230 kV Line	B	L-1	-8%	-9%	-9%	-10%	-10%	-8%	New Industrial area 230/60 kV substation
Stoc-DV-07	LOCKFORD 230 kV	Lockeford-Bellota 230 kV Line	B	L-1	-13%	-13%	-14%	-14%	-14%	-12%	Lockeford voltage Support
Stoc-DV-08	LODI 60 kV	Lockeford-Bellota 230 kV Line	B	L-1	-8%	-9%	-10%	-10%	-10%	-8%	New Industrial area 230/60 kV substation
Stoc-DV-09	MONDAVI 60 kV	Lockeford-Bellota 230 kV Line	B	L-1	-8%	-9%	-10%	-10%	-10%	-8%	New Industrial area 230/60 kV substation
Stoc-DV-10	OI GLASS 115 kV	Schulte Sw Sta-Lammers 115 kV Line	B	L-1	-5%	-5%	-5%	-5%	-5%	-6%	Vierra 115 kV looping
Stoc-DV-11	PNE GRVE 60 kV	WEST PNT 1 11.50	B	G-1	-7%	-7%	-2%	-3%	-3%	-3%	Second West Point-Valley Springs line

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-DV-12	STANISLS 115 kV	STANISLS 1 13.80 _Schulte Sw Sta-Lammers 115 kV Line	B	G-1/L-1	-6%	-6%	-6%	-6%	-6%	-6%	Stanislaus voltage support
Stoc-DV-13	VICTOR 60 kV	Lockeford-Bellota 230 kV Line	B	L-1	-8%	-9%	-9%	-10%	-10%	-8%	New Industrial area 230/60 kV substation
Stoc-DV-14	WEST PNT 60 kV	WEST PNT 1 11.50	B	G-1	-8%	-8%	-3%	-3%	-4%	-4%	Second West Point-Valley Springs line

Table A-4.21: Summary of voltage deviations for summer peak conditions – Central Valley / Stockton / Stanislaus Division (Category C)

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-DV-15	BELLOTA 115 kV	Bellota 230/115 kV Transformer No. 1 _Bellota 230/115 kV Transformer No. 2	C	N-1-1	-5%	-5%	-6%	-6%	-7%	-12%	Bellota 115 kV voltage support
Stoc-DV-16	CAMANCHE 115 kV	Bellota 230/115 kV Transformer No. 1 _Bellota 230/115 kV Transformer No. 2	C	N-1-1	-4%	-4%	-5%	-6%	-6%	-12%	Bellota 115 kV voltage support
Stoc-DV-17	CNTRY CB 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	Stagg voltage Support
Stoc-DV-18	CNTRY CB 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-9%	-11%	-12%	-13%	D	Stagg voltage Support
Stoc-DV-19	COLONY 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	-11%	-12%	-12%	-13%	-13%	-11%	Lockeford voltage Support
Stoc-DV-20	COLONY 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-14%	-15%	-16%	-16%	-17%	-14%	Lockeford voltage Support
Stoc-DV-21	EIGHT MI 230 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-10%	-10%	-11%	-11%	-12%	D	Voltage support

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-DV-22	EIGHT MI 230 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-11%	-11%	-12%	-13%	-13%	D	Voltage support
Stoc-DV-23	HAMMER 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	Stagg voltage Support
Stoc-DV-24	HAMMER 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-10%	-11%	-12%	-13%	D	Stagg voltage Support
Stoc-DV-25	KYOHO 115 kV	Bellota 230/115 kV Transformer No. 1 _Bellota 230/115 kV Transformer No. 2	C	N-1-1	-5%	-5%	-6%	-6%	-7%	-12%	Bellota 115 kV voltage support
Stoc-DV-26	LAMMERS 115 kV	Tesla-Tracy 115 kV Line _Schulte Sw Sta-Lammers 115 kV Line	C	N-1-1	-9%	-9%	-10%	-10%	-10%	-12%	Vierra 115 kV looping
Stoc-DV-27	LOCKEFRD 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	-11%	-11%	-12%	-12%	-13%	-11%	New Industrial area 230/60 kV substation
Stoc-DV-28	LOCKEFRD 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-13%	-15%	-15%	-16%	-17%	-14%	New Industrial area 230/60 kV substation
Stoc-DV-29	LOCKFORD 230 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	-15%	-15%	-16%	-16%	-17%	-14%	Lockeford voltage Support
Stoc-DV-30	LOCKFORD 230 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-17%	-18%	-18%	-19%	-19%	-17%	Lockeford voltage Support
Stoc-DV-31	LODI 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	-12%	-12%	-12%	-13%	-13%	-11%	New Industrial area 230/60 kV substation
Stoc-DV-32	LODI 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-14%	-15%	-16%	-17%	-17%	-14%	New Industrial area 230/60 kV substation

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-DV-33	METTLER 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	New Industrial area 230/60 kV substation
Stoc-DV-34	METTLER 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-10%	-11%	-12%	-13%	D	New Industrial area 230/60 kV substation
Stoc-DV-35	MONDAVI 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	-12%	-12%	-12%	-13%	-13%	-11%	New Industrial area 230/60 kV substation
Stoc-DV-36	MONDAVI 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-14%	-15%	-16%	-17%	-17%	-14%	New Industrial area 230/60 kV substation
Stoc-DV-37	MSHR 60V 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	New Industrial area 230/60 kV substation
Stoc-DV-38	MSHR 60V 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-16%	-18%	-19%	-20%	-20%	-17%	New Industrial area 230/60 kV substation
Stoc-DV-39	NEW HOPE 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	Stagg voltage Support
Stoc-DV-40	NEW HOPE 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-10%	-11%	-12%	-13%	D	Stagg voltage Support
Stoc-DV-41	OI GLASS 115 kV	Tesla-Tracy 115 kV Line _Schulte Sw Sta-Lammers 115 kV Line	C	N-1-1	-9%	-9%	-10%	-10%	-10%	-12%	Vierra 115 kV looping
Stoc-DV-42	SEBASTIA 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	Stagg voltage Support
Stoc-DV-43	SEBASTIA 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-10%	-11%	-12%	-13%	D	Stagg voltage Support

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Stoc-DV-44	STAGG 230 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-11%	-11%	-12%	-12%	-13%	D	Stagg voltage Support
Stoc-DV-45	STAGG 230 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-12%	-12%	-13%	-14%	-15%	D	Stagg voltage Support
Stoc-DV-46	STKTON A 115 kV	Bellota 230/115 kV Transformer No. 1 _Bellota 230/115 kV Transformer No. 2	C	N-1-1	-3%	-3%	-4%	-4%	-5%	-11%	Bellota 115 kV voltage support
Stoc-DV-47	STKTON B 115 kV	Bellota 230/115 kV Transformer No. 1 _Bellota 230/115 kV Transformer No. 2	C	N-1-1	-5%	-5%	-6%	-6%	-7%	-12%	Bellota 115 kV voltage support
Stoc-DV-48	TERMNOUS 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	Stagg voltage Support
Stoc-DV-49	TERMNOUS 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-10%	-11%	-12%	-13%	D	Stagg voltage Support
Stoc-DV-50	TRACY 115 kV	Tesla-Tracy 115 kV Line _Schulte Sw Sta-Lammers 115 kV Line	C	N-1-1	-8%	-8%	-9%	-9%	-9%	-11%	Vierra 115 kV looping
Stoc-DV-51	UOP 60 kV	Stagg-Tesla 230 kV Line & Eight Mile Road-Tesla 230 kV Line	C	DCTL	-8%	-7%	-8%	-9%	-10%	D	Stagg voltage Support
Stoc-DV-52	UOP 60 kV	Eight Mile Road-Tesla 230 kV Line _Stagg 230/60 kV Transformer No. 4	C	N-1-1	-10%	-9%	-11%	-12%	-13%	D	Stagg voltage Support
Stoc-DV-53	VICTOR 60 kV	Lockeford-Bellota 230 kV Line & Brighton-Bellota 230 kV Line	C	DCTL	-11%	-11%	-12%	-13%	-13%	-11%	New Industrial area 230/60 kV substation
Stoc-DV-54	VICTOR 60 kV	Lockeford-Bellota 230 kV Line _Hammer-Country Club 60 kV Line	C	N-1-1	-13%	-15%	-16%	-16%	-17%	-14%	New Industrial area 230/60 kV substation

APPENDIX A-5: Reliability Assessment Results for Greater Bay Area

Table A-5.1: Summary of thermal overloads for summer peak conditions – San Francisco

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
SF-T-01	Potrero - Mission (AX) 115 kV Cable	Potrero-Larkin #2 (AY-2) 115kV Cable	B	Line	106%	106%	105%	104%	107%	108%	Reduce TransBay cable output
SF-T-02	Potrero - Larkin #1 (AY-1) 115 kV Cable	Mission-Larkin (XY-1) 115kV Cable _Martin-Larkin (HY-1) 115kV Cable	C	N-1-1	164%	164%	165%	165%	165%	168%	Develop an action plan to transfer loads among substation (NB: reducing TransBay cable output doesn't solve the problem)
SF-T-03	Potrero - Larkin #2 (AY-2) 115 kV Cable	Potrero 115kV Bus 1D	C	Bus	129%	129%	128%	128%	129%	132%	Develop an action plan to transfer loads among substation, reduce TransBay cable output and if overload still exists, drop load manually or by SPS
SF-T-04	Potrero - Mission (AX) 115 kV Cable	Potrero 115kV Bus 2E	C	Bus	122%	123%	121%	120%	122%	125%	Develop an action plan to transfer loads among substation, reduce TransBay cable output and if overload still exists, drop load manually or by SPS

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Potrero-Larkin #1 (AY-1) 115kV Cable _Potrero-Larkin #2 (AY-2) 115kV Cable	C	N-1-1	134%	135%	134%	133%	135%	138%	Develop an action plan to transfer loads among substation, reduce TransBay cable output and if overload still exists, drop load manually or by SPS
		Potrero-Larkin #2 (AY-2) 115kV Cable _HP-Misson #1 (PX-1) 115kV Cable	C	N-1-1	122%	122%	123%	123%	123%	138%	Develop an action plan to transfer loads among substation, reduce TransBay cable output and if overload still exists, drop load manually or by SPS

Table A-5.2: Summary of thermal overloads for summer peak conditions – Peninsula

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Penn-T-01	Jefferson - Stanford 60 kV Line	Cooley Landing-Stanford 60kV Line w/ Cardinal Co-Gen offline	B	(L-1/G-1)	100%	101%	103%	103%	105%	107%	Build a new Jefferson-Stanford #2 60 kV Line
Penn-T-02	Ravenswood - Palo Alto #1 115 kV Line	Ravenswood 115kV Bus 2E	C	Bus	118%	119%	120%	121%	122%	126%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
		Ravenswood-Cooley Landing #2 115kV Lin_Ravenswood-Palo Alto #2 115kV Line	C	N-1-1	118%	120%	120%	121%	122%	126%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-T-03	Ravenswood - Palo Alto #2 115 kV Line	Ravenswood-Palo Alto No. 1 115 kV and Cooley Landing-Palo Alto 115 kV lines	C	DCTL	106%	106%	106%	106%	107%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Ravenswood-Cooley Landing #2 115kV Lin_Ravenswood-Palo Alto #1 115kV Line	C	N-1-1	118%	119%	121%	121%	122%	126%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-T-04	Cooley Landing - Palo Alto 115 kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C	DCTL	114%	114%	115%	115%	116%	118%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-T-05	Ravenswood - Cooley Landing #2 115 kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C	DCTL	140%	142%	108%	108%	109%	113%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-T-06	Ravenswood - San Mateo 115 kV Line	Ravenswood-San Mateo Nos. 1 & 2 230 kV lines	C	DCTL	103%	107%	less than 80%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate			

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Penn-T-07	San Mateo - Belmont 115 kV Line	Ravenswood-Bair Nos. 1 & 2 115 kV lines	C	DCTL	87%	89%	92%	94%	96%	103%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
		Ravenswood 230/115kV Transformer #1 _Ravenswood 230/115kV Transformer #2	C	N-1-1	98%	100%	104%	103%	105%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-T-08	Bair 115/60 kV Transformer No. 1	Ravenswood-Cooley Landing #1 115kV Lin_Cooley Landing 115/60kV Transformer #2	C	N-1-1	112%	117%	120%	123%	124%	134%	Replace transformer or SPS
Penn-T-09	Bair - Cooley Landing #1 60 kV Line	Bair-Cooley Landing #2 60kV Line _Bair 115/60kV Transformer #1	C	N-1-1	< 95%	< 95%	< 95%	95%	97%	104%	Drop load either manually or thru SPS as appropriate
Penn-T-10	Bair - Cooley Landing #2 60 kV Line	San Mateo-Bair 60kV Line _Bair 115/60kV Transformer #1 (N-1-1)	C	N-1-1	< 95%	100%	103%	107%	109%	118%	Drop load either manually or thru SPS as appropriate

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Penn-T-11	San Mateo 230/115 kV Transformer No. 7	San Mateo 230/115kV Transformer #5 _San Mateo 230/115kV Transformer #6	C	N-1-1	94%	95%	96%	95%	98%	102%	Add cooling fans to increase transformer capacity or drop load

Table A-5.3: Summary of thermal overloads for summer peak conditions – East Bay

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EBay-T-01	Oleum - North Tower - Christie 115 kV Line	Christie-Sobrante (Oleum-Sobrante) 115kV Line	B	Line	84%	86%	89%	90%	92%	102%	Reconductor the line
EBay-T-02	Oleum - North Tower - Christie 115 kV Line	Sobrante 115kV Bus 1	C	Bus	84%	86%	89%	90%	93%	102%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
		Sobrante-G Nos. 1 & 2 115 kV lines	C	DCTL	91%	95%	96%	95%	97%	110%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
		Christie-Sobrante 115 kV and Martinez-Sobrante 115 kV lines	C	DCTL	84%	86%	89%	90%	92%	102%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Christie-Sobrante (Oleum-Sobrante) 115_UNION CH 1 9.11	C	N-1-1	104%	107%	109%	111%	114%	125%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
EBay-T-03	Christie - Sobrante 115 kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C	DCTL	101%	107%	109%	108%	109%	124%	Drop load either manually or thru SPS as appropriate
EBay-T-04	Moraga - Oakland "J" 115kV Line	San Leandro U 115kV Bus Sec D	C	Bus	117%	118%	120%	121%	123%	131%	Drop load either manually or thru SPS as appropriate
EBay-T-05	Oakland "C" - Oakland "L" #1 115 kV Cable	Claremont K - Oakland D #1 115kV Cable_Claremont K - Oakland D #2 115kV Cable	C	N-1-1	93%	95%	96%	97%	98%	105%	Drop load either manually or thru SPS as appropriate

Table A-5.4: Summary of thermal overloads for summer peak conditions – Diablo

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
Diab-T-01	Contra Costa PP - Contra Costa Sub 230 kV Line	Birds Landing- Contra Costa PP 230kV Line	B	Line	Less than 80%						131%	Congestion Management

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
Diab-T-02	Birds Landing - Contra Costa 230 kV Line	CC PP - CC Sub 230kV Line	B	Line	Less than 80%						112%	
Diab-T-03	Pittsburg - Clayton #1 115 kV Line	Pittsburg-Clayton Nos. 3 & 4 115 kV lines	C	DCTL	110%	107%	108%	109%	109%	109%	Drop load either manually or thru SPS as appropriate	
Diab-T-04	Pittsburg - Clayton #3 115 kV Line	Pittsburg-Clayton #1 115kV Line _Pittsburg-Clayton #4 115kV Line	C	N-1-1	115%	112%	113%	114%	114%	114%	Drop load either manually or thru SPS as appropriate	
Diab-T-05	Pittsburg - Clayton #4 115 kV Line	Pittsburg-Clayton #1 115kV Line _Pittsburg-Clayton #3 115kV Line	C	N-1-1	124%	121%	122%	123%	123%	123%	Drop load either manually or thru SPS as appropriate	
Diab-T-06	Lakewood - Meadow Lane - Clayton 115 kV Line	Clayton 115kV Bus 1	C	Bus	139%	134%	135%	137%	136%	137%	Drop load either manually or thru SPS as appropriate	
		Clayton-Meadow Lane 115kV Line _Lakewood-Clayton 115kV Line	C	N-1-1	140%	135%	137%	139%	138%	136%	Drop load either manually or thru SPS as appropriate	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Diab-T-07	Moraga - Lakewood 115 kV Line	Lakewood-Clayton and Lakewood-Meadow Lane-Clayton 115 kV lines	C	DCTL	127%	126%	127%	127%	129%	134%	Drop load either manually or thru SPS as appropriate
Diab-T-08	Moraga - Oakland "J" 115kV Line	San Leandro U 115kV Bus Sec D	C	Bus	117%	118%	120%	121%	123%	131%	Drop load either manually or thru SPS as appropriate
Diab-T-09	Moraga - San Leandro #1 115 kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	C	DCTL	116%	118%	119%	120%	122%	131%	Drop load either manually or thru SPS as appropriate
		Moraga-San Leandro #2 115kV Line _Moraga-San Leandro #3 115kV Line	C	N-1-1	130%	132%	133%	134%	136%	145%	Drop load either manually or thru SPS as appropriate
Diab-T-10	Moraga - San Leandro #2 115 kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	C	DCTL	118%	119%	120%	121%	124%	132%	Drop load either manually or thru SPS as appropriate

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Moraga-San Leandro #1 115kV Line _Moraga-San Leandro #3 115kV Line	C	N-1-1	131%	132%	134%	135%	137%	146%	Drop load either manually or thru SPS as appropriate
Diab-T-11	Moraga - San Leandro #3 115 kV Line	Moraga-San Leandro Nos. 1 & 2 115 kV lines	C	DCTL	105%	106%	107%	108%	109%	117%	Drop load either manually or thru SPS as appropriate
		Moraga-Oakland J 115 kV and Moraga-San Leandro No. 2 115 kV lines	C	N-1-1	95%	96%	97%	98%	101%	107%	Drop load either manually or thru SPS as appropriate
Diab-T-12	Christie - Sobrante 115 kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C	DCTL	101%	107%	109%	108%	109%	122%	Drop load either manually or thru SPS as appropriate
Diab-T-13	Oleum - Martinez 115 kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C	DCTL	105%	104%	105%	109%	111%	115%	Drop load either manually or thru SPS as appropriate

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Diab-T-14	Moraga - Castro Valley 230 kV Line	Contra Costa - Las Positas 230 kV and Contra Costa-Lonetree 230 kV lines	C	DCTL	106%	99%	101%	103%	109%	113%	Drop load either manually or thru SPS as appropriate
Diab-T-15	Contra Costa PP - Contra Costa Sub 230 kV Line	Lambie SW STA-Birds Landing SW STA 230 kV and Peabody-Birds Landing SW STA 230 k	C	DCTL	Less than 80%	109%	Congestion Management				
		Contra Costa-Gateway 230kV Line _Birds Landing-Contra Costa PP 230kV Line	C	N-1-1	Less than 80%	152%	Congestion Management				

Table A-5.5: Summary of thermal overloads for summer peak conditions – Mission

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-T-01	Moraga - San Leandro #1 115 kV Line	San Leandro U 115kV Bus Sec E	C	Bus	111%	113%	114%	115%	116%	124%	To develop flow gate limit in the operating procedure

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	C	DCTL	116%	118%	119%	120%	122%	131%	To develop flow gate limit in the operating procedure
		Moraga-San Leandro #2 115kV Line _Moraga-San Leandro #3 115kV Line	C	N-1-1	130%	132%	133%	134%	136%	145%	To develop flow gate limit in the operating procedure
Miss-T-02	Moraga - San Leandro #2 115 kV Line	Moraga-San Leandro #1 115kV Line _Moraga-San Leandro #3 115kV Line	C	N-1-1	131%	132%	134%	135%	137%	146%	To develop flow gate limit in the operating procedure
		Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	C	DCTL	118%	119%	120%	121%	124%	132%	To develop flow gate limit in the operating procedure
Miss-T-03	Moraga - San Leandro #3 115 kV Line	Moraga-San Leandro Nos. 1 & 2 115 kV lines	C	DCTL	105%	106%	107%	108%	109%	117%	To develop flow gate limit in the operating procedure

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-T-04	Newark - Ames #1 115 kV Line	Newark-Ravenswood 230 kV and Tesla- Ravenswood 230 kV lines	C	DCTL	103%	108%	less than 80%				Drop load either manually or thru SPS as appropriate
Miss-T-05	Newark - Ames #2 115 kV Line	Newark-Ravenswood 230 kV and Tesla- Ravenswood 230 kV lines	C	DCTL	114%	120%	less than 80%				Drop load either manually or thru SPS as appropriate
Miss-T-06	Newark - Ames #3 115 kV Line	Newark-Ravenswood 230 kV and Tesla- Ravenswood 230 kV lines	C	DCTL	112%	118%	less than 80%				Drop load either manually or thru SPS as appropriate
Miss-T-07	Newark - Ames Distribution 115 kV Line	Newark-Ravenswood 230 kV and Tesla- Ravenswood 230 kV lines	C	DCTL	113%	119%	less than 80%				Drop load either manually or thru SPS as appropriate
Miss-T-08	Moraga - Castro Valley 230 kV Line	Contra Costa - Las Positas 230 kV and Contra Costa - Lonetree 230 kV lines	C	DCTL	106%	99%	101%	103%	109%	113%	Drop load either manually or thru SPS as appropriate

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Contra Costa-Las Positas 230kV Line _Tesla-Newark #2 230kV Line	C	N-1-1	111%	105%	103%	106%	111%	116%	Drop load either manually or thru SPS as appropriate
Miss-T-09	East Shore 230/115 KV Transformer No. 1	Dumbarton-Newark 115kV Line _Eastshore 230/115kV Transformer #2	C	N-1-1	99%	101%	103%	104%	105%	113%	Drop load either manually or thru SPS as appropriate
Miss-T-10	East Shore 230/115 KV Transformer No. 2	Dumbarton-Newark 115kV Line _Eastshore 230/115kV Transformer #1	C	N-1-1	150%	153%	156%	157%	159%	173%	Drop load either manually or thru SPS as appropriate
Miss-T-11	Newark 115/60 kV Transformer No. 1	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	92%	94%	96%	97%	99%	127%	Congestion Management
Miss-T-12	Grant - East Shore #1 115 kV Line	San Leandro-Oakland J 115kV Line _Grant-Eastshore #2 115kV Line	C	N-1-1	92%	94%	96%	97%	98%	107%	Congestion Management

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-T-13	Grant - East Shore #2 115 kV Line	San Leandro-Oakland J 115kV Line _Grant-Eastshore #1 115kV Line	C	N-1-1	92%	94%	96%	97%	98%	107%	Congestion Management
Miss-T-14	East Shore - Dumbarton 115 kV Line	Pittsburg-Eastshore 230kV Line _Eastshore-San Mateo 230kV Line	C	N-1-1	82%	84%	86%	87%	89%	106%	Congestion Management
Miss-T-15	Las Positas - Newark 230 kV Line	Tesla-Newark #1 230kV Line _Tesla-Newark #2 230kV Line	C	N-1-1	96%	96%	94%	97%	103%	106%	Congestion Management
Miss-T-16	Castro Valley - Newark 230 kV Line	Contra Costa-Las Positas 230kV Line _Tesla-Newark #2 230kV Line	C	N-1-1	101%	94%	92%	95%	100%	104%	Congestion Management

Table A-5.6: Summary of low voltages for summer peak conditions – Mission

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-V-01	SUNOL 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.93	0.92	0.92	0.92	0.91	0.86	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-V-02	VALLECTS 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.91	0.91	0.91	0.91	0.90	0.85	Install reactive support device in the 60kV system
Miss-V-03	IUKA 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.88	0.87	0.86	0.80	
Miss-V-04	LIVRMR_2 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.88	0.87	0.86	0.80	
Miss-V-05	LIVERMRE 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.88	0.87	0.86	0.80	
Miss-V-06	VINEYARD 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.87	0.87	0.86	0.80	
Miss-V-07	RADUM 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.87	0.87	0.86	0.80	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-V-08	CALMAT60 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.87	0.87	0.86	0.80	Install reactive support device in the 60kV system
Miss-V-09	SAN RAMN 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.87	0.87	0.87	0.86	0.80	
Miss-V-10	E DUBLIN 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.87	0.87	0.87	0.86	0.80	
Miss-V-11	LPOSTAS 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.87	0.87	0.86	0.80	
Miss-V-12	SEAWEST 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.87	0.87	0.86	0.80	
Miss-V-13	VASCO 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	0.88	0.88	0.87	0.87	0.86	0.80	

Table A-5.7: Summary of voltages deviations for summer peak conditions – Mission

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Miss-dV-01	E DUBLIN 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	-12%	-12%	-13%	-13%	-14%	-19%	Install reactive support device in the 60kV system
Miss-dV-02	SAN RAMN 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	-12%	-13%	-13%	-13%	-14%	-20%	
Miss-dV-03	LPOSTAS 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	-12%	-13%	-13%	-13%	-14%	-20%	
Miss-dV-04	SEAWEST 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	-12%	-13%	-13%	-13%	-14%	-20%	
Miss-dV-05	VASCO 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C	N-1-1	-12%	-13%	-13%	-13%	-14%	-20%	

Table A-5.8: Summary of thermal overloads for summer peak conditions – San Jose

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
SanJ-T-01	Newark-Dixon Landing 115kV Line	Piercy-Metcalf 115kV Line	B	N-1	104%	Less than 80%					Reconductor project is scheduled to be completed by 2012
SanJ-T-02	Metcalf 230/115 kV Transformer No. 1	Metcalf 230/115 kV Transformer No. 4 _Metcalf 230/115 kV Transformer No. 2	C	N-1-1	84%	86%	92%	95%	110%	103%	Congestion Management
SanJ-T-03	Metcalf 230/115 kV Transformer No. 2	Metcalf 230kV Bus 1D	C	Bus	87%	90%	96%	99%	117%	109%	Congestion Management
		Metcalf 230/115 kV Transformer No.1 _Metcalf 230/115 kV Transformer No. 3	C	N-1-1	88%	90%	96%	98%	115%	108%	Congestion Management
SanJ-T-04	Metcalf 230/115 kV Transformer No. 3	Metcalf 230kV Bus 1D	C	Bus	81%	84%	90%	92%	109%	101%	Congestion Management
		Metcalf 230/115 kV Transformer No. 4 _Metcalf 230/115 kV Transformer No. 2	C	N-1-1	82%	84%	90%	92%	106%	101%	Congestion Management
SanJ-T-05	Metcalf 230/115 kV Transformer No. 4	Metcalf 230/115 kV Transformer No. 1 _Metcalf 230/115 kV Transformer No. 2	C	N-1-1	86%	89%	95%	98%	114%	107%	Congestion Management
SanJ-T-06	Piercy - Metcalf 115 kV Line	Metcalf - Evergreen #1 and #2 115 kV Lines	C	DCTL	87%	87%	93%	94%	97%	104%	Congestion Management

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Newark-Metcalf No. 2 115 kV Line(Newar_Mabury-Jennings J. 115 kV Line	C	N-1-1	96%	97%	98%	98%	99%	106%	Congestion Management
SanJ-T-07	Evergreen - Mabury 115 kV Line	Newark-Metcalf No. 2 115 kV Line(Newar_Piercy-Metcalf 115 kV Line	C	N-1-1	N/A	120%	121%	122%	125%	132%	Drop load either manually or thru SPS as appropriate
SanJ-T-08	Metcalf 500/230 kV Transformer No. 13	Metcalf 500/230 kV Tranformer No. 11 _Metcalf 500/230 kV Tranformer No. 12	C	N-1-1	93%	96%	104%	108%	121%	121%	Congestion Management
SanJ-T-09	Newark - Milpitas #2 115 kV Line	Newark-Milpitas 115 kV Line No. 1 _Swift-Metcalf 115 kV Line	C	N-1-1	103%	106%	108%	109%	111%	120%	Drop load either manually or thru SPS as appropriate
SanJ-T-10	Metcalf - Llagas 115 kV Line	Metcalf-Morgan Hill 115 kV Line _Llagas-Gilroy Foods 115 kV Line	C	N-1-1	92%	95%	97%	98%	99%	108%	Drop load either manually or thru SPS as appropriate
SanJ-T-11	Metcalf - Morgan Hill 115 kV Line	Metcalf-Morgan Hill 115 kV Line _Llagas-Gilroy Foods 115 kV Line	C	N-1-1	92%	95%	97%	98%	99%	108%	Drop load either manually or thru SPS as appropriate
SanJ-T-12	Hicks - Metcalf 230 kV Line	Metcalf-Monta Vista No. 3 230 kV Line _Monta Vista-Coyote Sw. Sta. 230 kV Line	C	N-1-1	88%	90%	94%	96%	99%	107%	Congestion Management

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
SanJ-T-13	Monta Vista - Hicks 230 kV Line	Metcalf-Monta Vista No. 3 230 kV Line _Monta Vista-Coyote Sw. Sta. 230 kV Line	C	N-1-1	81%	84%	88%	91%	94%	103%	Congestion Management
SanJ-T-14	Trimble - San Jose B 115 kV Line	Los Esteros-Montague 115 kV Line _Los Esteros-Trimble 115 kV Line	C	N-1-1	81%	85%	89%	91%	91%	101%	Congestion Management

Table A-5.9: Summary of thermal overloads for summer peak conditions – De Anza

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
DeAn-T-01	Monta Vista - Saratoga 230 kV Line	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	C	DCTL	Less than 80%	81%	86%	89%	92%	101%	Congestion Management
DeAn-T-02	Monta Vista - Hicks 230 kV Line	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	C	DCTL	81%	84%	88%	91%	94%	103%	Congestion Management
DeAn-T-03	Saratoga - Vasona 230 kV Line	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	C	DCTL	88%	90%	95%	97%	100%	109%	Congestion Management
DeAn-T-04	Monta Vista 230/115 kV Transformer No. 4	Monta Vista 230/115 kV Transformer No._Monta Vista 230/115 kV Transformer No. 3	C	N-1-1	82%	84%	90%	92%	94%	101%	Congestion Management

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
DeAn-T-05	Monta Vista 230/115 kV Transformer No. 2	Monta Vista 230/115 kV Transformer No. 4	C	N-1-1	82%	84%	90%	92%	94%	101%	Congestion Management

APPENDIX A-6: Reliability Assessment Results for Fresno Area

Table A-6.1: Summary of thermal overloads for summer peak conditions - Fresno

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-T-01	BORDEN-GREGG 230kV line	Normal	A	N-0	92%	90%	89%	88%	94%	107%	reconductor
Frsn-T-02	OAKHURST TAP 115kV	Normal	A	N-0	89%	90%	93%	96%	99%	116%	build new line
Frsn-T-03	LEPRINO TAP 70kV	Normal	A	N-0	93%	95%	97%	99%	104%	117%	build new line
Frsn-T-04	OAKHURST TAP 115kV	KERCKHOF 1 13.80	B	G-1	78%	80%	82%	85%	87%	102%	build new line
Frsn-T-05	LEPRINO TAP 70kV	GWF-PWR. 1 13.80	B	G-1	94%	96%	98%	100%	106%	119%	build new line
Frsn-T-06	PANOCHÉ-MENDOTA 115kV line	Borden - Gregg 230 kV Line	B	L-1	75%	76%	76%	77%	91%	101%	reconductor
Frsn-T-07	ORO LOMA-MENDOTA 70kV line	Madera Generation & PANOCHÉ-MENDOTA 115kV line	B	G-1/L-1	100%	101%	101%	102%	105%	111%	SPS to trip load or reconductor or build new line
Frsn-T-08	BORDEN-GREGG 230kV line	Herndon - Bullard #1 & Herndon - Bullard #2 115 kV Lines	C	DCTL	88%	88%	87%	87%	91%	104%	reconductor
Frsn-T-09	OAKHURST TAP 115kV	Helms - Gregg #1 & #2 230 kV Lines	C	DCTL	76%	78%	80%	83%	86%	100%	build new line
Frsn-T-10	LEPRINO TAP 70kV	Helms - Gregg #1 & #2 230 kV Lines	C	DCTL	93%	95%	98%	100%	106%	120%	build new line
Frsn-T-11	PANOCHÉ-MENDOTA 115kV line	Panoche - Kearney & Gates - Gregg 230 kV Lines	C	DCTL	80%	82%	82%	83%	100%	112%	reconductor
Frsn-T-12	OAKHURST TAP 115kV	Le Grand - Chowchilla 115 kV Line _Kerkchoff 115/13.8 kV GSU 1	C	N-1-1	80%	82%	84%	87%	90%	105%	reconductor

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-T-13	LEPRINO TAP 70kV	Henrietta-GWF Henrietta 70 kV Line _GWF-PWR. 1 13.80	C	N-1-1	96%	98%	101%	104%	106%	120%	build new line
Frsn-T-14	WILSON-ATWATER 115kV line #2	Atwater - Merced 115 kV Line _El Capitan - Wilson 115 kV Line	C	N-1-1	93%	96%	97%	99%	101%	117%	modify Atwater SPS or install new SPS or Establish 15 minute rating, curtail load within 15 minutes
Frsn-T-15	CALIFORNIA AVE-MCCALL 115kV line	California Ave.-Sanger 115 kV Line _McCall- West Fresno 115 kV Line	C	N-1-1	91%	91%	92%	93%	95%	103%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes
Frsn-T-16	BARTON-AIRWAYS-SANGER 115kV line	Herndon 230/115 kV Transformer No. 1 _Herndon 230/115 kV Transformer No. 2	C	N-1-1	108%	26%	29%	29%	27%	39%	Establish 15 minute rating, curtail load within 15 minutes
Frsn-T-17	ORO LOMA-MENDOTA 70kV line	Dairyland - Mendota 115 kV Line _Panoche - Mendota 115 kV Line	C	N-1-1	218%	217%	216%	215%	217%	225%	SPS to trip load or reconductor or build new line
Frsn-T-18	ORO LOMA-CANAL 70kV line #1	Los Banos - Canal - Oro Loma 70 kV Lin _Los Banos-Livingston Jct-Canal 70 kV Lin	C	N-1-1	200%	205%	209%	215%	224%	267%	SPS to trip load or reconductor or build new line
Frsn-T-19	LOS BANOS-CANAL-ORO LOMA 70kV line	Oro Loma - Canal #1(Oro Loma - Santa R_ _Los Banos-Livingston Jct-Canal 70 kV Lin	C	N-1-1	100%	102%	103%	105%	107%	117%	SPS to trip load or reconductor or build new line

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-T-20	LOS BANOS-LIVINGSTON JCT-CANAL 70kV line	Mendota 115/70 kV Transformer No. 1 _Oro Loma 115/70 kV Transformer No. 2	C	N-1-1	98%	99%	100%	101%	102%	109%	SPS to trip load or reconductor or build new line
Frsn-T-21	ORO LOMA 115/70kV transformer bank #2	Los Banos - Canal - Oro Loma 70 kV Lin_Los Banos-Livingston Jct-Canal 70 kV Lin	C	N-1-1	114%	116%	118%	120%	125%	133%	SPS to trip load or replace the bank
Frsn-T-22	LOSBANOS 230/70kV transformer bank #3	Los Banos 230/70 kV Transformer No. 4 _Oro Loma 115/70 kV Transformer No. 2	C	N-1-1	92%	93%	94%	95%	97%	104%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes
Frsn-T-23	PANOCHESCHINDLER 115kV line #1	Panoche - Mendota 115 kV Line _Panoche 230/115 kV Transformer No. 1	C	N-1-1	100%	99%	99%	99%	100%	109%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes
Frsn-T-24	PANOCHESCHINDLER 115kV line	Panoche - Schindler #1 115 kV Line _Panoche 230/115 kV Transformer No. 1	C	N-1-1	120%	120%	120%	120%	120%	134%	reconductor
Frsn-T-25	WILSON-LE GRAND 115kV line	Wilson 230/115 kV Transformer No. 1 _Wilson 230/115 kV Transformer No. 2	C	N-1-1	153%	157%	161%	166%	171%	175%	reconductor
Frsn-T-26	LE GRAND-DAIRYLAND 115kV line	Wilson 230/115 kV Transformer No. 1 _Wilson 230/115 kV Transformer No. 2	C	N-1-1	91%	93%	96%	101%	98%	106%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-T-27	WILSON-ORO LOMA 115kV line	Wilson 230/115 kV Transformer No. 1 _Wilson 230/115 kV Transformer No. 2	C	N-1-1	115%	118%	122%	127%	138%	142%	reconductor
Frsn-T-28	PANOCHÉ-ORO LOMA 115kV line	Wilson 230/115 kV Transformer No. 1 _Wilson 230/115 kV Transformer No. 2	C	N-1-1	114%	116%	118%	120%	128%	134%	reconductor

Table A-6.2: Summary of low voltages for summer peak conditions - Fresno

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-V-01	TOMATAK 70kV	Mendota 115/70 kV Transformer No. 1	B	T-1	0.91	0.91	0.91	0.91	0.91	0.90	Var support at Oro Loma area
Frsn-V-02	STOREY 2 230kV	Borden - Gregg & Wilson - Gregg 230 kV Lines	C	DCTL	0.92	0.91	0.92	0.92	0.91	0.89	Var support at Borden area
Frsn-V-03	BORDEN 230kV		C	DCTL	0.92	0.91	0.91	0.91	0.91	0.89	Var support at Borden area
Frsn-V-04	CORCORAN 115kV	McCall - Kingsburg #1 & #2 115 kV Lines	C	DCTL	0.89	0.89	0.94	0.93	0.93	0.93	Var support at Kingsburg area
Frsn-V-05	HARDWICK 70kV		C	DCTL	0.90	0.90	0.95	0.95	0.95	0.94	Var support at Kingsburg area
Frsn-V-06	CAMDEN 70kV		C	DCTL	0.87	0.86	1.00	1.00	0.97	0.96	Var support at Kingsburg area
Frsn-V-07	ANGIOLA 70kV		C	DCTL	0.90	0.97	1.00	1.00	1.00	1.00	Var support at Kingsburg area
Frsn-V-8	CAL AVE 115kV	California Ave.-Sanger 115 kV Line _McCall-West Fresno 115 kV Line	C	N-1-1	0.87	0.87	0.87	0.87	0.86	0.83	Var support at California Ave area
Frsn-V-9	DANISHCM 115kV		C	N-1-1	0.88	0.88	0.88	0.87	0.87	0.84	Var support at California Ave area

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-V-10	WST FRSO 115kV		C	N-1-1	0.86	0.86	0.86	0.86	0.85	0.82	Var support at California Ave area
Frsn-V-12	COLNGA 1 70kV	Gates-Coalinga No.1 70 kV Line _Coalinga No.1-Coalinga No. 2 70 kV Line	C	N-1-1	0.81	0.80	0.79	0.78	0.78	0.74	Var support at Gates area
Frsn-V-13	MENDOTA 115kV	Dairyland - Mendota 115 kV Line _Panoche - Mendota 115 kV Line	C	N-1-1	0.65	0.65	0.66	0.66	0.65	0.63	Var support at Mendota area
Frsn-V-14	CHWCHLLA 115kV	Le Grand - Chowchilla 115 kV Line _Kerkchoff 115/13.8 kV GSU 1	C	N-1-1	0.91	0.92	0.92	0.92	0.91	0.90	Var support at Chowchilla area
Frsn-V-15	CANAL 70kV	Los Banos - Canal - Oro Loma 70 kV Lin_Los Banos-Livingston Jct-Canal 70 kV Lin	C	N-1-1	0.73	0.72	0.72	0.70	0.68	0.66	Var support at Oro Loma area
Frsn-V-16	DOS PALS 70kV		C	N-1-1	0.92	0.92	0.91	0.91	0.90	0.88	Var support at Oro Loma area
Frsn-V-17	SNTA RTA 70kV		C	N-1-1	0.84	0.84	0.83	0.82	0.81	0.79	Var support at Oro Loma area
Frsn-V-18	DOS PALS 70kV	Mendota 115/70 kV Transformer No. 1 _Oro Loma 115/70 kV Transformer No. 2	C	N-1-1	0.91	0.91	0.91	0.91	0.91	0.89	Var support at Oro Loma area
Frsn-V-19	FIREBAGH 70kV		C	N-1-1	0.79	0.79	0.79	0.79	0.79	0.77	Var support at Oro Loma area
Frsn-V-20	ORO LOMA 70kV		C	N-1-1	0.91	0.91	0.91	0.91	0.91	0.89	Var support at Oro Loma area
Frsn-V-21	TOMATAK 70kV		C	N-1-1	0.78	0.79	0.79	0.79	0.78	0.77	Var support at Oro Loma area
Frsn-V-22	ATWATER 115kV		Wilson 230/115 kV Transformer No. 1 _Wilson 230/115 kV Transformer No. 2	C	N-1-1	0.88	0.88	0.87	0.85	0.82	Not Solved
Frsn-V-23	CRESSEY 115kV	C		N-1-1	0.88	0.88	0.86	0.85	0.82	Not Solved	
Frsn-V-24	EL CAPTN 115kV	C		N-1-1	0.89	0.88	0.87	0.86	0.83	Not Solved	
Frsn-V-25	EL NIDO 115kV	C		N-1-1	0.92	0.92	0.91	0.90	0.88	Not Solved	

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-V-26	GALLO 115kV		C	N-1-1	0.86	0.86	0.85	0.83	0.80	Not Solved	
Frsn-V-27	JR WOOD 115kV		C	N-1-1	0.88	0.88	0.87	0.85	0.82	Not Solved	
Frsn-V-28	LIVNGSTN 115kV		C	N-1-1	0.87	0.86	0.85	0.83	0.81	Not Solved	
Frsn-V-29	MERCED 115kV		C	N-1-1	0.90	0.89	0.88	0.86	0.84	Not Solved	
Frsn-V-30	WILSON A 115kV		C	N-1-1	0.91	0.90	0.89	0.87	0.85	Not Solved	

Table A-6.3: Summary of voltage deviations for summer peak conditions - Fresno

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-DV-01	GATES 115kV	Gates 230/115 kV Transformer No. 1	B	T-1	-0.07	-0.07	-0.08	-0.07	-0.07	-0.06	Var support at Gates area
Frsn-DV-02	FIREBAGH 70kV	Mendota 115/70 kV Transformer No. 1	B	T-1	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	Var support at Oro Loma area
Frsn-DV-03	TOMATAK 70kV		B	T-1	-0.13	-0.13	-0.12	-0.12	-0.12	-0.13	Var support at Oro Loma area
Frsn-DV-04	CORCORAN 115kV	McCall - Kingsburg #1 & #2 115 kV Lines	C	DCTL	-0.09	-0.10	-0.06	-0.06	-0.06	-0.05	Var support at Kingsburg area
Frsn-DV-05	CAMDEN 70kV		C	DCTL	-0.10	-0.10	0.00	0.00	0.00	0.00	Var support at Kingsburg area
Frsn-DV-06	ANGIOLA 70kV		C	DCTL	-0.10	-0.04	-0.02	-0.01	-0.02	-0.01	Var support at Kingsburg area
Frsn-DV-7	CAL AVE 115kV	California Ave.-Sanger 115 kV Line _McCall-West Fresno 115 kV Line	C	N-1-1	-0.13	-0.14	-0.14	-0.14	-0.14	-0.16	Var support at California Ave area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-DV-8	DANISHCM 115kV		C	N-1-1	-0.13	-0.13	-0.13	-0.13	-0.14	-0.15	Var support at California Ave area
Frsn-DV-9	WST FRSO 115kV		C	N-1-1	-0.14	-0.14	-0.14	-0.15	-0.15	-0.17	Var support at California Ave area
Frsn-DV-10	COLNGA 1 70kV	Gates-Coalinga No.1 70 kV Line _Coalinga No.1-Coalinga No. 2 70 kV Line	C	N-1-1	-0.22	-0.22	-0.23	-0.24	-0.24	-0.28	Var support at Gates area
Frsn-DV-11	CHWCHLLA 115kV	Le Grand - Chowchilla 115 kV Line _Kerkchoff 115/13.8 kV GSU 1	C	N-1-1	-0.11	-0.10	-0.10	-0.11	-0.11	-0.11	Var support at Chowchilla area
Frsn-DV-12	SHARON 115kV		C	N-1-1	-0.10	-0.10	-0.10	-0.10	-0.10	-0.11	Var support at Chowchilla area
Frsn-DV-13	CANAL 70kV	Los Banos - Canal - Oro Loma 70 kV Lin_Los Banos-Livingston Jct-Canal 70 kV Lin	C	N-1-1	-0.29	-0.30	-0.31	-0.32	-0.34	-0.36	Var support at Oro Loma area
Frsn-DV-14	SNTA RTA 70kV		C	N-1-1	-0.18	-0.19	-0.19	-0.20	-0.21	-0.23	Var support at Oro Loma area
Frsn-DV-15	DOS PALS 70kV	Mendota 115/70 kV Transformer No. 1 _Oro Loma 115/70 kV Transformer No. 2	C	N-1-1	-0.12	-0.12	-0.12	-0.12	-0.12	-0.13	Var support at Oro Loma area
Frsn-DV-16	FIREBAGH 70kV		C	N-1-1	-0.24	-0.24	-0.24	-0.24	-0.24	-0.25	Var support at Oro Loma area
Frsn-DV-17	ORO LOMA 70kV		C	N-1-1	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	Var support at Oro Loma area
Frsn-DV-18	TOMATAK 70kV		C	N-1-1	-0.25	-0.25	-0.25	-0.25	-0.25	-0.26	Var support at Oro Loma area
Frsn-DV-19	MENDOTA 115kV	Panoche - Mendota 115 kV Line _MADERA_G 1 13.80	C	N-1-1	-0.11	-0.11	-0.11	-0.11	-0.11	-0.12	Var support at Mendota area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Frsn-DV-20	ATWATER 115kV	Wilson 230/115 kV Transformer No. 1 _Wilson 230/115 kV Transformer No. 2	C	N-1-1	-0.13	-0.13	-0.15	-0.16	-0.19	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-21	CERTTEED 115kV		C	N-1-1	-0.06	-0.06	-0.06	-0.07	-0.10	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-22	CRESSEY 115kV		C	N-1-1	-0.13	-0.13	-0.15	-0.16	-0.19	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-23	EL CAPTN 115kV		C	N-1-1	-0.13	-0.13	-0.15	-0.16	-0.19	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-24	EL NIDO 115kV		C	N-1-1	-0.10	-0.11	-0.12	-0.13	-0.15	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-25	GALLO 115kV		C	N-1-1	-0.13	-0.13	-0.15	-0.17	-0.19	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-26	JR WOOD 115kV		C	N-1-1	-0.13	-0.13	-0.15	-0.16	-0.19	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-27	LE GRAND 115kV		C	N-1-1	-0.08	-0.09	-0.10	-0.11	-0.12	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-28	LIVNGSTN 115kV		C	N-1-1	-0.13	-0.13	-0.15	-0.16	-0.19	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-29	MERCED 115kV		C	N-1-1	-0.13	-0.13	-0.14	-0.16	-0.18	Not Solved	Var support at MERCED 115kV Bus
Frsn-DV-30	WILSON A 115kV		C	N-1-1	-0.13	-0.13	-0.14	-0.16	-0.18	Not Solved	Var support at MERCED 115kV Bus

Table A- 6.4: Summary of thermal overloads for summer off-peak conditions - Fresno

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			ISO Proposed Mitigation
					2011	2015	2020	
Frsn-op-T-01	MCCALL-HENRIETTA 230kV line	Normal	A	N-0	105%	47%	51%	curtail Path 15 flow or interim temperature adjusted rating
Frsn-op-T-02	MCCALL-HENRIETTA 230kV line	Helm - McCall 230 kV Line	B	L-1	109%	59%	63%	curtail Path 15 flow or interim temperature adjusted rating
Frsn-op-T-03	PANOCHHE-HELM 230kV line	Gates - Gregg 230 kV Line & Gates - McCall 230 kV Lines	C	DCTL	114%	53%	60%	interim congestion management
Frsn-op-T-04	HELM-MCCALL 230kV line	Gates - Gregg 230 kV Line & Gates - McCall 230 kV Lines	C	DCTL	109%	51%	58%	interim congestion management
Frsn-op-T-05	MCCALL-HENRIETTA 230kV line	Panoche - Gates #1 & #2 230 kV Lines	C	DCTL	103%	55%	59%	curtail Path 15 flow or interim temperature adjusted rating
Frsn-op-T-06	MCCALL-SANGER 115kV line #3	McCall - Sanger #1 & #2 115 kV Lines	C	DCTL	90%	95%	104%	interim temperature adjusted rating

APPENDIX A-7: Reliability Assessment Results for Kern Area

Table A-7.1: Summary of thermal overloads for summer peak conditions - Kern

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Kern-T-01	KERN-LAMONT 115kV line	Kern-Stockdale 115 kV Line	B	L-1	91%	94%	95%	96%	97%	104%	rerate
Kern-T-02	MIDWAY-KERN 230kV line #3	Midway-Kern No. 1 & Midway-Kern No. 4 230 kV Lines	C	DCTL	97%	101%	104%	107%	109%	120%	SPS to trip load or reconductor
Kern-T-03	KERN-MAGUNDEN-WITCO 115kV line	Kern PP-Westpark No. 1 & 2 115 kV Lines	C	DCTL	97%	100%	103%	105%	108%	122%	SPS to trip load or reconductor
Kern-T-04	WESTPARK-MAGUNDEN 115kV line	Kern PP-Westpark No. 1 & 2 115 kV Lines	C	DCTL	75%	78%	81%	83%	86%	101%	SPS to trip load or reconductor
Kern-T-05	KERN-WESTPARK 115kV line #2	Kern PP-Westpark No. 1 115 kV Line _Kern-Magunden-Witco 115 kV Line	C	N-1-1	95%	99%	101%	103%	106%	119%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes
Kern-T-06	KERN-WESTPARK 115kV line #1	Kern PP-Westpark No. 2 115 kV Line _Kern-Magunden-Witco 115 kV Line	C	N-1-1	95%	99%	101%	103%	106%	119%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes
Kern-T-07	WASCO-FAMOSO 70kV line	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 2	C	N-1-1	85%	87%	89%	90%	95%	102%	SPS to trip load or Establish 15 minute rating, curtail load within 15 minutes
Kern-T-08	KERN-LAMONT 115kV line	Midway-Kern No. 1 230 kV Line _Kern-Stockdale 115 kV Line	C	N-1-1	92%	95%	96%	97%	98%	105%	rerate

Table A-7.2: Summary of low voltages for summer peak conditions - Kern

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Kern-V-01	COPUS 70kV	Normal	A	N-0	0.94	0.98	0.98	0.98	0.97	0.96	Var support at Kern PP area

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Kern-V-02	LEBEC 70kV	Normal	A	N-0	0.94	0.96	0.96	0.96	0.96	0.95	Var support at Wheeler Ridge area
Kern-V-03	CASTAC 70kV	Normal	A	N-0	0.95	0.96	0.97	0.96	0.96	0.95	Var support at Wheeler Ridge area
Kern-V-04	WEEDPTCH 70kV	Kern Canyon-Magunden-Weedpatch 70 kV Line	B	L-1	0.89	0.92	0.93	0.92	0.92	0.91	Var support at Wheeler Ridge area
Kern-V-05	GRMWY_SM 70kV	Kern Canyon-Magunden-Weedpatch 70 kV Line	B	L-1	0.88	0.91	0.92	0.91	0.91	0.90	Var support at Wheeler Ridge area
Kern-V-06	WELLFILD 70kV	Kern Canyon-Magunden-Weedpatch 70 kV Line	B	L-1	0.88	0.91	0.91	0.91	0.91	0.90	Var support at Wheeler Ridge area
Kern-V-07	3EMIDIO 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.88	0.91	0.92	NA	0.91	0.90	Var support at Wheeler Ridge area
Kern-V-08	ARVIN 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.88	0.92	0.92	NA	0.91	0.91	Var support at Wheeler Ridge area
Kern-V-09	GRMWY_SM 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.83	0.87	0.87	NA	0.86	0.85	Var support at Wheeler Ridge area
Kern-V-10	KELLEY 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.87	0.91	0.91	NA	0.90	0.90	Var support at Wheeler Ridge area
Kern-V-11	LAKEVIEW 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.88	0.92	0.92	NA	0.92	0.91	Var support at Wheeler Ridge area
Kern-V-12	SN BRNRD 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.89	0.92	0.93	NA	0.92	0.91	Var support at Wheeler Ridge area
Kern-V-13	TECUYA 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.89	0.92	0.93	NA	0.92	0.91	Var support at Wheeler Ridge area
Kern-V-14	WEEDPTCH 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.84	0.88	0.88	NA	0.87	0.86	Var support at Wheeler Ridge area

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Kern-V-15	WELLFILD 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.82	0.86	0.87	NA	0.86	0.85	Var support at Wheeler Ridge area
Kern-V-16	WHEELER 115kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.89	0.92	0.93	NA	0.92	0.91	Var support at Wheeler Ridge area
Kern-V-17	CASTAC 70kV	Wheeler Ridge-Tejon 70 kV Line _Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.88	0.89	0.90	NA	0.89	0.88	Var support at Wheeler Ridge area
Kern-V-18	GRAPEVNE 70kV	Wheeler Ridge-Tejon 70 kV Line _Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.88	0.90	0.90	NA	0.89	0.88	Var support at Wheeler Ridge area
Kern-V-19	LEBEC 70kV	Wheeler Ridge-Tejon 70 kV Line _Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.87	0.89	0.89	NA	0.88	0.88	Var support at Wheeler Ridge area
Kern-V-20	PACI_PIP 70kV	Wheeler Ridge-Tejon 70 kV Line _Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.88	0.90	0.90	NA	0.89	0.88	Var support at Wheeler Ridge area
Kern-V-21	ROSE 70kV	Wheeler Ridge-Tejon 70 kV Line _Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.89	0.91	0.91	NA	0.90	0.89	Var support at Wheeler Ridge area
Kern-V-22	TEJON 70kV	Wheeler Ridge-Tejon 70 kV Line _Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	0.90	0.91	0.91	NA	0.91	0.90	Var support at Wheeler Ridge area
Kern-V-23	COPUS 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	1.03	0.86	0.86	NA	0.84	0.78	Var support at Kern PP area
Kern-V-24	FRUITVLE 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	1.00	0.88	0.88	NA	0.86	0.80	Var support at Kern PP area
Kern-V-25	OLD RIVR 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	1.04	0.90	0.90	NA	0.88	0.82	Var support at Kern PP area
Kern-V-26	PANAMA 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	0.99	0.94	0.94	NA	0.92	0.89	Var support at Kern PP area

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Kern-V-27	EISEN 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 2	C	N-1-1	Not Solved	0.91	0.91	NA	0.90	0.89	Var support at Kern PP area

Table A-7.3: Summary of voltage deviations for summer peak conditions - Kern

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
Kern-DV-01	GRMWY_SM 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	-0.13	-0.11	-0.11	NA	-0.11	-0.11	Var support at Wheeler Ridge area
Kern-DV-02	WEEDPTCH 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	-0.13	-0.11	-0.11	NA	-0.11	-0.11	Var support at Wheeler Ridge area
Kern-DV-03	WELLFILD 70kV	Kern Canyon-Magunden-Weedpatch 70 kV L_Midway-Wheeler Ridge No. 2 230 kV Line	C	N-1-1	-0.13	-0.11	-0.11	NA	-0.11	-0.11	Var support at Wheeler Ridge area
Kern-DV-04	COPUS 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	0.09	-0.11	-0.12	NA	-0.13	-0.18	Var support at Kern PP area
Kern-DV-05	FRUITVLE 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	-0.01	-0.13	-0.14	NA	-0.16	-0.21	Var support at Kern PP area
Kern-DV-06	OLD RIVR 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	0.07	-0.11	-0.11	NA	-0.13	-0.17	Var support at Kern PP area
Kern-DV-07	PANAMA 70kV	Kern PP 70 kV Bus Tie Breaker _Kern PP 115/70 kV Transformer No. 1	C	N-1-1	0.00	-0.07	-0.07	NA	-0.08	-0.11	Var support at Kern PP area
Kern-DV-08	KERNRDGE 115kV	Midway-Temblor 115 kV Line _KERNRDGE 1 9.11	C	N-1-1	-0.12	-0.12	-0.12	NA	-0.12	-0.12	Var support at Temblor area
Kern-DV-09	TEMBLOR 115kV	Midway-Temblor 115 kV Line _KERNRDGE 1 9.11	C	N-1-1	-0.12	-0.12	-0.12	NA	-0.12	-0.12	Var support at Temblor area

APPENDIX A-8: Reliability Assessment Results for Central Coast and Los Padres Area

Table A-8.1: Summary of thermal overloads for summer peak conditions (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
LP-S-T-001	T239SWST - MIDWAY #1 230 Kv Line	Q239SWST-MIDWAY #2 230.00 kV Line	B	L-1	-	-	-	-	100.9	87.2	Reconductor Morro Bay-Midway 230 kV line sections
LP-S-T-002	T239SWST - MIDWAY #2 230 Kv Line	Q239SWST-MIDWAY #1 230.00 kV Line	B	L-1	-	-	-	-	100.9	87.2	Reconductor Morro Bay-Midway 230 kV line sections
LP-S-T-003	T239SWST - MIDWAY #2 230 kV line	Q239SWST-MIDWAY #1 230.00 kV Line and DIABLO #2	B	L-1/G-1	-	-	-	-	114.8	101.6	Reconductor Morro Bay-Midway 230 kV line sections

Table A-8.2: Summary of low voltages for summer peak conditions (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-S-LV-001	CRYHSE 60 kV	Green Valley 115/60 Bank #1	B	T-1	0.88	0.88	0.88	-	-	-	Voltage support/Watsonville UVLS will activate
CC-S-LV-002	GREN VLY 60 kV	Green Valley 115/60 Bank #1	B	T-1	0.88	0.88	0.88	-	-	-	Voltage support/Watsonville UVLS will activate

CC-S-LV-003	TEXACO 60 kV	Coburn-Oil Fields #1 60 kV Line and SALNR GN	B	L-1/G-1	0.89	0.89	0.89	0.89	0.89	0.89	Install voltage support at Oil Fields 60 kV substation
CC-S-LV-004	OIL FLDS 60 kV	Coburn-Oil Fields #1 60 kV Line and SALNR GN	B	L-1/G-1	0.89	0.89	0.89	0.89	0.89	0.89	Install voltage support at Oil Fields 60 kV substation
CC-S-LV-005	SALN RVR 60 kV	Coburn-Oil Fields #1 60 kV Line and SALNR GN	B	L-1/G-1	0.89	0.89	0.89	0.89	0.89	0.89	Install voltage support at Oil Fields 60 kV substation
CC-S-LV-006	SARGENT CYN 60 kV	Coburn-Oil Fields #1 60 kV Line and SALNR GN	B	L-1/G-1	0.89	0.89	0.89	0.89	0.89	0.89	Install voltage support at Oil Fields 60 kV substation

Table A-8.3: Summary of voltage deviations for summer peak conditions (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-S-VD-001	AGRILINK 60 kV	Green Valley 115/60 Bank #1	B	T-1	-15.44	-15.68	-15.88	-	-	-	Voltage support/Watsonville UVLS will activate
CC-S-VD-002	C.I.C. 60 kV	Green Valley 115/60 Bank #1	B	T-1	-15.60	-15.86	-16.05	-	-	-	Voltage support/Watsonville UVLS will activate
CC-S-VD-003	GREN VLY 60 kV	Green Valley 115/60 Bank #1	B	T-1	-16.81	-17.08	-17.28	-	-	-	Voltage support/Watsonville

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											UVLS will activate
CC-S-VD-004	WTSNVILLE 60 kV	Green Valley-Watsonville 60 kV Line	B	T-1	-13.56	-13.78	-13.93	-	-	-	Voltage support/Watsonville UVLS will activate
LP-S-VD-005	MORRO BAY 115 kV	Morro Bay 230/115 Bank #6	B		-5.07	-5.18	-0.23	-0.24	-0.17	-0.30	Install voltage support
LP-S-VD-006	CAYUCOS 70 kV	San Luis Obispo 115/70 kV Bank #3	B	T-1	-4.48	-4.57	-4.78	-4.91	-4.86	-5.01	Install 25 MVAR shunt capacitor at Cayucos substation and re-rate San Luis Obispo-Mustang Jct 70 kV line.
LP-S-VD-007	PERRY 60 kV	San Luis Obispo 115/70 kV Bank #3	B	T-1	-4.52	-4.62	-4.83	-4.97	-4.91	-5.08	Install 25 MVAR shunt capacitor at Cayucos substation and re-rate San Luis Obispo-Mustang Jct 70 kV line.
LP-S-VD-008	CAMBRIA 70 kV	San Luis Obispo 115/70 kV Bank #3	B	T-1	-4.53	-4.63	-4.83	-4.97	-4.92	-5.08	Install 25 MVAR shunt capacitor at Cayucos substation and re-rate San Luis Obispo-

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											Mustang Jct 70 kV line.
LP-S-VD-009	BAYWOOD 70 kV	San Luis Obispo 115/70 kV Bank #3	B	T-1	-5.08	-5.18	-5.41	-5.56	-5.52	-5.67	Install 25 MVAR shunt capacitor at Cayucos substation and re-rate San Luis Obispo-Mustang Jct 70 kV line.
LP-S-VD-010	MUSTANG 70 kV	San Luis Obispo 115/70 kV Bank #3	B	T-1	-6.14	-6.27	-6.54	-6.71	-6.72	-6.84	Install 25 MVAR shunt capacitor at Cayucos substation and re-rate San Luis Obispo-Mustang Jct 70 kV line.
LP-S-VD-011	SN LS OBISPO 70 kV	San Luis Obispo 115/70 kV Bank #3	B	T-1	-6.59	-6.73	-7.02	-7.20	-7.23	-7.37	Install 25 MVAR shunt capacitor at Cayucos substation and re-rate San Luis Obispo-Mustang Jct 70 kV line.
LP-S-VD-012	VAFB SSA 70 kV	Divide-Vandenberg #1 70 kV Line	B	L-1	-6.01	-6.01	-6.01	-6.02	-5.93	-6.08	Install voltage support at Vandenberg AFB 70 kV

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											substation
LP-S-VD-013	VAFB SSA 70 kV	Divide-Vandenberg 70 kV Line No. 1 and MORRO 3 1	B	L-1/G-1	-6.16	-6.15	-6.11	-6.15	-5.83	-6.21	Install voltage support at Vandenberg AFB 70 kV substation
CC-S-VD-014	SARG CYN 60 kV	Coburn-Oil Fields #1 60 kV Line and SALINAS RVR #1	B	L-1/G-1	-10.51	-10.60	-10.70	-10.77	-10.72	-11.04	Install voltage support at Oil Fields 60 kV substation
CC-S-VD-015	OILFLDS 60 kV	Coburn-Oil Fields #1 60 kV Line and SALINAS RVR #1	B	L-1/G-1	-10.03	-10.12	-10.22	-10.29	-10.24	-10.58	Install voltage support at Oil Fields 60 kV substation
CC-S-VD-016	SALN RVR	Coburn-Oil Fields #1 60 kV Line and SALINAS RVR #1	B	L-1/G-1	-9.99	-10.09	-10.18	-10.25	-10.20	-10.54	Install voltage support at Oil Fields 60 kV substation
CC-S-VD-017	TEXACO 60 kV	Coburn-Oil Fields #1 60 kV Line and SALINAS RVR #1	B	L-1/G-1	-9.99	-10.08	-10.18	-10.26	-10.20	-10.55	Install voltage support at Oil Fields 60 kV substation

Table A-8.4: Summary of low voltages for winter peak conditions (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-LV-001	AGRILINK 60 kV	Green Valley 115/60 Bank #1	B	T-1	0.87	0.86	0.86	-	-	-	Voltage support/Watsonville UVLS will activate
CC-W-LV-002	CRYHSE 60 kV	Green Valley 115/60 Bank #1	B	T-1	0.87	0.86	0.86	-	-	-	Voltage support/Watsonville UVLS will activate
CC-W-LV-003	WTSNVILLE 60 kV	Green Valley 115/60 Bank #1	B	T-1	0.87	0.86	0.86	-	-	-	Voltage support/Watsonville UVLS will activate

Table A-8.5: Summary of voltages deviations for winter peak conditions (Category B)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-001	GREN VLY 60 kV	Green Valley 115/60 Bank #1	B	T-1	-17.65	-18.69	-18.21	-	-	-	Voltage support/Watsonville UVLS will activate
CC-W-VD-002	AGRILINK 60 kV	Green Valley 115/60 Bank #1	B	T-1	-16.18	-17.14	-16.70	-	-	-	Voltage support/Watsonville UVLS will activate
CC-W-VD-003	WTSNVILLE 60 kV	Green Valley 115/60 Bank #1	B	T-1	-16.02	-16.97	-16.55	-	-	-	Voltage support/Watsonville UVLS will activate
CC-W-VD-004	CRYHSE 60 kV	Green Valley 115/60 Bank #1	B	T-1	-17.07	-18.08	-17.61	-	-	-	Voltage support/Santa Cruz Reinforcement Project
CC-W-VD-005	OILFLDS 60 kV	Coburn-Oil Fields #1 60 kV Line and Salinas River Unit	B	L-1/G-1	-8.45	-8.44	-8.21	-8.40	-8.39	-9.20	Install voltage support at Oil Fields 60 kV substation

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-006	PAUL SWT 115 kV	Paul Sweet Statcom	B	N-1	-6.24	-3.69	-3.82	-2.75	-2.67	-1.74	Voltage support/Santa Cruz Reinforcement Project

Table A-8.6: Summary of thermal overloads for summer peak conditions (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
LP-S-T-001	N/A	Templeton-Gates 230 kV Line and Morro Bay-Gates #1 230 kV Line (Morro)	C3	L-2	Diverged	Diverged	Diverged	Diverged	Diverged	Diverged	Load shedding. The approved Los Padres Transmission Project (SPS at Mesa and Santa Maria) drops 250 MW Load.
LP-S-T-002	N/A	Morro Bay-Diablo 230 kV Line and Morro Bay-Mesa 230 kV Line	C3	L-2	Diverged	Diverged	Diverged	Diverged	Diverged	Diverged	Load shedding. The approved Los Padres Transmission Project (SPS at Mesa and Santa Maria) drops 250 MW Load.
LP-S-T-003	N/A	Morro Bay-Mesa 230 kV Line and Diablo-Mesa 230 kV Line	C3	L-2	Diverged	Diverged	Diverged	Diverged	Diverged	Diverged	Load shedding. The approved Los Padres Transmission Project (SPS at Mesa and Santa Maria) drops 250 MW Load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
LP-S-T-004	N/A	Mesa-Divide #1 115 kV Line and Mesa-Divide #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	Diverged	Diverged	Diverged	Develop operating procedure to curtail load within 15 minutes
LP-S-T-005	N/A	Mesa 230/115 kV Bank #2 and Mesa 230/115 kV Bank #3	C3	T-2	Diverged	Diverged	Diverged	Diverged	Diverged	Diverged	Load shedding. The approved Los Padres Transmission Project (SPS at Mesa and Santa Maria) drops 250 MW Load.
CC-S-T-006	NTVD SW1 - SALINA S #1 115 kV	Moss Landing 115 kV Bus 1D	C1	Bus_Out	92.97	115.17	116.16	35.68	13.49	14.47	Implement SPS, develop operating procedure to curtail load.
LP-S-T-007	Mesa-Sisquoc 115 kV Line (Between Sisquoc -S.M. ASSO - Mesa PGE)	Mesa - Santa Maria 115 kV Line, and San Luis Obispo-Santa Maria 115 kV Line	C5	DCTL	108.00	109.90	119.00	120.20	113.20	137.90	Reconductor the 4.1-mile limiting 397.5 AAC Mesa-Sisquoc 115 kV line section.
LP-S-T-008	Mesa-Sisquoc 115 kV	Mesa - Santa Maria 115 kV Line, and San	C5	DCTL	116.00	117.80	118.00	119.00	121.20	138.00	Reconductor the 4.1-mile limiting 397.5 AAC Mesa-Sisquoc

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
	Line (Between Sisquoc and S.M. ASSO)	Luis Obispo-Santa Maria 115 kV Line										115 kV line section.
LP-S-T-009	Santa Maria-Sisquoc 115 kV Line (Between Sisquoc and Fairway Jct - Santa Maria)	Mesa - Santa Maria 115 kV Line, and San Luis Obispo-Santa Maria 115 kV Line	C5	DCTL	130.60	131.90	133.40	134.70	136.20	161.80		Reconductor the 4.1-mile limiting 397.5 AAC Mesa-Sisquoc 115 kV line section.
CC-S-T-10	GRN VLY1 - ERTA JCT #1 115 Kv Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	133.17	133.15	Diverged		Develop operating procedure to curtail load within 15 minutes
CC-S-T-11	CIC JCT - ERTA JCT #1	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	134.44	134.42	Diverged		Develop operating procedure to curtail load within 15 minutes

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	115 kV Line										
CC-S-T-12	CIC JCT - AGRILINK #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	134.57	134.56	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-13	WTSN VLE - AGRILINK #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	134.67	134.66	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-14	WTSN VLE - GRANT JT #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	143.44	143.43	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-15	BRIGT ANO - GRANT JT #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	147.64	147.66	Diverged	Develop operating procedure and curtail load within 15 minutes
CC-S-T-16	CRZY_HRS - BRIGT	Moss Landing - Green Valley #1 and #2 115 kV	C5	DCTL	-	-	-	148.72	148.74	Diverged	Develop operating procedure to curtail load within 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	ANO #1 115 kV Line	Lines									minutes
CC-S-T-17	CRZY_ HRS - NTVD SW1 #1 115 kV Line	Moss Landing - Salinas #1 and #2 115 kV Lines	C5	DCTL	-	-	-	149.23	-	-	Develop operating procedure to curtail load within 15 minutes
CC-S-T-18	CRZY_ HRS - NTVD SW2 #1 115 kV Line	Moss Landing - Salinas #1 and #2 115 kV Lines	C5	DCTL	-	-	-	149.23	23.39	25.31	Develop operating procedure to curtail load within 15 minutes
CC-S-T-19	LGNTS SW1 - NTVD SW1 #1 115 kV Line	Moss Landing - Salinas #1 and #2 115 kV Lines	C5	DCTL	138.14	129.61	131.69	-	-	-	Develop operating procedure to curtail load within 15 minutes
CC-S-T-20	LGNTS SW2 - NTVD SW2 #1 115 kV Line	Moss Landing - Salinas #1 and #2 115 kV Lines	C5	DCTL	138.14	129.61	131.69	-	-	-	Develop operating procedure to curtail load within 15 minutes
CC-S-T-21	NTVD SW2 - SALINA	Moss Landing - Salinas #1 and #2 115 kV Lines	C5	DCTL	111.90	123.20	124.96	113.99	-	-	Develop operating procedure to curtail load within 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	S #1 115 kV Line										minutes
CC-S-T-22	NTVD SW1 - SALINA S #1 115 kV	Moss Landing - Salinas #1 and #2 115 kV Lines	C5	DCTL	104.70	97.28	98.91	113.99	1.93	2.03	Develop operating procedure to curtail load within 15 minutes
CC-S-T-23	TEMPL ETN - MORR OBAY #1 230 kV Line	Q239SWST- MIDWAY #1 & #2 230.00 kV Line	C5	DCTL	-	-	-	-	104.98	101.10	Develop operating procedure to curtail load within 15 minutes
CC-S-T-24	ATASC DRO - SN LS OBISP O #1 70 kV Line	Morro Bay- Gates and Morro Bay- Templeton 230 kV Lines	C5	DCTL	64.34	65.58	66.90	68.20	107.79	119.16	Develop operating procedure to curtail load within 15 minutes
CC-S-T-25	GRN VLY1 - ERTA JCT #1 115 kV Line	Moss Landing- Green Valley #1 115 kV Line and Moss Landing- Green Valley #2 115 kV Line	C3	L-2	-	-	-	133.17	133.15	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-26	CIC JCT - AGRILI NK #1	Moss Landing- Green Valley #1 115 kV Line and Moss Landing-	C3	L-2	-	-	-	134.57	134.56	Diverged	Develop operating procedure to curtail load within 15 minutes

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	115 kV Line	Green Valley #2 115 kV Line									
CC-S-T-27	WTSN VLE - AGRILINK #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Lin	C3	L-2	-	-	-	134.67	134.66	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-28	WTSN VLE - GRANT JT #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Lin	C3	L-2	-	-	-	143.44	143.43	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-29	BRIGT ANO - GRANT JT #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	147.64	147.66	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-30	CRZY_HRS - BRIGT ANO #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	148.72	148.74	Diverged	Develop operating procedure to curtail load within 15 minutes
CC-S-T-31	LGNTS SW2 - NTVD	Moss Landing-Salinas #1 115 kV Line and	C3	L-2	146.40	159.68	161.92	-	-	-	Develop operating procedure to curtail load within 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	SW2 #1 115 kV Line	Moss Landing-Salinas #2 115 kV Line									minutes
CC-S-T-32	NTVD SW2 - SALINAS #1 115 kV Line	Moss Landing-Salinas #1 115 kV Line and Moss Landing-Salinas #2 115 kV Line	C3	L-2	111.90	123.20	124.96	113.99	-	-	Develop operating procedure to curtail load within 15 minutes
CC-S-T-33	LGNTS SW1 - NTVD SW1 #1 115 kV Line	Moss Landing-Salinas #1 115 kV Line and Moss Landing-Salinas #2 115 kV Line	C3	L-2	138.14	129.61	131.69	-	-	-	Develop operating procedure to curtail load within 15 minutes
CC-S-T-34	CRZY_HRS - NTVD SW1 #1 115 kV Line	Moss Landing-Salinas #1 115 kV Line and Moss Landing-Salinas #2 115 kV Line	C3	L-2	-	-	-	149.23	-	-	Develop operating procedure to curtail load within 15 minutes
CC-S-T-35	NTVD SW1 - SALINAS #1 115 kV Line	Moss Landing-Salinas #1 115 kV Line and Moss Landing-Salinas #2 115 kV Line	C3	L-2	104.70	97.28	98.91	113.99	1.93	2.03	Develop operating procedure to curtail load within 15 minutes
CC-S-T-36	CRZY_HRS - NTVD	Moss Landing-Salinas #1 115 kV Line and	C3	L-2	-	-	-	149.23	23.39	25.31	Develop operating procedure to curtail load within 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	SW2 #1 115 kV Line	Moss Landing- Salinas #2 115 kV Line									minutes
CC-S-T-37	GRN VLY2 - MOSLN D D #1 115 kV Line	Moss Landing- Green Valley #1 115 kV Line and Watsonville- Salinas 60 kV Line	C3	L-2	97.80	99.38	100.93	-	-	-	Develop operating procedure to curtail load within 15 minutes/Watsonville UVLS will activate
CC-S-T-38	GRN VLY1 - MOSLN D D #1 115 kV Line	Moss Landing- Green Valley #2 115 kV Line and Crazy Horse- Watsonville 115 kV Line	C3	L-2	-	-	-	101.88	101.64	110.21	Develop operating procedure to curtail load within 15 minutes
CC-S-T-39	GRN VLY1 - MOSLN D D #1 115 kV Line	Moss Landing- Green Valley #2 115 kV Line and Watsonville- Salinas 60 kV Line	C3	L-2	97.78	99.40	100.95	-	-	-	Develop operating procedure to curtail load within 15 minutes/Watsonville UVLS may activate
CC-S-T-40	GRN VLY1 - MOSLN D D #2 115 kV Line	Moss Landing- Green Valley #1 115 kV Line and Crazy Horse- Watsonville 115 kV Line	C3	L-2	-	-	-	101.88	101.64	110.21	Develop operating procedure to curtail load within 15 minutes
CC-S-T-41	MOSLN D D 115/23	Moss Landing 230/115 kV Bank #10 and	C3	T-2	196.30	200.70	203.91	204.83	208.94	226.45	Develop operating procedure to curtail load within 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
	0 kV Bank #1	Moss Landing 230/115 kV Bank #8									minutes
CC-S-T-42	MOSLN D D 115/230 kV Bank #2	Moss Landing 230/115 kV Bank #10 and Moss Landing 230/115 kV Bank #8	C3	T-2	195.58	199.97	203.20	204.12	208.25	225.82	Develop operating procedure to curtail load within 15 minutes
CC-S-T-43	MOSLN D E 115/230 kV Bank #8	Moss Landing 230/115 kV Bank #10 and Moss Landing 230/115 kV Bank #2	C3	T-2	107.92	110.59	112.30	112.86	115.04	122.71	Develop operating procedure to curtail load within 15 minutes
CC-S-T-44	MOSLN D E 115/230 kV Bank #10	Moss Landing 230/115 kV Bank #8 and Moss Landing 230/115 kV Bank #1	C3	T-2	108.37	111.05	112.74	113.33	115.51	123.24	Develop operating procedure to curtail load within 15 minutes.
LP-S-T-045	ATASC DRO - SN LS OB #1 70 kV Line	Morro Bay-Gates 230 kV Line No. 1(Morro and San Luis Obispo-Cayucos 70 kV Line(Baywood	C3	L-2	78.60	80.46	83.92	85.57	117.60	132.65	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
LP-S-T-046	ATASC DRO - CACOS J2 #1 70 kV Line	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	79.07	81.65	83.97	86.58	89.17	106.25	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-T-047	MESA_PGE - UNION OL #1 115 kV Line	Templeton 230/70 kV Bank #1 and Morro Bay 230/115 Bank #6	C3	T-2	114.24	115.95	42.72	42.94	45.67	42.37	Develop operating procedure and curtail load within 15 minutes
LP-S-T-048	MORRO BY - GLDTR JC1 #1 115 kV Line	Morro Bay-Mesa 230 kV Line and Morro Bay-San Luis Obispo 115 kV Line N	C3	L-2	85.51	86.32	94.42	95.40	99.98	106.91	Develop operating procedure and curtail load within 15 minutes
LP-S-T-049	MUSTNG J - SN LS OB #1 70 kV Line	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	104.35	107.06	109.32	111.95	114.40	130.65	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-T-050	OCEANO - UNION OL #1 115 kV Line	Templeton 230/70 kV Bank #1 and Morro Bay 230/115 Bank #6	C3	T-2	104.83	106.52	32.59	33.16	35.57	38.96	Develop operating procedure to curtail load within 15 minutes

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
LP-S-T-051	SN LS OB - SNTA MRA #1 115 kV Line	Morro Bay-Mesa 230 kV Line and San Luis Obispo-Mesa 115 kV Line(San LS OB	C3	L-2	85.52	86.18	93.27	93.98	92.55	104.29	Develop operating procedure to curtail load within 15 minutes
LP-S-T-052	T239S WST - MIDWAY #2 230 kV Line	Q239SWST-MIDWAY #1 230.00 kV Line and Templeton 230/70 kV Bank #1	C3	L-1/T-1	-	-	-	-	127.53	114.89	Reconductor Morro Bay-Midway 230 kV line. (Also Category B mitigation)
LP-S-T-053	TEMPL ETN - MORROBAY #1 230 kV Line	Q239SWST-MIDWAY #1 230.00 kV Line and Q239SWST-MIDWAY #2 230.00 kV Line	C3	L-2	-	-	-	-	104.98	101.10	Reconductor Morro Bay-Midway 230 kV line. (Also Category B mitigation)

Table A-8.7: Summary of low voltages for summer peak conditions (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-S-LV_001	GREEN VALLEY 60 kV	Green Valley Bus 1	C1	Bus_Out	0.88	0.88	0.88	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											UVLS will activate.
CC-S-LV_002	CRYHSE 60 kV	Green Valley Bus 1	C1	Bus_Out	0.88	0.88	0.88	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV_003	WTSNV LLE 60kV	Green Valley Bus 1	C1	Bus_Out	0.88	0.88	0.88	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV_004	GRANT RK 60 kV	Green Valley Bus 1	C1	Bus_Out	0.90	0.90	0.90	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV_005	AGRILINK 60 kV	Green Valley Bus 1	C1	Bus_Out	0.88	0.88	0.88	-	-	-	Develop operating procedure to

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											curtail load in 15 min/Watsonville UVLS will activate.
LP-S-LV-006	BUELLTON 115 kV	Mesa 115 kV Bus 1	C1	Bus_Out	0.91	0.91	0.92	0.91	0.92	0.89	Implement SPS, develop operating procedure to curtail load.
LP-S-LV-007	LMPCCTY 115 kV	Mesa 115 kV Bus 1	C1	Bus_Out	0.91	0.91	0.91	0.91	0.91	0.89	Implement SPS, develop operating procedure to curtail load.
LP-S-LV-008	MANVILLE 115 kV	Mesa 115 kV Bus 1	C1	Bus_Out	0.90	0.90	0.91	0.90	0.91	0.89	Implement SPS, develop operating procedure to curtail load.
LP-S-LV-009	PURISIMA 115 kV	Mesa 115 kV Bus 1	C1	Bus_Out	0.91	0.91	0.91	0.91	0.91	0.89	Implement SPS, develop operating procedure to curtail load.
LP-S-LV-010	SNTAYNZ 115	Mesa 115 kV Bus 1	C1	Bus_Out	0.91	0.91	0.91	0.91	0.92	0.89	Implement SPS, develop operating procedure to curtail load.

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
LP-S-LV-011	SURF 115 kV	Mesa 115 kV Bus 1	C1	Bus_Out	0.91	0.91	0.91	0.91	0.91	0.89	Implement SPS, develop operating procedure to curtail load.
CC-S-LV-012	CRYHS E 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.88	0.88	0.88	1.00	1.00	Diverged	Develop operating procedure or load curtailment scheme
CC-S-LV-013	AGRILIN K 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.89	0.88	0.88	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-014	AGRILIN K 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-015	BRIGTA NO 60 kV	Moss Landing-Salinas #1 115 kV Line and Green	C3	L-1/T-1	0.89	0.89	0.88	-	-	-	Develop operating procedure to

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Valley 115/60 Bank #1									curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-016	C.I.C. 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-017	CRYHSE 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-018	GRANT RK 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.88	0.88	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-S-LV-019	GREN VLY 60 kV	Moss Landing- Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-020	SARG CYN 60 kV	Coburn-Oil Fields #1 60 kV Line and Oil Fields-Salinas River 60 kV Line	C3	L-2	0.90	0.90	0.90	0.90	0.90	0.89	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-021	WTSNV LLE 60 kV	Moss Landing- Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-022	WTSNV LLE 60 kV	Moss Landing- Soledad-Salinas #2 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-	0.87	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville

ID	Overload Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											UVLS will activate.
CC-S-LV-023	WTSNV LLE 60 kV	San Benito-Hollister 115 kV Line and Green Valley-Watsonville 60 kV Line	C3	L-2	-	0.90	0.90	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-LV-024	WTSNV LLE 60 kV	San Benito-Hollister 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-	0.88	0.88	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
LP-S-LV-025	ATASCD RO 70 kV	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	0.88	0.88	0.87	0.87	0.86	0.82	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-026	BAYWOOD 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	0.90	0.90	0.91	0.90	0.90	0.89	Install reactive support at Cayucos 70 kV Sub. (Also a Category B

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
												mitigation)
LP-S-LV-027	CAMBRIA 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	0.89	0.88	0.89	0.89	0.89	0.88		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-028	CAMBRIA 70 kV	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	0.92	0.91	0.91	0.91	0.91	0.87		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-029	CAYUCOS 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	0.90	0.89	0.90	0.90	0.90	0.89		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-030	CAYUCOS 70 kV	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	0.93	0.92	0.92	0.92	0.92	0.88		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-031	OCEANO 115 kV	San Luis Obispo-Mesa 115 kV Line(Callend_Morro	C3	L-1/T-1	0.89	0.89	0.96	0.96	0.96	0.96		Develop operating procedure to

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		Bay 230/115 Bank #6										curtail load.
LP-S-LV-032	PERRY 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	0.89	0.88	0.89	0.89	0.89	0.88		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-033	PERRY 70 kV	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	0.92	0.91	0.91	0.91	0.91	0.87		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-LV-034	UNION OL 115 kV	San Luis Obispo-Mesa 115 kV Line(Callender_Morro Bay 230/115 Bank #6	C3	L-1/T-1	0.89	0.89	0.96	0.96	0.96	0.96		Develop operating procedure to curtail load.

Table A-8.8: Summary of voltages deviations for summer peak conditions (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
CC-S-VD-001	GREN VLY 60 kV	Green Valley Bus 1	C1	Bus_Out	-16.82	-16.98	-17.19	-	-	-		Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-S-VD-002	C.I.C. 60 kV	Green Valley Bus 1	C1	Bus_Out	-15.61	-15.76	-15.96	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-003	CRYHSE 60 kV	Green Valley Bus 1	C1	Bus_Out	-16.28	-16.42	-16.62	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-004	WTSNVLE 60 kV	Green Valley Bus 1	C1	Bus_Out	-15.29	-15.43	-15.63	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-005	GRANT RK 60 kV	Green Valley Bus 1	C1	Bus_Out	-10.74	-10.82	-10.96	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-006	AGRILINK 60 kV	Green Valley Bus 1	C1	Bus_Out	-15.45	-15.59	-15.78	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-S-VD-007	BRIGTANO 60 kV	Green Valley Bus 1	C1	Bus_Out	-10.51	-10.58	-10.72	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
LP-S-VD-008	MORRO BY 230 kV	Morro Bay 230 kV Bus 2D	C1	Bus_Out	-5.20	-5.32	-0.39	-0.40	-0.29	Diverged	Implement SPS, develop operating procedure to curtail load.
CC-S-VD-009	GREN VLY 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-16.53	-16.81	-17.01	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-010	AGRILINK 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-15.16	-15.41	-15.60	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-011	CRYHSE 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-15.98	-16.25	-16.44	0.00	0.00	Diverged	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-012	GREN VLY 60 kV	Moss Landing-Salinas #1 115 kV Line and	C3	L-1/T-1	-18.78	-19.10	-19.34	-	-	-	Develop operating procedure to curtail load in 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Green Valley 115/60 Bank #1									min/Watsonville UVLS will activate.
CC-S-VD-013	C.I.C. 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-17.56	-17.87	-18.11	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-014	AGRILINK 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-17.40	-17.70	-17.94	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-015	WTSNVILLE 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-17.25	-17.55	-17.78	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-016	GRANT RK 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-12.65	-12.89	-13.07	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-S-VD-017	BRIGTANO 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley	C3	L-1/T-1	-12.40	-12.63	-12.80	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		115/60 Bank #1										UVLS will activate.
CC-S-VD-018	CRYHSE 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-18.23	-18.54	-18.78	-	-	-		Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate. Install voltage support
CC-S-VD-019	GRN VLY1 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	-5.14	-5.45	Diverged		Develop operating procedure to curtail load.
CC-S-VD-020	ERTA 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	-5.28	-5.59	Diverged		Develop operating procedure to curtail load.
CC-S-VD-021	AGRILINK 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	-5.41	-5.70	Diverged		Develop operating procedure to curtail load.
CC-S-VD-022	WTSNVLL 115 kV	Moss Landing-Green Valley #1 115 kV Line and	C3	L-2	-	-	-	-5.43	-5.71	Diverged		Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		Moss Landing-Green Valley #2 115 kV Line										
CC-S-VD-023	GRANT RK 115 kV	Moss Landing-Green Valley #1 115 kV Line_Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	-4.86	-5.07	Diverged	Develop operating procedure to curtail load.	
LP-S-VD-024	ATASCERO 70 kV	Templeton-Atascadero 70 kV Line AND _Atascadero-San Luis Obispo 70 kV Line	C3	L-2	-12.21	-12.72	-12.88	-13.36	-13.63	-17.68	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)	
LP-S-VD-025	BAYWOOD 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	-10.36	-10.59	-9.81	-10.07	-10.09	-10.69	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)	
LP-S-VD-026	CAMBRIA 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	-10.54	-10.78	-9.96	-10.22	-10.25	-10.91	Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)	
LP-S-VD-027	CAMBRIA 70 kV	Templeton-Atascadero 70 kV Line and	C3	L-2	-7.41	-7.77	-7.88	-8.22	-8.46	-11.48	Install reactive support at Cayucos 70 kV	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		Atascadero-San Luis Obispo 70 kV Line										Sub. (Also a Category B mitigation)
LP-S-VD-028	CAYUCOS 70 kV	Atascadero-Cayucos 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	-10.41	-10.64	-9.84	-10.09	-10.12	-10.76		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-VD-029	CAYUCOS 70 kV	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	-7.33	-7.68	-7.79	-8.12	-8.35	-11.32		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-VD-030	MUSTANG 70 kV	Atascadero-San Luis Obispo 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	-10.61	-10.78	-11.10	-10.24	-11.36	-10.58		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-VD-031	OCEANO 115 kV	San Luis Obispo-Mesa 115 kV Line(Callend and Morro Bay 230/115 Bank #6	C3	L-1/T-1	-10.60	-10.82	-3.17	-3.29	-3.15	-3.41		Develop operating procedure to curtail load.
LP-S-VD-032	PERRY 70 kV	Atascadero-Cayucos 70 kV Line and San	C3	L-1/T-1	-10.53	-10.77	-9.95	-10.21	-10.23	-10.90		Install reactive support at Cayucos 70 kV

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		Luis Obispo 115/70 kV #3										Sub. (Also a Category B mitigation)
LP-S-VD-033	PERRY 70 kV	Templeton-Atascadero 70 kV Line and Atascadero-San Luis Obispo 70 kV Line	C3	L-2	-7.41	-7.76	-7.87	-8.21	-8.44	-11.47		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-VD-034	SN LS OB 70 kV	Atascadero-San Luis Obispo 70 kV Line and San Luis Obispo 115/70 kV Bank #3	C3	L-1/T-1	-11.58	-11.77	-12.11	-11.27	-12.41	-11.66		Install reactive support at Cayucos 70 kV Sub. (Also a Category B mitigation)
LP-S-VD-035	UNION OL 115 kV	San Luis Obispo-Mesa 115 kV Line(Callender and Morro Bay 230/115 Bank #6	C3	L-1/T-1	-11.21	-11.42	-3.74	-3.86	-3.73	-3.97		Develop operating procedure to curtail load
LP-S-VD-036	VAFB A-N 70 kV	Morro Bay-Mesa 230 kV Line and Divide-Vandenberg 70 kV #1	C3	L-2	-5.23	-5.28	-5.26	-5.32	-5.27	Diverged		Develop operating procedure to curtail load.
CC-S-VD-037	WTSNVLE 60 kV	Green Valley-Watsonville 60 kV Line and PSWTSTCM #1	C3	L-2	-13.56	-13.77	-13.92	-	-	-		Voltage support/ Watsonville UVLS may activate.

Table A-8.9: Summary of thermal overloads for winter peak conditions (Category C)

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-T-001	GRN VLY1 - ERTA JCT #1 115 Kv Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	116.72	116.54	Diverged	Develop operating procedure to curtail load.
CC-W-T-002	CIC JCT - ERTA JCT #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	117.92	117.70	Diverged	Develop operating procedure to curtail load.
CC-W-T-003	CIC JCT - AGRILIN K #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	118.06	117.84	Diverged	Develop operating procedure to curtail load.
CC-W-T-004	WTSNVLE - AGRILIN K #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	118.15	117.93	Diverged	Develop operating procedure to curtail load.
CC-W-T-005	WTSNVLE - GRANT JT #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	126.21	125.96	Diverged	Develop operating procedure to curtail load.

ID	Overload Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-T-006	BRIGTA NO - GRANT JT #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	130.07	129.82	Diverged	Develop operating procedure to curtail load.
CC-W-T-007	CRZY_HRS - BRIGTA NO #1 115 kV Line	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	131.15	130.90	Diverged	Develop operating procedure to curtail load.
CC-W-T-008	GRN VLY1 - ERTA JCT #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	116.72	116.54	Diverged	Develop operating procedure to curtail load.d
CC-W-T-009	WTSNVLE - GRANT JT #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	126.21	125.96	Diverged	Develop operating procedure to curtail load.
CC-W-T-010	BRIGTA NO - GRANT JT #1	Moss Landing-Green Valley #1 115 kV Line and Moss	C3	L-2	-	-	-	130.07	129.82	Diverged	Develop operating procedure to curtail load.

ID	Overload Facility	Worst Contingency	Category	Category Description	Loading (%)					ISO Proposed Mitigation	
					2011	2012	2013	2014	2015		2020
	115 kV Line	Landing-Green Valley #2 115 kV Line									
CC-W-T-011	CRZY_HRS - BRIGTANO #1 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	131.15	130.90	Diverged	Develop operating procedure to curtail load.
CC-W-T-012	GRN VLY1 - MOSLND D #1 115 kV Line	Moss Landing-Green Valley #2 115 kV Line and Crazy Horse-Watsonville 115 kV Line	C3	L-2	-	-	-	96.60	96.24	106.71	Develop operating procedure to curtail load.
CC-W-T-013	GRN VLY1 - MOSLND D #2 115 kV Line	Moss Landing-Green Valley #1 115 kV Line and Crazy Horse-Watsonville 115 kV Line	C3	L-2	-	-	-	96.60	96.24	106.71	Develop operating procedure to curtail load.
CC-W-T-014	MOSLND D 115/230 kV Bank #1	Moss Landing 230/115 kV Bank #10 and Moss Landing 230/115 kV Bank #8	C3	T-2	177.34	179.80	182.85	183.18	186.77	Diverged	Develop operating procedure to curtail load.

ID	Overload ed Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-T-015	MOSLND D 115/230 kV Bank #2	Moss Landing 230/115 kV Bank #10 and Moss Landing 230/115 kV Bank #8	C3	T-2	176.64	179.12	182.17	182.52	186.11	Diverged	Develop operating procedure to curtail load.
CC-W-T-016	MOSLND E 115/230 kV Bank #10	Moss Landing 230/115 kV Bank #8 and Moss Landing 230/115 kV Bank #1	C3	T-2	97.05	99.07	100.57	101.08	102.96	110.60	Develop operating procedure to curtail load.
CC-W-T-017	MOSLND E 115 kV Bank #8	Moss Landing 230/115 kV Bank #10 and Moss Landing 230/115 kV Bank #1	C3	T-2	96.59	98.61	100.11	100.61	102.48	110.04	Develop operating procedure to curtail load.

Table A-8.10: Summary of low voltages for winter peak conditions (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-LV-001	GREN VLY 60 kV	Green Valley Bus 1	C1	Bus_Out	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-002	C.I.C. 60 kV	Green Valley Bus 1	C1	Bus_Out	0.86	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											min/Watsonville UVLS will activate.
CC-W-LV-003	AGRILINK 60 kV	Green Valley Bus 1	C1	Bus_Out	0.86	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-004	WTSNVLE 60 kV	Green Valley Bus 1	C1	Bus_Out	0.86	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-005	GRANT RK 60 kV	Green Valley Bus 1	C1	Bus_Out	0.89	0.88	0.89	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-006	BRIGTANO 60 kV	Green Valley Bus 1	C1	Bus_Out	0.90	0.89	0.90	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-007	CRYHSE 60 kV	Green Valley Bus 1	C1	Bus_Out	0.86	0.86	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-008	GREN VLY 60 kV	Moss Landing - Green	C5	DCTL	0.87	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Valley #1 and #2 115 kV Lines									min/Watsonville UVLS will activate.
CC-W-LV-009	C.I.C. 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.87	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-010	AGRILINK 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.87	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-011	WTSNVILLE 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.87	0.86	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-012	GRANT RK 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.89	0.89	0.89	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-013	BRIGTANO 60 kV	Moss Landing - Green Valley #1	C5	DCTL	0.90	0.89	0.90	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		and #2 115 kV Lines									UVLS will activate.
CC-W-LV-014	CRYHSE 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.87	0.86	0.87	1.00	1.00	Diverged	Develop operating procedure to curtail load.
CC-W-LV-015	ERTA 115 Kv	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-016	C.I.C. 115 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-017	AGRILINK 115 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-018	WTSNVILLE 115 kV	Moss Landing - Green Valley #1	C5	DCTL	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		and #2 115 kV Lines									
CC-W-LV-019	GRN VLY1 115 Kv	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	1.01	1.01	1.01	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-020	ROB ROY 115 Kv	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	1.02	1.02	1.02	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-021	PAUL SWT 115 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	1.02	1.02	1.02	0.90	0.90	Diverged	Develop operating procedure to curtail load.
CC-W-LV-022	CMP EVRS 115 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	1.02	1.02	1.02	0.90	0.90	Diverged	Develop operating procedure to curtail load.
CC-W-LV-023	GREN VLY 60 kV	Moss Landing-Salinas #1 115 kV Line	C3	L-1/T-1	0.85	0.84	0.85	-	-	-	Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		and Green Valley 115/60 Bank #1									
CC-W-LV-024	C.I.C. 60 kV	Green Valley 115/60 Bank #1 and MOSSLND7 1 22.00	C3	T-1/G-1	-	-	0.86	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-025	AGRILINK 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.85	0.84	0.85	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-026	WTSNVLE 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.85	0.84	0.85	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-027	GRANT RK 60 kV	Moss Landing-Salinas #1 115 kV Line	C3	L-1/T-1	0.87	0.87	0.87	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		and Green Valley 115/60 Bank #1										UVLS will activate.
CC-W-LV-028	BRIGTANO 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.88	0.87	0.88	-	-	-		Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-029	CRYHSE 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	0.85	0.84	0.85	-	-	-		Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-LV-030	ERTA 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	0.89	0.89	Diverged		Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-LV-031	C.I.C. 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-032	AGRILINK 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-033	WTSNVILLE 115 kV	Moss Landing-Green Valley #1 115 kV Line_Moss Landing-Green Valley #2 115 kV Lin	C3	L-2	-	-	-	0.89	0.89	Diverged	Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-LV-034	GRN VLY1 115 kV	Moss Landing-Green Valley #1 115 kV Line_Moss Landing-Green Valley #2 115 kV Lin	C3	L-2	Diverged	Diverged	Diverged	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-035	ROB ROY 115 kV	Green Valley-Paul Sweet 115 kV Line and Paul Sweet Statcom	C3	L-2	0.88	0.99	0.99	1.00	1.00	0.99	Develop operating procedure to curtail load.
CC-W-LV-036	ROB ROY 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	0.89	0.89	Diverged	Develop operating procedure to curtail load.
CC-W-LV-037	PAUL SWT 115 kV	Green Valley-Paul Sweet 115 kV Line and Paul Sweet	C3	L-2	0.89	0.98	0.98	0.99	0.99	0.98	Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Statcom									
CC-W-LV-038	PAUL SWT 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	0.90	0.90	Diverged	Develop operating procedure to curtail load.
CC-W-LV-039	WTSNVILLE 60 kV	Green Valley-Watsonville 60 kV Line and Paul Sweet Statcom	C3	L-1/G-1	0.88	0.88	0.88	-	-	-	Voltage support/Watsonville UVLS will activate

Table A-8.11: Summary of voltages deviations for winter peak conditions (Category C)

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-001	AGRILINK 60 kV	Green Valley Bus 1	C1	Bus_Out	-16.47	-16.99	-16.56	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-002	BRIGTANO 60 kV	Green Valley Bus 1	C1	Bus_Out	-11.22	-11.45	-11.17	-	-	-	Develop operating procedure to curtail

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
											load in 15 min/Watsonville UVLS will activate.
CC-W-VD-003	CRYHSE 60 Kv	Green Valley Bus 1	C1	Bus_Out	-17.36	-17.93	-17.46	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-004	GREN VLY 60 kV	Green Valley Bus 1	C1	Bus_Out	-17.94	-18.54	-18.06	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-005	WTSNVLL E 60 kV	Green Valley Bus 1	C1	Bus_Out	-16.31	-16.83	-16.40	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-006	ERTA 115 Kv	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-	-	-	-13.38	-13.49	Diverged	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-007	CMP EVRS 115 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.42	-0.10	-0.09	-12.78	-12.85	Diverged	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-008	GRN VLY1 115 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-0.49	-0.76	-0.75	-13.56	-13.67	Diverged	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-009	ROB ROY 115kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	0.46	0.30	0.31	-13.34	-13.43	Diverged	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-010	GREN VLY 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-17.30	-18.31	-17.82	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-011	C.I.C 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-16.00	-16.96	-16.50	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-012	WTSNVLL E 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-15.66	-16.59	-16.16	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-013	CRYHSE 60 kV	Moss Landing - Green Valley #1 and #2 115 kV Lines	C5	DCTL	-16.71	-17.70	-17.22	0.00	0.00	Diverged	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-014	GREN VLY 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-19.25	-20.35	-19.89	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-015	C.I.C. 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-17.96	-18.99	-18.57	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-016	AGRILINK 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-17.78	-18.79	-18.38	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-017	WTSNVLL E 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-17.62	-18.63	-18.23	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-018	GRANT RK 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-12.74	-13.46	-13.20	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-019	BRIGTANO 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank #1	C3	L-1/T-1	-12.48	-13.17	-12.93	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.
CC-W-VD-020	CRYHSE 60 kV	Moss Landing-Salinas #1 115 kV Line and Green Valley 115/60 Bank	C3	L-1/T-1	-18.67	-19.73	-19.29	-	-	-	Develop operating procedure to curtail load in 15 min/Watsonville UVLS will activate.

ID	Overloaded Facility	Worst Contingency #1	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
CC-W-VD-021	GRN VLY1 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	-13.56	-13.67	Diverged	Develop operating procedure to curtail load.
CC-W-VD-022	ROB ROY 115 kV	Green Valley-Paul Sweet 115 kV Line and Paul Sweet Statcom	C3	L-2	-13.54	-3.16	-3.27	-2.39	-2.33	-1.84	Develop operating procedure to curtail load.
CC-W-VD-023	ROB ROY 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	-13.34	-13.43	Diverged	Develop operating procedure to curtail load.
CC-W-VD-024	PAUL SWT 115 kV	Green Valley-Paul	C3	L-2	-13.71	-4.21	-4.36	-3.24	-3.16	-2.30	Develop operating procedure to curtail

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		Sweet 115 kV Line and Paul Sweet Statcom										load.
CC-W-VD-025	PAUL SWT 115 kV	Metcalf-Moss Landing #2 230 kV Line and Paul Sweet Statcom	C3	L-2	-6.52	-3.91	-4.05	-2.98	-2.89	Diverged	Develop operating procedure to curtail load.	
CC-W-VD-026	PAUL SWT 115 kV	Metcalf-Moss Landing #1 230 kV Line and Paul Sweet Statcom	C3	L-2	-6.51	-3.91	-4.05	-2.98	-2.89	Diverged	Develop operating procedure to curtail load.	
CC-W-VD-027	PAUL SWT 115 kV	Paul Sweet Statcom and Coburn 230/60 kV Bank #1	C3	L-1/T-1	-6.43	Diverged	-3.99	-2.92	-2.83	Diverged	Develop operating procedure to curtail load.	
CC-W-VD-028	PAUL SWT 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green	C3	L-2	Diverged	Diverged	Diverged	-12.69	-12.76	Diverged	Develop operating procedure to curtail load.	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Valley #2 115 kV Line									
CC-W-VD-029	CMP EVRS 115 kV	Moss Landing-Green Valley #1 115 kV Line and Paul Sweet Statcom	C3	L-2	-12.09	-9.04	-9.31	-5.07	-5.00	-4.82	Develop operating procedure to curtail load.
CC-W-VD-030	CMP EVRS 115 kV	Metcalf-Moss Landing #2 230 kV Line and Paul Sweet Statcom	C3	L-2	-5.86	-3.58	-3.70	-2.47	-2.39	Diverged	Develop operating procedure to curtail load.
CC-W-VD-031	CMP EVRS 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	Diverged	Diverged	Diverged	-12.78	-12.85	Diverged	Develop operating procedure to curtail load.
CC-W-VD-032	ERTA 115 kV	Moss Landing-Green	C3	L-2	-	-	-	-13.38	-13.49	Diverged	Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		Valley #1 115 kV Line and Moss Landing- Green Valley #2 115 kV Line									
CC-W- VD-033	C.I.C. 115 kV	Moss Landing- Green Valley #1 115 kV Line and Moss Landing- Green Valley #2 115 kV Line	C3	L-2	-	-	-	-13.11	-13.22	Diverg ed	Develop operating procedure to curtail load.
CC-W- VD-034	AGRILINK 115 kV	Moss Landing- Green Valley #1 115 kV Line and Moss Landing- Green Valley #2 115 kV Line	C3	L-2	-	-	-	-13.02	-13.13	Diverg ed	Develop operating procedure to curtail load.
CC-W- VD-035	GRANT RK 115 kV	Moss Landing- Green Valley #1	C3	L-2	-	-	-	-9.72	-9.84	Diverg ed	Develop operating procedure to curtail load.

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
		115 kV Line and Moss Landing-Green Valley #2 115 kV Line									
CC-W-VD-036	BRIGTANO 115 kV	Moss Landing-Green Valley #1 115 kV Line and Moss Landing-Green Valley #2 115 kV Line	C3	L-2	-	-	-	-9.49	-9.61	Diverged	Develop operating procedure to curtail load.
CC-W-VD-037	PAUL SWT 115 kV	Moss Landing-Green Valley #1 115 kV Line and Paul Sweet Statcom	C3	L-1/G-1	-9.62	-6.26	-6.54	-2.97	-2.88	-2.40	Voltage support/Santa Cruz Reinforcement Project

APPENDIX A-9: Reliability Assessment Results for SCE Bulk System

Table A-9-1: Transient stability analyses and study results

Switching File	Voltage Performance	Frequency Performance
N-1: Midway - Vincent 500 kV line #2	Met Performance Requirement	Met Performance Requirement
N-1: Midway - Whirlwind 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Mira Loma - Serrano 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: PDCI bipole outage	Met Performance Requirement	Met Performance Requirement
N-1: PDCI monopole outage	Met Performance Requirement	Met Performance Requirement
N-1: Palo Verde - Colorado River 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Rancho Vista - Serrano 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Big Creek 3 - Rector 230 kV line #1	Met Performance Requirement	Met Performance Requirement
N-1: Valley - Serrano 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Vincent - Mira Loma 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Windhub - Antelope 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Windhub - Whirlwind 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Whirlwind - Antelope 500 kV line	Met Performance Requirement	Met Performance Requirement
N-1: Whirlwind - Vincent 500 kV line	Met Performance Requirement	Met Performance Requirement
G-2: SONGS G-2	Met Performance Requirement	Met Performance Requirement
G-2: Palo Verde G-2	Met Performance Requirement	Met Performance Requirement
N-2: Lugo - Mira Loma 500 kV No. 2 & No. 3	Met Performance Requirement	Met Performance Requirement
N-2: Lugo - Vincent 500 kV No. 1 & No. 2	Met Performance	Met Performance Requirement

Switching File	Voltage Performance	Frequency Performance
	Requirement	
N-2: Midway - Vincent No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Antelope - Vincent 500 kV No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Devers - Colorado River 500 kV No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Devers - Valley 500 kV No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Vincent - Mesa 230 kV No. 1 & No.2	Met Performance Requirement	Met Performance Requirement
N-2: Vincent - Rio Hondo 230 kV No. 1 & No.2	Met Performance Requirement	Met Performance Requirement
N-2: San Onofre - Santiago 230 kV No.1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: McCullough - Victorville 500 kV No. 1 and No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Rector - Big Creek 3 230 kV No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Rector - Vestal 230 kV No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
N-2: Springville - Magunden 230 kV No. 1 & No.2	Met Performance Requirement	Met Performance Requirement
N-2: Vestal - Magunden 230 kV No. 1 & No. 2	Met Performance Requirement	Met Performance Requirement
T-2: Lugo - Eldorado 500 kV No. 1 & Lugo - Mohave 500 kV No. 1	Met Performance Requirement	Met Performance Requirement
T-2: Devers 500/230 kV No. 1 & No. 2 transformer banks	Met Performance Requirement	Met Performance Requirement
T-2: Valley 500/115 kV No. 1 & No. 2 transformer banks	Met Performance Requirement	Met Performance Requirement
T-2: Vincent 500/230 kV No. 1 & No. 2 transformer banks	Met Performance Requirement	Met Performance Requirement
N-2: Kramer - Lugo 230 kV No. 1 & No. 2 w/ SPS	SCE one 115 bus duration > 40 cycles	SCE zone 246 and 247 duration > 6 cycles Area 64 duration > 6 cycles
T-2: Lugo 200/230 kV No. 1 & No. 2 transformer banks	Met Performance	Met Performance Requirement

Switching File	Voltage Performance	Frequency Performance
w/ SPS	Requirement	
Category D: Lugo Substation	Unstable	Unstable

APPENDIX A-10: Reliability Assessment Results for SCE Big Creek/Antelope Area

Table A-10.1: Summary of thermal overloads for summer peak conditions – Big Creek/Antelope Area

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
ANT-T-01	Bailey - Neenach - Westpac 66kV No. 1 (Neenach leg)	Bailey 230/66kV Transformer Bank No. 3	B	T-1	112%	117%	119%	diverge	127%	diverge	Frazier Park Substation Dynamic Voltage Support project, previously approved by ISO, would mitigate the voltage collapse from 2014 to 2020. Operate two Bailey 230/66kV banks in parallel by 2011.
ANT-T-02	Antelope - Neenach 66kV No. 1	Bailey 230/66kV Transformer Bank No. 3	B	T-1	84%	87%	89%	diverge	131%	diverge	
ANT-T-03	Antelope - Neenach 66kV No. 1	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	84%	87%	89%	diverge	132%	diverge	Develop operating procedure or use SPS shedding load for L-1-1 condition.
ANT-T-04	Bailey - Neenach - Westpac 66kV No. 1 (Westpac leg)	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	112%	117%	119%	diverge	127%	diverge	
ANT-T-05	Antelope - Lanpri - Shuttle - Lancaster 66kV No. 1 (Antelope leg)	Antelope - Del Sur 66kV No. 1 Line & Antelope - Oasis - Lancaster 66kV No. 1 Line	C	L-1/L-1	97%	100%	104%	74%	72%	78%	Operating procedure to mitigate the overload before EKWRA is in-service in 2013.
ANT-T-06	Antelope - Lanpri - Shuttle - Lancaster 66kV No. 1 (Lancaster Leg)	Antelope - Del Sur 66kV No. 1 Line & Antelope - Oasis - Lancaster 66kV No. 1 Line	C	L-1/L-1	115%	118%	123%	54%	53%	51%	
ANT-T-07	Antelope - Lanpri - Shuttle - Lancaster 66kV No. 1 (Lancaster	Del Sur - Lancaster - Rite Aid 66kV No. 1 & Antelope - Oasis -	C	L-1/L-1	97%	100%	104%	88%	87%	87%	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
	Leg)	Lancaster 66kV No. 1 Line										
ANT-T-08	Del Sur - Lancaster - Rite Aid 66kV No. 1 (Del Sur leg)	Antelope - Lanpri - Shuttle - Lancaster 66kV No. 1 & Antelope - Oasis - Lancaster 66kV No. 1 Line	C	L-1/L-1	117%	121%	126%	115%	113%	116%	SPS to drop Lancaster load.	
ANT-T-09	Del Sur - Lancaster - Rite Aid 66kV No. 1 (Lancaster leg)	Antelope - Lanpri - Shuttle - Lancaster 66kV No. 1 & Antelope - Oasis - Lancaster 66kV No. 1 Line	C	L-1/L-1	107%	110%	115%	104%	102%	105%		
ANT-T-10	Antelope - Anaverde - Helijet 66kV No. 1 (Helijet leg)	Palmdale - Acton - Shuttle 66kV No. 1 & Palmdate - Oasis - Quartz Hill 66kV No. 1	C	L-1/L-1	111%	115%	118%	124%	124%	131%	SPS to trip Palmdale load for L-1-1 condition	
ANT-T-11	Little Rock - Palmdale - Rockair - Helijet 66kV No. 1 (Helijet leg)	Palmdale - Acton - Shuttle 66kV No. 1 & Palmdate - Oasis - Quartz Hill 66kV No. 1	C	L-1/L-1	117%	120%	125%	130%	128%	139%		
ANT-T-12	Little Rock - Palmdale - Rockair - Helijet 66kV No. 1 (Tap 61 - Tap 62)	Palmdale - Acton - Shuttle 66kV No. 1 & Palmdate - Oasis - Quartz Hill 66kV No. 1	C	L-1/L-1	105%	108%	112%	116%	112%	116%		
ANT-T-13	Lancaster - Little Rock - Piute 66kV No. 1 (Little Rock leg)	Palmdale - Acton - Shuttle 66kV No. 1 & Palmdate - Oasis - Quartz Hill 66kV No. 1	C	L-1/L-1	73%	76%	78%	87%	86%	101%		
BCK-T-01	Magunden - Vestal 230kV No. 1	Big Creek 1 - Rector 230kV No. 1 & Big Creek 3 - Rector	C	L-2	105%	98%	<100%	<100%	<100%	<100%	Modify BC/SJV SPS to trip more load before San Joaquin Cross Valley	

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation	
					2011	2012	2013	2014	2015	2020		
		230kV No. 1										Loop-in Transmission Project is in-service
BCK-T-02	Magunden - Vestal 230kV No. 2	Big Creek 1 - Rector 230kV No. 1 & Big Creek 3 - Rector 230kV No. 1	C	L-2	103%	96%	<100%	<100%	<100%	<100%		
BCK-T-03	Big Creek 3 - Rector 230kV No. 1	Magunden - Vestal 230kV No. 1 & No. 2	C	L-2	106%	100%	<100%	<100%	<100%	<100%		

Table A-10.2: Summary of voltage deviation for summer peak conditions – Big Creek/Antelope Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
ANT-DV-01	OSO 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-14%	-15%	-14%	diverge	-24%	diverge	Parallel the two Bailey 230/66 kV banks.
ANT-DV-02	ALAMO SC 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-14%	-15%	-14%	diverge	-24%	diverge	
ANT-DV-03	BAILEY 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-15%	-16%	-15%	diverge	-25%	diverge	
ANT-DV-04	FRAZPARK 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-14%	-15%	-14%	diverge	-25%	diverge	
ANT-DV-05	GORMAN 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-14%	-15%	-14%	diverge	-25%	diverge	
ANT-DV-06	NEENACH 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-8%	-9%	-8%	diverge	-16%	diverge	
ANT-DV-07	WESTPAC 66kV	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-14%	-15%	-14%	diverge	-24%	Diverge	
ANT-DV-08	BAILEY 230kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-15%	-16%	-16%	diverge	-24%	diverge	Frazier Park Substation Dynamic Voltage Support project, previously approved by ISO, would mitigate the voltage collapse from 2014 to 2020. Use operating procedure or SPS to shed
ANT-DV-09	OSO 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-15%	-15%	-15%	diverge	-25%	diverge	
ANT-DV-10	ALAMO SC 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-14%	-15%	-15%	diverge	-24%	diverge	
ANT-DV-11	BAILEY 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-15%	-16%	-16%	diverge	-25%	diverge	
ANT-DV-12	FRAZPARK 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-15%	-15%	-15%	diverge	-25%	diverge	
ANT-DV-13	GORMAN 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-14%	-15%	-15%	diverge	-25%	diverge	
ANT-DV-14	NEENACH 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-8%	-9%	-9%	diverge	-16%	diverge	

ANT-DV-15	WESTPAC 66kV	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-14%	-15%	-15%	diverge	-24%	diverge	Westpac load.
ANT-DV-16	PALMDALE 66kV	Palmdale - Acton - Shuttle 66kV No. 1 & Palmdate - Oasis - Quartz Hill 66kV No. 1	C	L-1/L-1	-7%	-8%	-7%	-9%	-11%	-10%	SPS to trip Palmdale load for L-1-1 condition
ANT-DV-17		Bailey 230/66kV Transformer Bank No. 3 & Antelope - Neenach 66kV No. 1	C	T-1/L-1	diverge	diverge	diverge	solved	solved	solved	Parallel the two Bailey 230/66 kV banks.
ANT-DV-18		Antelope 230/66kV Transformer Bank No. 1 & No. 2	C	T-1/T-1	solved	solved	solved	solved	solved	diverge	

Table A-10.3: Summary of thermal overloads for spring off peak conditions – Big Creek/Antelope Area

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)					ISO Proposed Mitigation
					2011	2012	2013	2014	2015	
ANT-T-14	Antelope - Neenach 66kV No. 1	Bailey 230/66kV Transformer Bank No. 3	B	T-1	111%	106%	117%	diverge	diverge	Operate two Bailey banks in parallel
ANT-T-15	Bailey - Neenach - Westpac 66kV No. 1 (Westpac leg)	Bailey 230/66kV Transformer Bank No. 3	B	T-1	114%	107%	116%	diverge	diverge	
ANT-T-16	Bailey - Neenach - Westpac 66kV No. 1 (Westpac leg)	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	114%	107%	113%	diverge	diverge	Install shunt capacitor at Westpac

Table A-10.4: Summary of voltage deviation for spring off peak conditions – Big Creek/Antelope Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)					ISO Proposed Mitigation
					2011	2012	2013	2014	2015	
ANT-DV-19	ALAMO SC 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-19%	-18%	-21%	diverge	diverge	Parallel the two Bailey 230/66 kV banks by 2011.
ANT-DV-20	BAILEY 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-20%	-18%	-22%	diverge	diverge	
ANT-DV-21	FRAZPARK 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-19%	-17%	-21%	diverge	diverge	
ANT-DV-22	GORMAN 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-19%	-17%	-21%	diverge	diverge	
ANT-DV-23	NEENACH 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-12%	-11%	-14%	diverge	diverge	
ANT-DV-24	OSO 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-19%	-18%	-22%	diverge	diverge	
ANT-DV-25	WESTPAC 66	Bailey 230/66kV Transformer Bank No. 3	B	T-1	-19%	-17%	-21%	diverge	diverge	
ANT-DV-26	ALAMO SC 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-19%	-18%	-21%	diverge	diverge	Frazier Park Substation Dynamic Voltage Support project, previously approved by ISO, would mitigate the voltage collapse from 2014 to 2020. Use operating procedure or SPS to shed Westpac load.
ANT-DV-27	BAILEY 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-20%	-18%	-22%	diverge	diverge	
ANT-DV-28	FRAZPARK 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-19%	-17%	-21%	diverge	diverge	
ANT-DV-29	GORMAN 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-19%	-17%	-21%	diverge	diverge	
ANT-DV-30	NEENACH 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-12%	-11%	-14%	diverge	diverge	
ANT-DV-31	OSO 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-19%	-18%	-22%	diverge	diverge	
ANT-DV-32	WESTPAC 66	Pardee - Bailey 230kV No. 1 Line & Pastoria - Bailey 230kV No. 1 Line	C	L-1/L-1	-19%	-17%	-21%	diverge	diverge	

APPENDIX A-11: Reliability Assessment Results for SCE North of Lugo Area

Table A-11.1: Summary of thermal overloads for summer peak conditions – SCE North of Lugo Area

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
NOL-T-01	Control - Inyo 115kV Line	Kramer No. 1 & No. 2 230/115 kV Transformer Banks	C	T-1/T-1	106%	106%	106%	106%	102%	101%	Operating procedure to reduce generation
NOL-T-02	Inyo 115kV Phase Shifter	Kramer No. 1 & No. 2 230/115 kV Transformer Banks	C	T-1/T-1	146%	145%	145%	145%	141%	140%	Operating procedure to reduce generation
NOL-T-03	Inyokern-Randsburg-Kramer No. 1 115 kV Line	Control-Inyo 115 kV Line & Inyokern-Randsburg-Kramer No. 3 115 kV Line	C	L-1/L-1	109%	108%	107%	107%	105%	98%	Operating procedure to reduce generation
NOL-T-04	Kramer No. 1 230/115 kV Transformer Bank	Kramer-Roadway-Victor 115 kV Line & Kramer No.2 230/115 kV Transformer Bank	C	L-1/T-1	105%	104%	103%	103%	103%	102%	Operating procedure to reduce generation

Table A-11.2: Summary voltage deviations for summer peak conditions – SCE North of Lugo Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
NOL-DV-01	Dunn Siding	Kramer No. 1 & No. 2 230/115 kV Transformer Banks	C	T-1/T-1	-10%	-10%	-9%	-9%	-10%	-7%	Operating procedure to reduce generation
NOL-DV-02	Baker	Kramer No. 1 & No. 2 230/115 kV Transformer Banks	C	T-1/T-1	-12%	-12%	-11%	-11%	-12%	-9%	
NOL-DV-03	Mountain Pass	Kramer No. 1 & No. 2 230/115 kV Transformer Banks	C	T-1/T-1	-12%	-11%	-10%	-11%	-11%	-8%	

Table A-11.3: Summary voltage deviations for spring off-peak conditions – SCE North of Lugo Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
NOL-DV-04	Baker 115 kV	Cool Water-Kramer 115 kV Line & Kramer-Tortilla 115 kV Line	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-36%	Operating procedure to reduce generation
NOL-DV-05	Dunn Siding 115 kV	Cool Water-Kramer 115 kV Line & Kramer-Tortilla 115 kV Line	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-25%	
NOL-DV-06	Eldorado 115 kV	Cool Water-Kramer 115 kV Line & Kramer-Tortilla 115 kV Line	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-12%	
NOL-DV-07	Mountain Pass 115 kV	Cool Water-Kramer 115 kV Line & Kramer-Tortilla 115 kV Line	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-35%	

Table A-11.4: Transient stability analyses and study results

Switching File	Voltage Performance	Frequency Performance
N-2: Kramer-Lugo No.1 & No.2 230 kV Lines with existing Kramer SPS	Unstable	Unstable
Category D: Lugo Substation	Unstable	Unstable

APPENDIX A-12: Reliability Assessment Results for SCE East of Lugo

Table A-12.1: Summary of thermal overloads for summer peak conditions – East of Lugo

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EOL-T-1	Eldorado 500/230kV Transformer Bank No. 1	Eldorado - Moenkopi 500kV No. 1 & Eldorado - McCullough 500kV No. 1	C	L-1/L-1	80%	86%	89%	87%	106%	102%	Option 1: Develop emergency ratings of the overloaded transformer banks. Option 2: congestion management to reduce import at Eldorado following the first contingency
EOL-T-2	Eldorado 500/230kV Transformer Bank No. 2	Eldorado - Moenkopi 500kV No. 1 & Eldorado - McCullough 500kV No. 1	C	L-1/L-1	79%	85%	88%	87%	105%	101%	

APPENDIX A-13: Reliability Assessment Results for SCE Eastern Area

Table A-13.1: Summary of thermal overloads for summer peak conditions – Eastern Area

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EAST-T-1	BLYTHESC - EAGLEMTN 161 kV No. 1 Line	EAGLEMTN - IRON MTN 230kV No. 1 & J.HINDS - MIRAGE 230kV No. 1	C	L-1/L-1	<100%	<100%	133%	136%	<100%	<100%	Adjust Blythe gen after first N-1
EAST-T-2	FARREL - EISENHOW 115 kV No. 1 Line	DEVERS - FARREL - SEAWEST 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-2	<100%	<100%	<100%	100%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-3	FARREL - GARNET 115 kV No. 1 Line	DEVERS - FARREL - SEAWEST 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	117%	120%	123%	124%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-4	GARNET - TAP817 115 kV No. 1 Line	DEVERS - FARREL - SEAWEST 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	<100%	100%	102%	101%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-5	DEVERS - TAP822 115 kV No. 1 Line	DEVERS - FARREL - SEAWEST 115kV No. 1 & FARREL - GARNET 115kV No. 1	C	L-1/L-1	126%	129%	132%	135%	104%	102%	Operating procedure or SPS to trip load
EAST-T-6	EISENHOW - TAP822 115 kV No. 1 Line	DEVERS - FARREL - SEAWEST 115kV No. 1 & FARREL - GARNET 115kV No. 1	C	L-1/L-1	117%	120%	122%	124%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-7	GARNET - TAP817 115 kV No. 1 Line	DEVERS - GARNET - VENWIND 115kV No. 1 & DEVERS - FARREL - SEAWEST 115kV No. 1	C	L-1/L-1	111%	122%	125%	123%	103%	111%	Operating procedure or SPS to trip load
EAST-T-8	GARNET - TAP817 115 kV No. 1 Line	DEVERS - GARNET - VENWIND 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	105%	117%	119%	117%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-9	GARNET - TAP804 115 kV No. 1 Line	DEVERS - GARNET - INDIGO 115kV No. 1 & DEVERS - FARREL - SEAWEST 115kV No. 1	C	L-1/L-1	113%	126%	128%	126%	105%	113%	Operating procedure or SPS to trip load

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EAST-T-10	DEVERS - TAP804 115 kV No. 1 Line	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - FARREL - SEAWEST 115kV No. 1	C	L-1/L-1	111%	125%	127%	125%	106%	114%	Operating procedure or SPS to trip load
EAST-T-11	GARNET - TAP804 115 kV No. 1 Line	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	107%	121%	122%	121%	101%	109%	Operating procedure or SPS to trip load
EAST-T-12	FARREL - EISENHOW 115 kV No. 1 Line	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	<100%	100%	103%	104%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-13	DEVERS - TAP809 115 kV No. 1 Line	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	114%	132%	131%	127%	109%	117%	Operating procedure or SPS to trip load
EAST-T-14	FARREL - TAP819 115 kV No. 1 Line	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<100%	111%	115%	113%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-15	TAP809 - TAP819 115 kV No. 1 Line	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	101%	116%	118%	117%	<100%	106%	Operating procedure or SPS to trip load
EAST-T-16	FARREL - TAP819 115 kV No. 1 Line	FARREL - GARNET 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	126%	129%	132%	133%	104%	101%	Operating procedure or SPS to trip load
EAST-T-17	TAP809 - TAP819 115kV No. 1 Line	FARREL - GARNET 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	123%	125%	128%	129%	101%	<100%	Operating procedure or SPS to trip load
EAST-T-18	DEVERS - TAP809 115 kV No. 1 Line	FARREL - GARNET 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	136%	138%	139%	141%	109%	107%	Operating procedure or SPS to trip load
EAST-T-19	MIRAGE - TAP823 115 kV No. 1 Line	MIRAGE - CONCHO 115kV No. 1 & MIRAGE - SANTA RO 115kV No. 1	C	L-1/L-1	131%	135%	137%	139%	109%	110%	Operating procedure or SPS to trip load

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EAST-T-20	SANTA RO 115kV to TAP823 115kV Circuit 1	MIRAGE - CONCHO 115kV No. 1 & MIRAGE - SANTA RO 115kV No. 1	C	L-1/L-1	190%	196%	199%	201%	158%	164%	Operating procedure or SPS to trip load
EAST-T-21	MIRAGE - SANTA RO 115 kV No. 1 Line	MIRAGE - CONCHO 115kV No. 1 & TAMARISK - SANTA RO - MIRAGE 115kV No. 1	C	L-1/L-1	145%	149%	152%	153%	121%	125%	Operating procedure or SPS to trip load
EAST-T-22	MIRAGE - CONCHO 115 kV No. 1 Line	MIRAGE - SANTA RO 115kV No. 1 & TAMARISK - SANTA RO - MIRAGE 115kV No. 1	C	L-1/L-1	146%	151%	154%	155%	122%	127%	Operating procedure or SPS to trip load
EAST-T-23	MIRAGE 230/115 kV No. 1 Transformer	MIRAGE 230/115kV Transformer Bank No. 1 & No. 2	C	T-1/T-1	109%	111%	114%	115%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-24	MIRAGE 230/115 kV No. 3 Transformer	MIRAGE 230/115kV Transformer Bank No. 1 & No. 2	C	T-1/T-1	109%	111%	114%	115%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-25	MIRAGE 230/115 kV No. 4 Transformer	MIRAGE 230/115kV Transformer Bank No. 1 & No. 2	C	T-1/T-1	109%	111%	114%	115%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-26	SANTA RO - TAP823 115 kV No. 1 Line	SANTA RO - CONCHO - INDIAN W 115kV No. 1 & MIRAGE - SANTA RO 115kV No. 1	C	L-1/L-1	<100%	101%	103%	103%	<100%	<100%	Operating procedure or SPS to trip load

Table A-13.2: Summary of voltage deviations for summer peak conditions – Eastern Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EAST-DV-1	FARREL 115kV	GARNET_INDIGO_DEVERS115kV & DEVERS_GARNET_VENWIND 115kV	C	L-1/L-1	<10%	-14%	<10%	<10%	<10%	<10%	Shed Garnet load and trip Garnet wind generation (reactive power load)
EAST-DV-2	EISENHOW 115kV	DEVERS - FARREL - SEAWEST 115kV No. 1 & FARREL - GARNET 115kV No. 1	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-11%	Operating procedure or SPS to trip load
EAST-DV-3	FARREL 115kV	DEVERS - FARREL - SEAWEST 115kV No. 1 & FARREL - GARNET 115kV No. 1	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-14%	
EAST-DV-4	THORNHIL 115kV	DEVERS - FARREL - SEAWEST 115kV No. 1 & FARREL - GARNET 115kV No. 1	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-11%	
EAST-DV-5	BANWIND 115kV	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<10%	-14%	-13%	-14%	-13%	-16%	Shed Garnet load and trip Garnet wind generation (reactive power load)
EAST-DV-6	BOTTLE 115kV	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<10%	-14%	-13%	-14%	-13%	-16%	
EAST-DV-7	GARNET 115kV	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<10%	-14%	-13%	-14%	-13%	-16%	
EAST-DV-8	RENWIND 115kV	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<10%	-14%	-13%	-14%	-13%	-16%	
EAST-DV-9	TRANWIND 115kV	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<10%	-14%	-13%	-14%	-13%	-18%	
EAST-DV-10	BANNING 115kV	MARASCHI - BANNING 115kV No. 1 & EL CASCO - BANNING 115kV No. 1	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-17%	Operating procedure or SPS to trip load
EAST-DV-11	CRAFTHLS 115kV	MARASCHI - BANNING 115kV No. 1 & EL CASCO - BANNING 115kV No. 1	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-9%	
EAST-DV-12	MENTONE 115kV	MARASCHI - BANNING 115kV No. 1 & EL CASCO - BANNING 115kV No. 1	C	L-1/L-1	<10%	<10%	<10%	<10%	<10%	-8%	

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
EAST-DV-13	SANBRDNO 115kV	MARASCHI - BANNING 115kV No. 1 & EL CASCO - BANNING 115kV No. 1	C	L-1/L-1	<10 %	<10%	<10%	<10%	<10 %	-7%	
EAST-DV-14	ZANJA 115kV	MARASCHI - BANNING 115kV No. 1 & EL CASCO - BANNING 115kV No. 1	C	L-1/L-1	<10 %	<10%	<10%	<10%	<10 %	-10%	
EAST-DV-15	MARASCHI 115kV	MARASCHI - BANNING 115kV No. 1 & EL CASCO - BANNING 115kV No. 1	C	L-1/L-1	<10 %	<10%	<10%	<10%	<10 %	-17%	

Table A-13.3: Summary of thermal overloads for spring off peak conditions – Eastern Area

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)					ISO Proposed Mitigation
					2011	2012	2013	2014	2015	
EAST-T-27	DEVERS 115/230 kV No. 3 Transformer	Devers 230/115 No.1 & No.4 Transformers	C	T-1/T-1	<100%	101%	<100%	<100%	<100%	Trip generation in Devers 115kV system
EAST-T-28	DEVERS 115kV to TAP804 115kV	FARREL - GARNET 115kV No. 1 & DEVERS - GARNET- INDIGO 115kV No. 1	C	L-1/L-1	<100%	113%	108%	<100%	<100%	Trip GARNET wind generation
EAST-T-29	DEVERS 115kV to TAP809 115kV	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	<100%	115%	105%	<100%	<100%	Trip 50 MW wind generation at WINDTEC 6 and BUCKWIND
EAST-T-30	TAMARISK 115 - THORNHIL 115, ck 1	DEVERS - FARREL - SEAWEST 115kV No. 1 & DEVERS - THORNHIL - EISENHOW 115kV No. 1	C	L-1/L-1	107%	<100%	<100%	<100%	<100%	Operating procedure or SPS to trip load
EAST-T-31	SANTA RO - TAP823 115 kV No. 1 Line	MIRAGE - CONCHO 115kV No. 1 & MIRAGE - SANTA RO 115kV No. 1	C	L-1/L-1	<100%	<100%	108%	112%	<100%	Operating procedure or SPS to trip load

Table A-13.4: Summary of voltage deviations for spring off peak conditions – Eastern Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)					ISO Proposed Mitigation
					2011	2012	2013	2014	2015	
EAST-DV-16	BANWIND 115	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	-20%	<10%	<10%	<10%	<10%	Operating procedure or SPS to trip load
EAST-DV-17	BOTTLE 115	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	-20%	<10%	<10%	<10%	<10%	
EAST-DV-18	GARNET 115	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	-20%	<10%	<10%	<10%	<10%	
EAST-DV-19	RENWIND 115	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	-19%	<10%	<10%	<10%	<10%	
EAST-DV-20	SANTA RO 115	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	-8%	<10%	<10%	<10%	<10%	
EAST-DV-21	TRANWIND 115	DEVERS - GARNET- INDIGO 115kV No. 1 & DEVERS - GARNET - VENWIND 115kV No. 1	C	L-1/L-1	-20%	<10%	<10%	<10%	<10%	

APPENDIX A-14: Reliability Assessment Results for SDG&E Area

Table A-14.1: Summary of thermal overloads for summer peak conditions – SDG&E Area

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-01	BOULEVRD - 69kV-CRESTWD 69kV ckt1	Base system (n-0)	7.0	A	N-0	53%	65%	80%	81%	96%	167%	Distribution equipment and substation modifications
SDGE-T-02	MESAHGTS 69kV-MISSION 69kV ck 1	Base system (n-0) (high import scenario)	97	A (high import)	N-0	84%	87%	92%	94%	96%	103%	Upgrade the line
SDGE-T-03	BLDCRKTP - 69kV-DESCANSO 69kV ckt1	TL0625 BAR - DS - LV ck 1	32.0	B	L-1	80%	84%	90%	100%	104%	127%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett
SDGE-T-04	BLDCRKTP - 69kV-SANTYSBL 69kV ckt1	TL0625 BAR - DS - LV ck 1	32.0	B	L-1	80%	84%	90%	100%	105%	127%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett
SDGE-T-05	BOULEVRD - 69kV-CRESTWD 69kV ckt1	TL0625 BAR - DS - LV ck 1	7.0	B	L-1	57%	70%	91%	83%	97%	193%	Distribution equipment and substation modifications
SDGE-T-06	DESCANSO - 69kV-GLNCLFTP 69kV ckt1	TL0625 BAR - DS - LV ck 1	32.0	B	L-1	61%	65%	74%	82%	88%	109%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett
SDGE-T-07	EL CAJON 69kV-LOSCOCHS 69kV ckt1	TL0632 ML-GR-LC ck 1 (high import scenario)	70	B	L-1 (high import)	55%	45%	85%	105%	99%	107%	Mitigate by dispatching El Cajon peakers

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-08	KEARNY 69kV-MISSION 69kV ckt1	TL0676 MESAHGTS-MISSION ck 1 (high import scenario)	129.0	B	L-1 (high import)	89%	85%	96%	98%	101%	107%	Upgrade the line
SDGE-T-09	LOSCOCHS 138kV-LOSCOCHS 69kV ckt1	LC BK 51 69/138	180.0	B	T-1 (high import)	76%	68%	105%	107%	100%	105%	Upgrade the bank.
SDGE-T-10	MELROSE - 69kV-MELRSETP 69kV ckt1	LD_ME OPEN 693 PEAK ME/SM	102.0	B	L-1	94%	95%	97%	99%	101%	108%	Loop-in TL694A into Melrose
SDGE-T-11	MELROSE - 69kV-SANLUSRY 69kV ckt1	LD_ME OPEN 680A PEAK ME	102.0	B	L-1	92%	86%	89%	93%	95%	107%	Loop-in TL694A into Melrose
SDGE-T-12	MESAHGTS 69kV-MISSION 69kV ckt1	TL0663 KEARNY-MISSION (high import scenario)	137	B	L-1 (high import)	90%	86%	96%	96%	101%	107%	Upgrade the line
SDGE-T-13	MISSION 138kV-MISSION 69kV ckt 3	MS BK 50 138/69 (high import scenario)	239	B	T-1 (high import)	93%	90%	94%	92%	97%	103%	Further evaluation in 2012 TP. Conceptual plan of Bank upgrade.
SDGE-T-14	MISSION 69kV-CLAIRMNT 69kV ckt 1	TL0676 MESAHGTS-MISSION ck 1 (high import scenario)	50	B	L-1 (high import)	87%	79%	94%	95%	101%	106%	Upgrade the line
SDGE-T-15	MORHILTP 69kV - SANLUSRY 69kV ckt1	TL06912 PENDLETN-SANLUSRY (high import scenario)	100	B	L-1 (high import)	95%	97%	104%	98%	101%	108%	Loop-in TL694A into Melrose

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-16	PALA - 69kV-MNSRATTP 69kV ckt1	TL06932 LILAC - PALA ck 1	68.0	B	L-1	106%	104%	102%	102%	102%	99%	Line is scheduled to be reconducted through LGIP process, temporary SPS is in place as interim solution. See TMC1505 Section 6.13
SDGE-T-17	PENDLETN 69kV-SANLUSRY 69kV ckt1	TL0694 MONSRT-MRHLTP-MH-SLR (high import scenario)	102	B	L-1 (high import)	89%	50%	93%	92%	91%	101%	Mitigate by dispatching Orange Grove peakers
SDGE-T-18	POMERADO 69kV-SYCAMORE 69kV ckt 1	TL06924 POMERADO-SYCAMORE ck 2 (high import scenario)	179	B	L-1 (high import)	84%	83%	86%	100%	104%	109%	Build a new Sycamore – Bernardo 69kV line
SDGE-T-19	POMERADO 69kV-SYCAMORE 69kV ckt 2	TL06915 POMERADO-SYCAMORE ck 1 (high import scenario)	179	B	L-1 (high import)	84%	83%	86%	100%	104%	109%	Build a new Sycamore – Bernardo 69kV line
SDGE-T-20	POWAY 69kV-R.CARMEL 69kV ckt 1	TL06920 ARTESN-SYCAMORE ck 1 (high import scenario)	114	B	L-1 (high import)	62%	80%	79%	97%	106%	111%	Build a new Sycamore – Bernardo 69kV line
SDGE-T-21	SOUTHBAY - 69kV-SWEETWTR 69kV ckt1	TL0642 MG - SW - SY ck 1	143.0	B	L-1	40%	37%	107%	110%	113%	105%	Upgrade the line
SDGE-T-22	SOUTHBAY 69kV-MONGYTP 69kV ck 1	TL230XY SILVERGT - SY230 (high import scenario)	170	B	L-1 (high import)	N/A	N/A	79%	88%	90%	103%	Terminal equipment upgrade

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-23	SWEETWTR - 69kV-MONTGYTP 69kV ckt1	TL230XY SILVERGT - SY230	170.0	B	L-1	N/A	N/A	105%	113%	114%	101%	Terminal equipment upgrade
SDGE-T-24	SWEETWTR - 69kV-SWTWTRTP 69kV ckt1	TL230XY SILVERGT - SY230	215.0	B	L-1	N/A	N/A	88%	98%	102%	88%	Terminal equipment upgrade
SDGE-T-25	SWEETWTR - 69kV-SWTWTRTP 69kV ckt1	TL230XY SILVERGT - SY230 (high import scenario)	215.0	B	L-1	N/A	N/A	74%	98%	96%	116%	Terminal equipment upgrade
SDGE-T-26	SYCAMORE 69kV-SCRIPPS 69kV ckt1	TL23042 OTAYMESA - SY230 (high import scenario)	174	B	L-1 (high import)	N/A	N/A	93%	98%	102%	106%	Mitigate by dispatching Miramar peakers
SDGE-T-27	TA TAP - 138kV-LAGNA NL 138kV ckt1	TL13836 TALEGA-PICO ck 1	136.5	B	L-1	93%	94%	95%	96%	97%	101%	Southern Orange County Reliability Upgrade Project (SOCRUP)
SDGE-T-28	WARNERS - 69kV-RINCON 69kV ckt1	TL0625 BAR - DS - LV ck 1	32	B	L-1	91%	90%	92%	100%	102%	104%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett
SDGE-T-29	BERNARDO - 69kV-R.CARMEL 69kV ckt1	POM-SX #1+#2	68.0	C	N-2, common structure	143%	149%	158%	160%	161%	166%	Use SPS to drop RCL load. Documented in TMC 1505 Section 8.1
SDGE-T-30	BLDCRKTP - 69kV-DESCANSO 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0625 BAR - DS - LV ck 1	32.0	C	N-1-1	<100%	<100%	<100%	<100%	105%	166%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett (also identified as Category B overload)

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-31	BLDCRKTP - 69kV- DESCANSO 69kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL0625 BAR - DS - LV ck 1	32.0	C	N-1-1	<100%	<100%	<100%	103%	<100%	<100%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett (also identified as Category B overload)
SDGE-T-32	BLDCRKTP - 69kV- SANTYSBL 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0625 BAR - DS - LV ck 1	32.0	C	N-1-1	<100%	<100%	<100%	<100%	105%	166%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett (also identified as Category B overload)
SDGE-T-33	BLDCRKTP - 69kV- SANTYSBL 69kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL0625 BAR - DS - LV ck 1	32.0	C	N-1-1	<100%	<100%	<100%	103%	<100%	<100%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett (also identified as Category B overload)
SDGE-T-34	BOULEVRD - 69kV-CRESTWD 69kV ckt1	SA-MS 1 + SA- MS 2 230 kV	7.0	C	N-2, common structure	53%	65%	80%	81%	96%	167%	Distribution equipment and substation modifications (also identified as Category A and B overload)
SDGE-T-35	CAMERNTP - 69kV- GLNCLFTP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0625 BAR - DS - LV ck 1	32.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	122%	Use operating procedure to drop load
SDGE-T-36	CAPSTRNO - 138kV- TRABUCO 138kV ckt 1	TL13816 CAPSTRNO - PICO ck 1 _TL13835 SANMATEO- LAGNA NL ck 1	157.0	C	N-1-1	101%	<100%	<100%	<100%	<100%	<100%	Southern Orange County Reliability Upgrade Project (SOCRUP)

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-37	CHCARITA - 138kV- MDWLRKTP 138kV ckt1	EA-CAN & EA- BQ-PQ	204.0	C	N-2, common structure	120%	Not Run	Not Run	Not Run	Not Run	Not Run	Use SPS to trip Encina until Sunrise plan of service is constructed
SDGE-T-38	CHOLLAS - 69kV- SWEETWTR 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0603 NC- NSM-SW ck 1	100.6	C	N-1-1	<100%	<100%	107%	115%	117%	103%	Use operating procedure to drop load
SDGE-T-39	DEL MAR - 69kV- DELMARTP 69kV ckt1	Del Mar 69kV E Bus	50.0	C	Bus	125%	124%	129%	131%	132%	141%	Contingency drops two banks @ DM.
SDGE-T-40	DESCANSO - 69kV- GLNCLFTP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0625 BAR - DS - LV ck 1	32.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	145%	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett (also identified as Category B overload)
SDGE-T-41	DOUBLTTP - 138kV-FRIARS 138kV ckt 1	TL23013 PENSQTOS - OT ck 1 _TL50001 SPS+IV Gens+23050 SPS6.2A	150.8	C	N-1-1	117%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-42	ENCINA - 138kV- SHADOWR 138kV ckt1	EA-PAR + EA- BQ-PQ 138 kV	273.7	C	N-2, common structure	123%	82%	76%	81%	79%	88%	SPS Documented in TMC 1505 Section 6.9
SDGE-T-43	ESCNDIDO - 69kV- ESCNDIDO 230kV ckt2	ESCNDIDO 230 kV 2N CB	261.0	C	C, Stuck Breaker	90%	100%	102%	96%	98%	111%	Contingency drops ES BK 70 & BK 72

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-44	ESCNDIDO - 69kV-FELICITA 69kV ckt1	Escondido 69kV NE Bus	102.0	C	Bus	100%	94%	96%	93%	94%	103%	Use SPS or operating procedure to drop loadContingency drops ES BK 32
SDGE-T-45	ESCNDIDO - 69kV-SANMRCOS 69kV ckt 1	TL13801 CANNON-ENCINA ck 1 _SA BK 70 69/230	129.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	112%	Use operating procedure to drop load
SDGE-T-46	ESCNDIDO50 - 138kV-ESCNDIDO 69kV ckt2	EA-CAN & EA-BQ-PQ	73.0	C	N-2, common structure	136%	Not Run	Not Run	Not Run	Not Run	Not Run	Use SPS to trip Encina until Sunrise plan of service is constructed
SDGE-T-47	GARFIELD - 69kV-EL CAJON 69kV ckt1	Murray 69kV N Bus	102.0	C	Bus	126%	128%	120%	122%	124%	127%	Contingency drops MY BK32 & BK33
SDGE-T-48	GLENCLIF - 69kV-GLNCLFTP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0625 BAR - DS - LV ck 1	7.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	108%	Use operating procedure to drop load
SDGE-T-49	HORNO TP - 69kV-JAP MESA 69kV ckt 1	TL23007 TALEGA - SONGS ck 2 _TL23052 TALEGA - S.ONOFRE ck 1	32.0	C	N-1-1	<100%	<100%	<100%	103%	101%	104%	Use operating procedure to drop load
SDGE-T-50	HORNO TP - 69kV-JAP MESA 69kV ckt1	TA-SO 1 + 2 230 kV	32.0	C	N-2, common structure	101%	96%	97%	103%	101%	104%	SPS documented in TMC1505 Section 8.2

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-51	IMPRLVLY - 230kV-IMPRLVLY 500kV ckt2	IMPRLVLY 230 kV 11T CB	732.0	C	Stuck Breaker	127%	121%	122%	113%	116%	123%	will be mitigated by 3rd IV 500/230 kV bank, scheduled to be installed through LGIP, check if there is existing solution
SDGE-T-52	JAP MESA - 69kV-TALEGATP 69kV ckt1	TA-SO 1 + 2 230 kV	24.0	C	N-2, common structure	113%	106%	111%	118%	117%	120%	SPS documented in TMC1505 Section 8.2
SDGE-T-53	LASPULGS - 69kV-HORNO TP 69kV ckt1	TA-SO 1 + 2 230 kV	32.0	C	N-2, common structure	102%	96%	97%	103%	102%	104%	SPS documented in TMC1505 Section 8.2
SDGE-T-54	MELROSE - 69kV-MELRSETP 69kV ckt 1	TL13801 CANNON-ENCINA ck 1 _TL0693 MELROSE to SANLUSRY ck 1	102.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	101%	further evaluation in 2012 TP for a conceptual plan of Melrose TL694A loopin
SDGE-T-55	MIGUEL - 230kV-MIGUEL 500kV ckt 2	50003 IMPRLVLY-CENTRALS CK 1 _ML BK 80 230/500 ck 1	1344.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	103%	Use operating procedure to drop load
SDGE-T-56	MIGUEL - 230kV-MIGUEL 500kV ckt 2	TL23040 OTAYMESA-TJI _ML BK 80 230/500 ck 1	1344.0	C	N-1-1	106%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-57	MIGUEL - 230kV-MIGUELMP 500kV ckt 1	50003 IMPRLVLY-CENTRALS CK 1 _ML BK 81 230/500 ck 2	1329.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	105%	Use operating procedure to drop load

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-58	MIGUEL - 230kV- MIGUELMP 500kV ckt 1	TL23050 IMPRLVLY - ROA-230 ck 1 _ML BK 81 230/500 ck 2	1329.0	C	N-1-1	115%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-59	MURRAY - 69kV-GARFIELD 69kV ckt1	Murray 69kV N Bus	103.0	C	Bus	111%	112%	96%	98%	99%	102%	use SPS or operating procedure to drop load
SDGE-T-60	NATNLCTY - 69kV- SWTWTRTP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0658 SAMPSON- DIVISION ck 1	102.1	C	N-1-1	<100%	<100%	126%	<100%	142%	121%	Use operating procedure to drop load
SDGE-T-61	OCNSDETP - 69kV- STUARTTP 69kV ckt1	TA-SO 1 + 2 230 kV	32.0	C	N-2, common structure	115%	109%	112%	117%	116%	118%	SPS documented in TMC1505 Section 8.2
SDGE-T-62	OLD TOWN - 230kV-MISSION 230kV ckt 1	TL23028 SILVERGT - OT - MISSION _TL23042 OTAYMESA - SY230	456.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	101%	Use operating procedure to drop load
SDGE-T-63	OTAYMESA - 230kV- MLMS3TAP 230kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL23041 OTAYMESA- SYCAMORE	1255.0	C	N-1-1	100%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-64	PALA - 69kV- MNSRATTP 69kV ckt1	ES-TA 230 kV & LI-PA 69 kV	68.0	C	N-2, common structure	106%	104%	102%	102%	102%	99%	See TMC1505 Section 6.13 and T-132

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-65	POMERADO - 69kV-SYCAMORE 69kV ckt2	Sycamore 69kV S Bus	179.0	C	Bus	88%	86%	91%	103%	105%	111%	Build a new Sycamore – Bernardo 69kV line (also identified as Category B overload)
SDGE-T-66	POWAY - 69kV-POMERADO 69kV ckt1	PEN-ES #1 + #2 230 kV	148.0	C	N-2, common structure	75%	100%	103%	103%	124%	130%	Build a new Sycamore – Bernardo 69kV line (also identified as Category B overload)
SDGE-T-67	SAMPSON - 69kV-DIVISION 69kV ckt 1	TL23041 OTAYMESA-SYCAMORE _TL230XY SILVERGT - SY230	172.0	C	N-1-1	<100%	<100%	<100%	111%	112%	<100%	Use operating procedure to drop load
SDGE-T-68	SANLUSRY - 138kV-SANLUSRY 69kV ckt 1	TL13804 BATIQTOS-PENSQTOS-ENCINA _EA BK 60 230/138	160.0	C	N-1-1	<100%	<100%	<100%	104%	<1.00	<100%	Use operating procedure to drop load
SDGE-T-69	SANLUSRY - 138kV-SANLUSRY 69kV ckt 1	TL13804 BATIQTOS-PENSQTOS-ENCINA _CC-SH-BQ CK 1	160.0	C	N-1-1	133%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-70	SANLUSRY - 138kV-SANLUSRY 69kV ckt1	EA-PAR + EA-BQ-PQ 138 kV	160.0	C	N-2, common structure	100%	59%	58%	60%	56%	66%	SPS documented in TMC1505 Section 6.9
SDGE-T-71	SANLUSRY - 69kV-SANLUSRY 230kV ckt 1	TL13801 CANNON-ENCINA ck 1 _SA BK 71 69/230	262.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	133%	Use operating procedure to drop load

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-72	SANLUSRY - 69kV- SANLUSRY 230kV ckt 1	TL13801 CANNON- ENCINA ck 1 _SA BK 71 69/230	262.0	C	N-1-1	<100%	110%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-73	SANTYSBL - 69kV- CREELMAN 69kV ckt1	Loveland 69kV Bus	43.5	C	Bus	64%	71%	78%	88%	92%	111%	Use SPS or operating procedure to drop load
SDGE-T-74	SANYSDRO - 69kV-OTAY TP 69kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL0649 BD-OY- SYO ck 1	50.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	100%	Use operating procedure to drop load
SDGE-T-75	SILVERGT - 230kV- MLMS3TAP 230kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL23041 OTAYMESA- SYCAMORE	1175.0	C	N-1-1	107%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-76	SILVERGT - 69kV- NATNLCTY 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0658 SAMPSON- DIVISION ck 1	1.003844	C	N-1-1	<100%	<100%	<100%	<100%	100%	<1.00	Use operating procedure to drop load
SDGE-T-77	SILVERGT - 69kV-URBAN 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0699 B - SILVERGT ck 2	100.0	C	N-1-1	<100%	<100%	<100%	100%	101%	<1.00	Use operating procedure to drop load
SDGE-T-78	SILVERGT - 69kV-URBAN 69kV ckt1	Station B 69kV N Bus	100.0	C	Bus	90%	93%	93%	96%	97%	108%	Use SPS or operating procedure to drop load

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-79	SOUTHBAY - 69kV-MONTGMRYP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0644 SOUTHBAY - SWEETWTR ck 1	102.0	C	N-1-1	<100%	<100%	111%	118%	119%	106%	Use operating procedure to drop load
SDGE-T-80	SOUTHBAY - 69kV-MONTGYTP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0644 SOUTHBAY - SWEETWTR ck 1	170.0	C	N-1-1	<100%	<100%	123%	132%	133%	118%	Terminal equipment upgrade (also identified as Category B overload)
SDGE-T-81	SOUTHBAY - 69kV-SWEETWTR 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0642 MG - SW - SY ck 1	143.0	C	N-1-1	<100%	<100%	180%	194%	196%	170%	Upgrade line (also identified as Category B overload)
SDGE-T-82	STUARTTP - 69kV-LASPULGS 69kV ckt1	TA-SO 1 + 2 230 kV	32.3	C	N-2, common structure	108%	103%	105%	111%	109%	112%	SPS documented in TMC1505 Section 8.2
SDGE-T-83	SWEETWTR - 69kV-MONTGYTP 69kV ckt 1	TL230XY SILVERGT - SY230 _TL0644 SOUTHBAY - SWEETWTR ck 1	170.0	C	N-1-1	<100%	<100%	165%	178%	179%	156%	Terminal equipment upgrade (also identified as Category B overload)
SDGE-T-84	SWEETWTR - 69kV-SWTWTRTP 69kV ckt 1	TL23041 OTAYMESA-SYCAMORE _TL230XY SILVERGT - SY230	215.0	C	N-1-1	<100%	<100%	125%	141%	141%	114%	Terminal equipment upgrade (also identified as Category B overload)

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-85	SY230 - 230kV- SOUTHBAY 69kV ckt 1	TL230XY SILVERGT - SY230 _SY BK 72 230/69	285.0	C	N-1-1	<100%	<100%	108%	115%	117%	107%	Use operating procedure to drop load
SDGE-T-86	SY230 - 230kV- SOUTHBAY 69kV ckt 2	TL230XY SILVERGT - SY230 _SY BK 70 230/69	285.0	C	N-1-1	<100%	<100%	108%	115%	117%	107%	Use operating procedure to drop load
SDGE-T-87	SY230 - 230kV- SOUTHBAY 69kV ckt2	SY230 230 kV 1T CB	285.0	C	Stuck Breaker	Not Run	Not Run	108%	115%	117%	107%	Use SPS or operating procedure to drop load
SDGE-T-88	SYCAMORE - 138kV- CARLTHTP 138kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL23042 OTAYMESA - SILVERGT	247.0	C	N-1-1	108%	<100%	<100%	<100%	<100%	<100%	use operating procedure to drop load
SDGE-T-89	SYCAMORE - 230kV- MLSXTAP 230kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL23042 OTAYMESA - SILVERGT	912.0	C	N-1-1	126%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-90	SYCAMORE - 69kV-ELLIOTT 69kV ckt 1	50001 IMPRLVLY- MIGUEL ck 1 _TL23042 OTAYMESA - SY230	126.4	C	N-1-1	107%	<100%	<100%	<100%	101%	101%	Use operating procedure to drop load

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-91	TA TAP - 138kV-LAGNA NL 138kV ckt1	PI-CP & TA-TB	136.5	C	N-2, common structure	113%	114%	115%	116%	117%	121%	SPS documented in TMC1505 Section 8.4 Southern Orange County Reliability Upgrade Project (SOCRUP)
SDGE-T-92	TALEGA - 138kV-PICO 138kV ckt1	TA-TB + LNL-TA TAP-SMO 138 kV	204.0	C	N-2, common structure	111%	113%	114%	115%	116%	122%	SPS documented in TMC1505 Section 8.4 Southern Orange County Reliability Upgrade Project (SOCRUP)
SDGE-T-93	TALEGA - 230kV- S.ONOFRE 230kV ckt 1	50003 HASSYAMP- N.GILA ck 1 _TL23052 TALEGA - S.ONOFRE ck 1	557.0	C	N-1-1	<100%	<100%	<100%	<100%	<100%	100%	Use operating procedure to drop load
SDGE-T-94	TALEGA - 230kV- S.ONOFRE 230kV ckt 1	TL23052 TALEGA - S.ONOFRE ck 1 _TL50001 SPS+IV Gens+23050 SPS6.2A	557.0	C	N-1-1	106%	<100%	<100%	<100%	<100%	<100%	Use operating procedure to drop load
SDGE-T-95	TALEGA - 230kV-TALEGA 138kV ckt1	TALEGA 138 kV 5W CB	195.0	C	Stuck Breaker	119%	121%	123%	124%	126%	133%	Contingency opens TA138/69kV BK50.
SDGE-T-96	TALEGA - 69kV- TALEGATP 69kV ckt1	TA-SO 1 + 2 230 kV	24.0	C	N-2, common structure	100%	93%	99%	105%	105%	108%	Documented in TMC1505 Section 8.2

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Desc.	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-97	WARNERS - 69kV-RINCON 69kV ckt1	DE-ST-BC + CRE-ST	32.0	C	N-2, common structure	98%	102%	101%	104%	106%	126%	upgrade line (also identified as a Category B violation in 2014), use SPS as interim solution

Table A-14.2: Summary of low voltages for summer peak conditions – SDG&E Area

ID	Substation	Worst Contingency	Category	Category Description	Min. Post Contingency Voltage (PU)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
SDGE-V-01	BARRETT 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9287	0.9318	0.8628	0.9622	0.9469	0.7182	Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett
SDGE-V-02	BOLDRCRK 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9902	1.0027	0.9725	0.9969	0.9897	0.8868	
SDGE-V-03	BOULEVRD 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9354	0.9368	0.8749	0.9579	0.9424	0.7108	
SDGE-V-04	CAMERON 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9298	0.933	0.8695	0.9543	0.9395	0.7174	
SDGE-V-05	DESCANSO 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9738	0.983	0.9378	0.9817	0.9723	0.8259	
SDGE-V-06	GLENCLIF 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9463	0.9516	0.8964	0.962	0.949	0.7547	
SDGE-V-07	CRESTWD 69kV	TL0625 BAR - DS - LV ck 1 & Otay Mesa out	B	L-1/G-1	0.9403	0.9429	0.8829	0.9652	0.9512	0.7313	

Table A-14.3: Summary voltage deviations for summer peak conditions – SDG&E Area

ID	Substation	Worst Contingency	Category	Category Description	Post Contingency Voltage Deviation (%)						ISO Proposed Mitigation
					2011	2012	2013	2014	2015	2020	
SDGE-DV-01	BARRETT 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-8%	-9%	-14%	-4%	-5%	-28%	Long-term Mitigation: Remove Barrett Tap and create 2 new lines: Loveland-Descanso and Loveland-Barrett. Interim Mitigation: Advance the installation of Barrett and Crestwood 69kV capacitors which were part of a previously approved project – ‘New and/or Upgrade 69kV Capacitors’ (Approved in 2010 transmission plan)
SDGE-DV-02	BOLDRCRK 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-3%	-3%	-5%	-1%	-1%	-12%	
SDGE-DV-03	BORREGO 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-1%	-2%	1%	2%	2%	-6%	
SDGE-DV-04	BOULEVRD 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-6%	-7%	-11%	-2%	-3%	-25%	
SDGE-DV-05	CAMERON 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-7%	-8%	-12%	-4%	-5%	-27%	
SDGE-DV-06	DESCANSO 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-4%	-5%	-7%	-2%	-3%	-18%	
SDGE-DV-07	GLENCLIF 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-6%	-7%	-10%	-3%	-4%	-23%	
SDGE-DV-08	NARROWS 69kV	TL0686 WARNERS-NARROWS ck 1	B	L-1	-5%	-6%	0%	0%	0%	0%	
SDGE-DV-09	SANTYSBL 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-2%	-2%	-2%	0%	0%	-8%	
SDGE-DV-10	WARNERS 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-1%	-2%	0%	1%	1%	-6%	
SDGE-DV-11	CRESTWD 69kV	TL0625 BAR - DS - LV ck 1	B	L-1	-6%	-7%	-11%	-2%	-3%	-25%	
SDGE-DV-12	POWAY 69kV	TL06913 POWAY-POMERADO ck 1	B	L-1	-2%	-3%	-4%	-5%	-5%	-5%	

Table A- 14.4: Summary of thermal overloads for summer off-peak conditions – SDG&E Area

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Description	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-98	BOULEVRD - 69kV-CRESTWD 69kV ckt1	Base system (n-0)	7.0	A		35%	35%	51%	51%	60%	105%	Distribution equipment and substation modifications (also identified as Category A and B overload in on-peak)
SDGE-T-99	BOULEVRD - 69kV-CRESTWD 69kV ckt1	TL0625 BAR - DS - LV ck 1	7.0	B	L-1	37%	37%	54%	52%	61%	107%	Distribution equipment and substation modifications (also identified as Category A and B overload in on-peak)
SDGE-T-100	IMPRLVLY - 230kV-IMPRLVLY 500kV ckt2	IV BK 80 230/500	732.0	B	L-1	99%	116%	54%	23%	24%	111%	3rd bank is scheduled to be installed by LGIP project, Use congestion management as interim solution
SDGE-T-101	BERNARDO - 69kV-R.CARMEL 69kV ckt 1	Poway 69kV Bus	68.0	C	Bus	104%	106%	107%	107%	108%	113%	Use SPS or operating procedure to drop load
SDGE-T-102	BOULEVRD - 69kV-CRESTWD 69kV ckt 1	Loveland 69kV Bus	7.0	C	Bus	36%	37%	53%	51%	62%	108%	Upgrade line (also identified as Category A and B overload in on-peak)

ID	Overloaded Facility	Worst Contingency	Rating (MVA)	Category	Category Description	Loading (%)						ISO Proposed Mitigation
						2011	2012	2013	2014	2015	2020	
SDGE-T-103	IMPRLVLY - 230kV-IMPRLVLY 500kV ckt 2	IMPRLVLY 230 kV 11T CB	732.0	C	Stuck Breaker	136%	143%	58%	52%	51%	124%	Use SPS or operating procedure to drop load

Table A - 14.5: Summary of thermal overloads for Southern Orange County System – SDG&E Area

ID	Overloaded Facility	Contingency	Rating (MVA)	Category	Category Desc.	2020 Loading (%)	ISO Proposed Mitigation
"13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1	136.5	B	N-1	101.1%	SOCRUP - Alt3
"B_PI138E"	22841TA TAP 138 - 22396LAGNA NL 1381	PICO 138KV E	136.5	C	Bus Failure	101.1%	SOCRUP - Alt3
"B_TA13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TALEGA 138KV 13836	136.5	C	Bus Failure	101.1%	SOCRUP - Alt3
"CB_TA7T"	22112CAPSTRNO 138 - 22656PICO 1381	TA-TB 1 + TA-RMV 1 138 kV	204.0	C	Breaker Failure	121.4%	SOCRUP - Alt3
"CB_TA7T"	22112CAPSTRNO 138 - 22860TRABUCO 1381	TA-TB 1 + TA-RMV 1 138 kV	157.0	C	Breaker Failure	156.3%	SOCRUP - Alt3
"CB_TA7T"	22840TALEGA 138 - 22656PICO 1381	TA-TB 1 + TA-RMV 1 138 kV	204.0	C	Breaker Failure	146.1%	SOCRUP - Alt3
"CB_PI13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1	136.5	C	Breaker Failure	101.1%	SOCRUP - Alt3
"CB_TA8W"	22841TA TAP 138 - 22396LAGNA NL 1381	TA-PI 1 + TA BK 63 + TA BK 50	136.5	C	Breaker Failure	101.1%	SOCRUP - Alt3
"CB_TA7T"	22841TA TAP 138 - 22396LAGNA NL 1381	TA-TB 1 + TA-RMV 1 138 kV	136.5	C	Breaker Failure	113.8%	SOCRUP - Alt3
"CB_TA8T"	22841TA TAP 138 - 22396LAGNA NL 1381	TA-PI 1 138 + TA-SMO 1 138	136.5	C	Breaker Failure	101.0%	SOCRUP - Alt3
"CB_TA4W"	22844TALEGA 230 - 22840TALEGA 1381	TA BK 62 + TA BK 63	195.0	C	Breaker Failure	131.8%	SOCRUP - Alt3
"CB_TA5W"	22844TALEGA 230 - 22840TALEGA 1381	TA BK 62 + TA BK 63 + TA K 50	195.0	C	Breaker Failure	132.6%	SOCRUP - Alt3
"CB_TA4W"	22844TALEGA 230 - 22840TALEGA 1383	TA BK 62 + TA BK 63	192.0	C	Breaker Failure	129.3%	SOCRUP - Alt3
"CB_TA5W"	22844TALEGA 230 - 22840TALEGA 1383	TA BK 62 + TA BK 63 + TA K 50	192.0	C	Breaker Failure	130.1%	SOCRUP - Alt3
"13831W_TA"	22112CAPSTRNO 138 - 22656PICO 1381	TL13831 TALEGA-MARGARTA ck 1 _TAP	204.0	C	N-1-1	100.5%	SOCRUP - Alt3
"13831E_TA"	22112CAPSTRNO 138 - 22656PICO 1381	TL13831 TALEGA-MARGARTA ck 1 _TAP	204.0	C	N-1-1	107.4%	SOCRUP - Alt3

ID	Overloaded Facility	Contingency	Rating (MVA)	Category	Category Desc.	2020 Loading (%)	ISO Proposed Mitigation
"13816_TA"	22112CAPSTRNO 138 - 22860TRABUCO 1381	TL13816 CAPSTRNO - PICO ck 1 _TAP	157.0	C	N-1-1	101.2%	SOCRUP - Alt3
"13836_TA"	22112CAPSTRNO 138 - 22860TRABUCO 1381	TL13836 TALEGA-PICO ck 1 _TAP	157.0	C	N-1-1	134.1%	SOCRUP - Alt3
"13831W_TA"	22840TALEGA 138 - 22656PICO 1381	TL13831 TALEGA-MARGARTA ck 1 _TAP	204.0	C	N-1-1	125.1%	SOCRUP - Alt3
"13831E_TA"	22840TALEGA 138 - 22656PICO 1381	TL13831 TALEGA-MARGARTA ck 1 _TAP	204.0	C	N-1-1	132.0%	SOCRUP - Alt3
"13834_TA"	22840TALEGA 138 - 22656PICO 1381	TL13834 CAPSTRNO-TRABUCO ck 1 _TAP	204.0	C	N-1-1	101.2%	SOCRUP - Alt3
"CAP_TA_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TALEGA 230KV CAP _TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	101.6%	SOCRUP - Alt3
"CAP_CP_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	CAPISTRANO 138KV CAP _TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	103.2%	SOCRUP - Alt3
"230SO_VIE_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	SAN ONOFRE - VIEJO 230 _TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"230SO_SER_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	SAN ONOFRE - SERRANO 230 _TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"230SO_SAN1_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	SAN ONOFRE - SANTIAGO 230 _TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"230SO_SAN2_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	SAN ONOFRE - SANTIAGO 230 _TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"23007_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL23052 TALEGA - S.ONOFRE ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.0%	SOCRUP - Alt3
"23052_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL23052 TALEGA - S.ONOFRE ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.0%	SOCRUP - Alt3
"23030_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL23030 ESCNDIDO-TALEGA ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.2%	SOCRUP - Alt3

ID	Overloaded Facility	Contingency	Rating (MVA)	Category	Category Desc.	2020 Loading (%)	ISO Proposed Mitigation
"23002_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL23002 SANLUSRY-S.ONOFRE ck 2 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"23006_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL23006 SANLUSRY - SONGS ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.2%	SOCRUP - Alt3
"23010_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL23010 SANLUSRY - SONGS ck 3 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13812_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13812 TALEGA - SANMATEO ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	101.0%	SOCRUP - Alt3
"13816_13831W"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13816 CAPSTRNO - PICO ck 1 _TL13831 TALEGA- MARGARTA ck 1	136.5	C	N-1-1	124.6%	SOCRUP - Alt3
"13816_13831E"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13816 CAPSTRNO - PICO ck 1 _TL13831 TALEGA- MARGARTA ck 1	136.5	C	N-1-1	132.7%	SOCRUP - Alt3
"13816_13834"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13816 CAPSTRNO - PICO ck 1 _TL13834 CAPSTRNO- TRABUCO ck 1	136.5	C	N-1-1	116.5%	SOCRUP - Alt3
"13830_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13830 MARGARTA-TRABUCO ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	112.2%	SOCRUP - Alt3
"13831W_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13831 TALEGA-MARGARTA ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	144.1%	SOCRUP - Alt3
"13831E_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13831 TALEGA-MARGARTA ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	152.3%	SOCRUP - Alt3
"13834_13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13834 CAPSTRNO-TRABUCO ck 1 _TL13836 TALEGA- PICO ck 1	136.5	C	N-1-1	155.4%	SOCRUP - Alt3

ID	Overloaded Facility	Contingency	Rating (MVA)	Category	Category Desc.	2020 Loading (%)	ISO Proposed Mitigation
"13836"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_690"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TL0690 SA-OS-STU-LP	136.5	C	N-1-1	101.2%	SOCRUP - Alt3
"13836_692"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TL0692 HORNO-HORNO TP- JPM-LSPL ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_695"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TL0695 CRSTNTS-TALEGATP- JPM-TL ck 1	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_TA50"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TA BK 50 69/138	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_TA60"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TA BK 60 230/138	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_TA62"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TA BK 62 230/138	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_TA61"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TA BK 61 230/138	136.5	C	N-1-1	101.1%	SOCRUP - Alt3
"13836_TA63"	22841TA TAP 138 - 22396LAGNA NL 1381	TL13836 TALEGA-PICO ck 1 _TA BK 63 230/138	136.5	C	N-1-1	101.1%	SOCRUP - Alt3