

Study Area: PG&E North Valley

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
31459 OREGNTRL 115 31469 SPI_AND 115 1 1	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	82.9	87.9	91.3	<80	71.3	88.9	116.1	105.4	<80	87.8	Action plan or SPS (Cascade - Benton)
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	96.0	7.5	51.0	94.5	NConv	NConv	63.3	NConv	Cottonwood.. Benton....scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	93.8	90.5	93.7	6.7	54.6	91.4	NConv	NConv	26.1	NConv	Cottonwood.. Benton....scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	83.9	92.4	NConv	7.3	54.1	93.2	106.4	NConv	27.1	95.4	Cottonwood.. Benton....scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	96.0	7.5	51.0	94.5	NConv	NConv	63.3	NConv	Cottonwood.. Benton....scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	83.9	91.9	94.6	7.3	54.1	93.4	NConv	NConv	27.1	NConv	Cottonwood.. Benton....scope under review
31464 COTWDPGE 115 31466 JESSUPJ1 115 1 1	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	78.6	83.2	88.3	<80	90.1	84.2	114.4	101.6	<80	113.9	Cottonwood.. Benton....scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	79.6	83.3	NConv	14.6	72.9	84.9	100.8	NConv	31.9	119.3	Cottonwood.. Benton....scope under review
31466 JESSUPJ1 115 31469 SPI_AND 115 1 1	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	60.0	64.4	NConv	19.9	76.0	66.7	78.4	NConv	43.2	98.5	Cottonwood.. Benton....scope under review
31468 CASCADE 115 31459 OREGNTRL 115 1 1	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	71.0	75.4	78.9	<80	72.0	76.3	101.7	92.0	<80	75.2	Cottonwood.. Benton....scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	72.0	80.8	NConv	4.8	54.7	81.5	93.3	NConv	31.6	84.0	Cottonwood.. Benton....scope under review
31480 WYANDTTE 115 31516 WYANDJT2 115 1 1	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	86.9	157.8	154.9	22.8	19.6	159.9	163.4	159.7	65.1	157.8	The issue is due to severe low voltage at WYANDTTE
31480 WYANDTTE 115 31518 WYANDJT1 115 1 1	Base Case	P0	Normal	90.5	93.3	94.5	26.1	21.7	93.8	103.0	99.0	64.1	94.6	PV is 6 MW less in sensitivity case as compared to the base case. The issue is on a very short circuit in the long term and under sensitivity scenario - continue to monitor
31482 PALERMO 115 31516 WYANDJT2 115 2 1	P1-2:A3:53:_PALERMO-WYANDOTTE 115KV P1-2:A3:22:_CARIBOU-TABLE MTN 230KV	P6	N-1-1	85.0	86.8	104.4	<80	<80	87.4	96.3	93.6	75.2	104.5	Action plan or SPS
	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	225.6	NConv	NConv	42.7	6.5	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator (or drop Caribou generator...)

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	225.9	NConv	NConv	42.9	6.4	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	228.1	NConv	NConv	43.2	8.6	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31486 CARIBOU 115 31488 GRIZ JCT 115 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	187.1	NConv	NConv	19.7	14.9	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	187.3	NConv	NConv	19.8	15.0	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	59.8	134.3	130.4	5.0	5.7	135.4	137.2	136.2	59.8	130.3	The issue is due to severe low voltage at WYANDTTE
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	189.1	NConv	NConv	20.1	13.0	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31488 GRIZ JCT 115 31512 BIG BEND 115 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	212.2	NConv	NConv	41.1	7.2	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	212.4	NConv	NConv	41.2	7.1	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	81.6	151.7	147.8	22.9	18.1	152.8	154.2	153.4	60.8	147.8	The issue is due to severe low voltage at WYANDTTE
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	214.2	NConv	NConv	41.5	9.7	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31497 NDAME J 115 31498 SYCAMORE 115 1 1	P2-1:A3:50:_BUTTE-SYCAMORE CREEK 115KV (NORD 1-CHICOTP2)	P2-1	Line Section w/o fault	90.3	95.4	97.9	16.3	9.6	91.5	106.9	100.8	63.8	98.0	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-2:A3:43:_BUTTE 115KV SECTION MD	P2	Bus	91.0	95.4	98.0	16.9	9.2	91.5	107.0	100.9	63.5	98.1	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-3:A3:50:_BUTTE - MD 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	118.3	123.7	126.1	23.3	17.9	119.7	137.3	131.3	83.0	126.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-3:A3:54:_TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	81.7	87.9	90.9	15.7	11.2	85.7	100.0	93.8	57.9	90.3	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	P2-4:A3:11:_BUTTE 115KV - SECTION MD & ME	P2	Bus-tie breaker	91.0	98.0	100.9	16.9	9.2	93.7	110.5	103.7	64.5	101.0	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
31500 BUTTE 115 31501 CHICOTP1 115 1 1	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	106.3	113.5	120.5	<80	<80	110.6	131.8	121.7	74.9	120.6	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	106.3	113.6	120.5	21.8	17.6	110.6	131.8	121.7	74.9	120.6	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
31500 BUTTE 115 31504 TBLE MTN 115 2 1	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV	P6	N-1-1	120.5	130.2	136.4	<80	<80	127.3	150.3	139.9	86.0	136.5	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
31501 CHICOTP1 115 31504 TBLE MTN 115 1 1	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	123.3	131.0	137.8	<80	<80	128.2	150.3	140.4	87.3	138.0	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-2:A3:46:_TBLE MTN 115KV SECTION 2D	P2	Bus	92.1	96.5	100.0	20.5	18.5	95.0	109.3	103.1	65.1	100.1	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-3:A3:52:_TBLE MTN - 2D 115KV & PARADISE-TABLE MTN LINE	P2	Non-bus-tie breaker	92.1	96.6	100.1	20.4	18.5	95.1	109.4	103.2	65.2	100.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-3:A3:53:_TBLE MTN - 2D 115KV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN LINE	P2	Non-bus-tie breaker	92.7	97.6	101.2	20.5	18.5	96.0	110.2	104.4	65.6	101.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	123.3	131.0	137.8	26.4	23.3	128.3	150.3	140.4	87.3	137.9	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
31503 CHICOTP2 115 31500 BUTTE 115 1 1	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV	P6	N-1-1	83.8	90.6	92.8	<80	<80	87.8	102.8	97.3	<80	92.9	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
31504 TBLE MTN 115 31497 NDAME J 115 1 1	P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	90.0	96.2	101.5	<80	<80	94.1	110.8	103.2	<80	100.8	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-2:A3:47:_TBLE MTN 115KV SECTION 1D	P2	Bus	89.9	96.4	101.2	19.0	16.4	94.8	110.9	103.0	63.8	101.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-3:A3:54:_TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	89.9	96.6	101.3	18.9	16.6	95.0	111.0	103.1	63.9	100.7	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
31514 PARADSE 115 31494 BIGBENTP 115 1 1	P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	90.6	96.0	100.1	<80	<80	94.6	109.1	102.6	<80	99.5	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-2:A3:47:_TBLE MTN 115KV SECTION 1D	P2	Bus	90.7	96.5	100.1	20.0	17.7	95.6	109.4	102.7	64.5	100.1	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
	P2-3:A3:54:_TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	90.5	96.4	100.0	19.8	17.7	95.5	109.3	102.5	64.5	99.3	Project: Table Mountain - Sycamore 115 kV Line - Scope under review, SPS could potentially address the issue
31516 WYANDJT2 115 31512 BIG BEND 115 2 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	226.0	NConv	NConv	43.1	6.6	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	226.3	NConv	NConv	43.2	6.5	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	86.9	162.0	157.9	23.2	19.6	163.2	164.6	163.8	65.1	157.9	The issue is due to severe low voltage at WYANDTTE
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	228.3	NConv	NConv	43.6	9.0	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewabl e & Min Gas Gen	2027 Retireme nt of QF Generatio ns	
31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1 1	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV P1-3:A3:42:_CASCADE 115/60KV TB 1	P6	N-1-1	98.7	142.7	102.2	<80	<80	159.5	122.1	164.6	81.5	122.0	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	22.5	26.8	34.2	148.8	96.2	11.1	37.4	82.4	63.7	143.7	Projects: Cottonwood-Redbluff and Cascade-Benton will address the issue. A reduced scope and/or an SPS could be another potential mitigation.
31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1 1	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV P1-3:A3:42:_CASCADE 115/60KV TB 1	P6	N-1-1	97.6	138.7	99.7	<80	<80	157.3	119.3	161.1	80.2	119.6	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	21.8	25.2	32.4	146.6	94.1	11.0	39.3	84.3	62.3	141.3	Cottonwood.. Benton... Scope
31566 KESWICK 60.0 31582 STILLWATR 60.0 1 1	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV P1-3:A3:42:_CASCADE 115/60KV TB 1	P6	N-1-1	101.8	142.4	101.4	<80	<80	164.0	122.0	163.2	84.3	123.0	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	18.6	20.1	27.9	165.0	106.1	12.4	52.7	105.6	65.7	153.5	Cottonwood.. Benton... Scope
31570 BENTON 60.0 31572 GIRVAN 60.0 1 1	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	73.1	76.5	84.3	<80	<80	74.9	106.6	89.9	<80	85.1	Cottonwood.. Benton... Scope
	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	74.3	81.1	91.9	19.8	11.3	79.2	101.0	86.7	52.3	93.8	Cottonwood.. Benton... Scope
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	56.6	69.8	NConv	15.9	7.5	68.3	90.3	NConv	38.1	83.2	Cottonwood.. Benton... Scope
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	4.0	6.0	7.6	103.7	91.2	11.8	26.3	15.3	39.6	31.6	Cottonwood.. Benton... Scope
31574 ANDERSON 60.0 31604 COTTONWD 60.0 1 1	P1-2:A3:63:_COTTONWOOD-BENTON #2 60KV P1-3:A3:42:_CASCADE 115/60KV TB 1	P6	N-1-1	102.1	111.2	116.0	<80	<80	112.6	129.7	121.2	73.6	104.8	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	30.8	37.8	42.9	17.2	36.8	40.4	64.5	66.9	37.0	125.4	Cottonwood.. Benton... Scope
31576 WNTU PMS 60.0 31570 BENTON 60.0 1 1	P1-3:A3:3:_COTWD_E2 230/115KV TB 1 P1-3:A3:6:_COTWD_F2 230/115KV TB 4	P6	N-1-1	<80	<80	<80	207.0	189.7	<80	<80	<80	68.9	<80	Cottonwood.. Benton... Scope
	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	74.4	81.1	91.9	20.0	11.2	79.2	101.0	86.6	52.2	93.8	Cottonwood.. Benton... Scope
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	111.2	20.6	10.9	94.5	NConv	NConv	59.2	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	75.1	95.4	110.2	20.6	11.0	92.8	NConv	NConv	52.2	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	74.3	94.2	NConv	20.5	11.0	91.9	122.9	NConv	51.9	113.8	Cottonwood.. Benton... Scope
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	111.2	20.6	10.9	94.5	NConv	NConv	59.2	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	74.3	94.0	108.4	20.5	11.0	92.0	NConv	NConv	51.9	NConv	Cottonwood.. Benton... Scope
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	36.4	35.3	30.1	204.5	189.6	55.2	15.6	12.8	65.6	45.2	Cottonwood.. Benton... Scope

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	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	46.2	56.4	57.3	65.1	87.9	46.0	16.2	22.6	17.8	145.1	Cottonwood.. Benton... Scope
31580 CASCADE 60.0 31581 OREGNTRL 60.0 1 1	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	173.9	188.3	203.6	99.9	76.5	187.6	267.3	227.1	<80	201.3	Cottonwood.. Benton... Scope
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	229.8	19.2	8.6	218.5	NConv	NConv	146.9	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	209.0	209.6	220.8	28.7	14.6	207.7	NConv	NConv	88.1	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	177.1	208.7	NConv	28.5	12.6	208.5	250.5	NConv	73.8	227.6	Cottonwood.. Benton... Scope
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	229.8	19.2	8.6	218.5	NConv	NConv	146.9	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	177.1	209.9	220.3	28.4	12.6	211.8	NConv	NConv	73.8	NConv	Cottonwood.. Benton... Scope
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	22.2	17.2	10.6	261.4	245.9	42.9	49.6	20.8	88.5	74.8	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	88.4	98.8	99.6	75.7	107.9	86.2	44.2	8.0	16.0	165.9	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	13.7	6.0	3.6	137.8	90.2	27.1	65.0	111.2	44.6	116.1	Cottonwood.. Benton... Scope
31580 CASCADE 60.0 31582 STILLWATR 60.0 1 1	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	13.7	6.0	3.6	137.8	90.2	27.1	65.0	111.2	44.6	116.1	Cottonwood.. Benton... Scope
31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1 1	P1-3:A3:3:_COTWD_E2 230/115KV TB 1 P1-3:A3:6:_COTWD_F2 230/115KV TB 4	P6	N-1-1	31.9	27.7	21.0	261.4	234.4	87.9	<80	<80	87.0	<80	Cottonwood.. Benton... Scope
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	216.9	22.6	8.9	205.0	NConv	NConv	138.9	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	197.7	194.1	211.8	32.1	13.8	194.3	NConv	NConv	81.3	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	165.9	198.9	NConv	31.9	11.9	198.6	235.2	NConv	67.3	214.2	Cottonwood.. Benton... Scope
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	216.9	22.6	8.9	205.0	NConv	NConv	138.9	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	165.9	195.5	210.9	31.8	11.9	196.7	NConv	NConv	67.3	NConv	Cottonwood.. Benton... Scope
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	32.5	28.3	21.9	257.9	246.8	54.1	37.6	9.1	83.2	67.3	Cottonwood.. Benton... Scope
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	77.2	88.6	89.5	72.1	108.8	75.5	32.6	5.6	13.1	176.1	Cottonwood.. Benton... Scope
31592 DESCHUTS 60.0 31594 VOLTA 60.0 1 1	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	107.9	51.2	5.5	108.6	NConv	NConv	78.0	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	80.3	98.0	109.2	60.4	20.2	99.4	NConv	NConv	7.1	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	52.4	88.6	NConv	59.8	17.8	91.3	105.5	NConv	9.9	91.5	Cottonwood.. Benton... Scope
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	107.9	51.2	5.5	108.6	NConv	NConv	78.0	NConv	Cottonwood.. Benton... Scope

Study Area: PG&E North Valley

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewabl e & Min Gas Gen	2027 Retireme nt of QF Generatio ns	
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	52.4	86.3	93.1	59.7	17.8	87.1	NConv	NConv	10.0	NConv	Cottonwood.. Benton... Scope
31594 VOLTA 60.0 31596 SOUTH 60.0 1 1	P1-2:A3:73:_COTTONWD-RED BLFF 60KV P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV	P6	N-1-1	<80	146.8	147.6	<80	<80	149.6	150.9	151.2	<80	142.1	Cottonwood.. Benton... Scope
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	157.0	45.3	13.0	159.3	NConv	NConv	125.8	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	108.4	143.6	153.9	56.6	26.1	145.4	NConv	NConv	29.8	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	75.1	136.1	NConv	55.6	21.3	138.6	154.3	NConv	8.8	135.5	Cottonwood.. Benton... Scope
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	157.0	45.3	13.0	159.3	NConv	NConv	125.8	NConv	Cottonwood.. Benton... Scope
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	75.1	133.1	138.7	55.5	21.2	134.3	NConv	NConv	8.7	NConv	Cottonwood.. Benton... Scope
31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1 1	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS	P3	G-1/N-1	119.4	122.6	124.5	<80	123.4	141.8	132.7	<80	123.7	<80	Cottonwood.. scope under review
	P1-2:A3:73:_COTTONWD-RED BLFF 60KV P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P6	N-1-1	119.3	NConv	222.8	<80	<80	224.0	228.9	NConv	<80	220.1	Cottonwood.. scope under review
	P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P1	N-1	119.4	121.9	124.5	33.5	10.8	122.8	140.8	132.1	74.7	124.7	Short term: Action plan Long term: Cottonwood-Red Bluff No. 2 60 kV Line Project and Red Bluff Area 230 kV Substation Project Project is on hold and scope is under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	175.0	39.9	26.2	179.5	NConv	NConv	185.3	NConv	Cottonwood.. scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	158.7	196.4	185.9	39.3	25.9	198.5	NConv	NConv	114.6	NConv	Cottonwood.. scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	120.2	183.9	NConv	32.3	10.9	185.5	169.7	NConv	77.6	171.2	Cottonwood.. scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	175.0	39.9	26.2	179.5	NConv	NConv	185.3	NConv	Cottonwood.. scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	120.3	187.7	179.1	32.5	10.8	186.8	NConv	NConv	77.5	NConv	Cottonwood.. scope under review
	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	119.6	121.7	124.3	33.5	10.8	122.6	140.6	131.8	74.3	124.4	Cottonwood.. scope under review

Study Area: PG&E North Valley

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
31604 COTTONWD 60.0 31607 RED B JT 60.0 1 1	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV (COLEMAN-CLMN JCT)	P2-1	Line Section w/o fault	119.1	118.4	121.0	33.8	10.7	119.1	135.8	127.7	72.7	121.2	Short term: Action plan Long term: Cottonwood-Red Bluff No. 2 60 kV Line Project and Red Bluff Area 230 kV Substation Project Project is on hold and scope is under review
	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	119.2	118.3	121.0	33.9	10.7	119.0	135.8	127.6	73.0	121.2	Cottonwood.. scope under review
	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	119.1	118.3	121.0	33.8	10.7	118.9	135.8	127.5	73.0	121.2	Cottonwood.. scope under review
31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1 1	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.	P3	G-1/N-1	<80	<80	<80	<80	<80	104.7	98.1	<80	<80	<80	Cottonwood.. scope under review
	P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV	P6	N-1-1	<80	<80	160.4	<80	<80	162.2	164.6	NConv	<80	157.4	Cottonwood.. scope under review
	P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P1	N-1	85.9	90.2	92.3	23.4	8.6	90.7	102.7	97.6	56.3	92.5	Cottonwood.. scope under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	134.1	29.8	24.0	136.8	NConv	NConv	147.0	NConv	Cottonwood.. scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	124.2	150.0	140.3	29.3	23.8	151.9	NConv	NConv	93.3	NConv	Cottonwood.. scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	86.5	133.1	NConv	22.5	8.7	133.1	121.6	NConv	58.2	124.7	Cottonwood.. scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	134.1	29.8	24.0	136.8	NConv	NConv	147.0	NConv	Cottonwood.. scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	86.6	134.7	128.2	22.7	8.5	135.0	NConv	NConv	58.1	NConv	Cottonwood.. scope under review
	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	86.0	90.0	92.2	23.4	8.6	90.6	103.6	97.4	56.1	92.3	Cottonwood.. scope under review
31607 RED B JT 60.0 31608 RED BLFF 60.0 1 1	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV (COLEMAN-CLMN JCT)	P2-1	Line Section w/o fault	118.7	118.3	121.0	33.2	10.7	119.1	134.9	127.7	72.0	121.2	Cottonwood.. scope under review
	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	118.8	118.4	121.0	33.2	10.7	119.0	135.7	127.6	73.0	121.2	Cottonwood.. scope under review
	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	118.7	118.3	121.0	33.2	10.7	118.9	135.6	127.5	73.0	121.2	Cottonwood.. scope under review
31626 CORNING 60.0 31729 CORNSWCH 60.0 4 1	Base Case	P0	Normal	88.3	89.1	97.2	26.7	23.1	86.6	103.6	93.6	62.5	97.1	The issue is in the long term and under sensitivity scenario - continue to monitor
31677 GRS F JT 60.0 31689 ELIZ TWN 60.0 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	97.2	NConv	NConv	8.9	8.4	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	97.9	NConv	NConv	8.8	8.5	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	96.3	NConv	NConv	8.3	5.7	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator

Study Area: PG&E North Valley

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
31683 EST Q1 60.0 31688 SPIQUINCYJCT 60.0 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	92.5	NConv	NConv	7.1	7.2	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	93.2	NConv	NConv	6.9	7.3	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	91.6	NConv	NConv	6.5	4.6	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31683 EST Q1 60.0 31689 ELIZ TWN 60.0 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	97.2	NConv	NConv	8.8	8.3	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	97.8	NConv	NConv	8.7	8.4	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	96.3	NConv	NConv	8.2	5.5	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31688 SPIQUINCYJCT 60.0 38056 PLMS-SRA 60.0 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	116.6	NConv	NConv	28.7	25.9	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	117.4	NConv	NConv	28.5	26.0	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	115.4	NConv	NConv	28.0	23.3	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31690 CARIBOU 60.0 31677 GRS F JT 60.0 1 1	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	113.9	NConv	NConv	10.6	10.0	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	114.7	NConv	NConv	10.4	10.1	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	112.9	NConv	NConv	9.9	6.8	NConv	NConv	NConv	NConv	NConv	Existing Caribou RAS should trip the generator
31722 GLENN 60.0 31729 CORNSWCH 60.0 4 1	Base Case	P0	Normal	88.3	89.1	97.2	26.7	22.9	86.6	103.6	93.6	62.5	97.1	The issue is in the long term and under sensitivity scenario - continue to monitor

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
ANDERSON 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.00	0.91	0.89	1.06	1.02	0.92	0.88	0.90	0.96	0.87	Cottonwood...Benton... Scope under review
ANDERSON 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.76	0.74	1.06	1.02	0.77	0.74	0.80	0.84	0.74	Cottonwood...Benton... Scope under review
ANDERSON 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.00	0.77	0.74	1.06	1.02	0.78	0.46	0.66	0.95	0.48	Cottonwood...Benton... Scope under review
ANDERSON 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.01	0.78	0.76	1.06	1.02	0.79	0.72	0.75	0.96	0.72	Cottonwood...Benton... Scope under review
ANDERSON 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.76	0.74	1.06	1.02	0.77	0.74	0.80	0.84	0.74	Cottonwood...Benton... Scope under review
ANDERSON 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.78	0.75	1.06	1.02	0.79	0.73	0.74	0.96	0.69	Cottonwood...Benton... Scope under review
ANDERSON 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1		0.91	0.89			0.93	0.85	0.88	0.97	0.89	Cottonwood...Benton... Scope under review
ANITA 60	Base Case	P0	Normal	1.01	1.00	1.00	1.03	1.05	1.01	1.00	1.01	1.02	1.00	Load power factor correction and voltage support if needed
ANTLER 60	P1-3:A3:42:_CASCADE 115/60KV TB 1	P1	N-1	0.96	0.94	0.94	1.01	1.00	0.94	0.94	0.94	0.96	0.93	Cottonwood...Benton... Scope under review
ANTLER 60	P2-2:A3:37:_CASCADE 115KV SECTION 1D	P2	Bus	0.96	0.94	0.94	1.01	1.00	0.94	0.94	0.94	0.96	0.93	Cottonwood...Benton... Scope under review
ANTLER 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.00	0.96	0.95	1.05	1.02	0.96	0.95	0.95	0.98	0.93	Cottonwood...Benton... Scope under review
ANTLER 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Cottonwood...Benton... Scope under review
ANTLER 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.86	0.85	1.05	1.02	0.87	0.69	0.80	0.97	0.69	Cottonwood...Benton... Scope under review
ANTLER 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.87	0.84	0.85	0.98	0.83	Cottonwood...Benton... Scope under review
ANTLER 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Cottonwood...Benton... Scope under review
ANTLER 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.88	0.85	0.85	0.98	0.81	Cottonwood...Benton... Scope under review
ANTLER 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.01	1.00	1.00	1.00	1.01	0.99	0.99	0.99	0.99	0.77	Cottonwood...Benton... Scope under review
ANTLER 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.63	0.35	0.53	0.93	0.86	0.33	0.35	0.33	0.69	0.54	Cottonwood...Benton... Scope under review
APT ORVC 60	Base Case	P0	Normal	1.03	1.01	1.01	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
APT ORVC 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	0.99	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
APT ORVC 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
APT ORVC 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
APT ORVC 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.12	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
APT ORVC 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.03	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.00	0.99	Load power factor correction and voltage support if needed
APT ORVC 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P3	G-1/N-1				1.11							Load power factor correction and voltage support if needed
APT ORVC 60	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690] P1-3:A3:35:_PALERMO 230/115KV TB 2	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
BCKS CRK 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	Load power factor correction and voltage support if needed
BELDEN 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
BENTON 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.02	0.94	0.93	1.06	1.03	0.95	0.92	0.94	0.98	0.91	Cottonwood...Benton... Scope under review
BENTON 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.78	0.77	1.06	1.03	0.79	0.77	0.83	0.86	0.77	Cottonwood...Benton... Scope under review
BENTON 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.80	0.77	1.06	1.03	0.80	0.50	0.69	0.97	0.53	Cottonwood...Benton... Scope under review
BENTON 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.02	0.80	0.78	1.06	1.03	0.81	0.75	0.77	0.97	0.75	Cottonwood...Benton... Scope under review
BENTON 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.78	0.77	1.06	1.03	0.79	0.77	0.83	0.86	0.77	Cottonwood...Benton... Scope under review
BENTON 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.80	0.78	1.06	1.03	0.81	0.76	0.77	0.97	0.72	Cottonwood...Benton... Scope under review
BENTON 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.03	1.04	1.03	1.02	1.02	1.02	0.93	Cottonwood...Benton... Scope under review
BENTON 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD E 230/60KV TB 3	P6	N-1/N-1		0.93	0.91			0.94	0.87	0.90		0.90	Cottonwood...Benton... Scope under review
BIG BAR 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.08	1.07	1.08	1.02	1.09	1.05	1.03	1.01	1.09	0.95	Cottonwood...Benton... Scope under review
BIG BEND 115	Base Case	P0	Normal	1.04	1.02	1.02	1.07	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
BIG BEND 115	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	0.76	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BIG BEND 115	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.76	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BIG BEND 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	0.97	0.70	0.68	1.06	1.03	0.70	0.69	0.70	0.95	0.68	Existing Caribou RAS should trip the generator
BIG BEND 115	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.75	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BIG BEND 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1				1.12							Load power factor correction and voltage support if needed
BIG BEND 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
BIG MDWS 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BIG MDWS 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.95	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BIG MDWS 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.95	0.90	1.04	1.02	0.95	0.94	0.94	1.01	0.90	Substation upgrade or voltage support if needed
BIG MDWS 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.95	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BIGGSJCT 60	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.01	0.99	0.99	1.02	1.00	0.99	0.99	0.99	0.84	0.99	Sensitivity only
BTTE CRK 60	Base Case	P0	Normal	1.04	1.02	1.03	1.05	1.05	1.03	1.02	1.02	1.03	1.03	Load power factor correction and voltage support if needed
BURNEY 60	Base Case	P0	Normal	1.01	1.04	1.04	1.07	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
BURNEY 60	P1-1:A3:67:_HAT CRK1 6.60KV GEN UNIT 1 P1-3:A3:11:_PIT 1 230/11KV TB 1	P3	G-1/N-1					1.11						Load power factor correction and voltage support if needed
BURNEY 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:62:_HT CRKRG 60/60KV TB 1	P6	N-1/N-1					1.11						Load power factor correction and voltage support if needed
BURNEYQF 60	Base Case	P0	Normal	1.01	1.04	1.04	1.07	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
BURNEYQF 60	P1-1:A3:67:_HAT CRK1 6.60KV GEN UNIT 1 P1-3:A3:11:_PIT 1 230/11KV TB 1	P3	G-1/N-1					1.11						Load power factor correction and voltage support if needed
BURNEYQF 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-2:A3:76:_HAT CREEK #1-PIT #1 60KV [7020]	P6	N-1/N-1					1.11						Load power factor correction and voltage support if needed
BURNYJCT 60	Base Case	P0	Normal	1.01	1.04	1.04	1.07	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
BURNYJCT 60	P1-1:A3:67:_HAT CRK1 6.60KV GEN UNIT 1 P1-3:A3:11:_PIT 1 230/11KV TB 1	P3	G-1/N-1					1.11						Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BURNYJCT 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-2:A3:76:_HAT CREEK #1-PIT #1 60KV [7020]	P6	N-1/N-1					1.11						Load power factor correction and voltage support if needed
BUTTVLLY 115	Base Case	P0	Normal	1.04	1.03	1.03	1.06	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
BUTTVLLY 115	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	0.96	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BUTTVLLY 115	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.96	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BUTTVLLY 115	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.96	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
BUTTVLLY 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1				1.12							Load power factor correction and voltage support if needed
BUTTVLLY 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
CANAL TP 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
CAPAY 60	Base Case	P0	Normal	1.04	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed
CAPAYJCT 60	Base Case	P0	Normal	1.04	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed
CAPYSWCH 60	Base Case	P0	Normal	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
CARBOU M 230	Base Case	P0	Normal	1.04	1.03	1.03	1.06	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
CARBOU M 230	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARBOU M 230	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.94	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARBOU M 230	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.94	0.91	1.06	1.04	0.94	0.93	0.93	1.01	0.91	Existing Caribou RAS should trip the generator
CARBOU M 230	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.94	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 115	Base Case	P0	Normal	1.04	1.03	1.03	1.06	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
CARIBOU 115	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 115	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.95	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 115	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.95	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
CARIBOU 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1				1.12							Load power factor correction and voltage support if needed
CARIBOU 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT D 230KV SECTION 1D	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
CARIBOU 230	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.98	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 230	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.98	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.94	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.93	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CARIBOU 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.02	0.94	0.90	1.04	1.02	0.94	0.93	0.93	1.01	0.90	Existing Caribou RAS should trip the generator
CARIBOU 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.93	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CASCADE 115	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.03	1.02	1.02	Load power factor correction and voltage support if needed
CASCADE 115	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	1.00	0.94	0.93	1.07	1.04	0.94	0.95	0.97	0.96	0.94	Cottonwood...Benton... Scope under review
CASCADE 115	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.94	0.93	1.07	1.04	0.95	0.84	0.90	1.01	0.83	Cottonwood...Benton... Scope under review
CASCADE 115	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.94	0.94	1.07	1.04	0.95	0.93	0.94	1.01	0.91	Cottonwood...Benton... Scope under review
CASCADE 115	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	1.00	0.94	0.93	1.07	1.04	0.94	0.95	0.97	0.96	0.94	Cottonwood...Benton... Scope under review
CASCADE 115	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.94	0.94	1.07	1.04	0.95	0.93	0.93	1.01	0.90	Cottonwood...Benton... Scope under review
CASCADE 115	P2-4:A3:8:_COTWDPG 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.79	Cottonwood...Benton... Scope under review
CASCADE 60	Base Case	P0	Normal	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
CASCADE 60	P1-3:A3:42:_CASCADE 115/60KV TB 1	P1	N-1	0.99	0.97	0.96	1.02	1.01	0.97	0.96	0.97	0.98	0.95	Cottonwood...Benton... Scope under review
CASCADE 60	P2-2:A3:37:_CASCADE 115KV SECTION 1D	P2	Bus	0.99	0.97	0.96	1.02	1.01	0.97	0.96	0.97	0.98	0.95	Cottonwood...Benton... Scope under review
CASCADE 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.03	0.98	0.98	1.06	1.04	0.99	0.97	0.98	1.00	0.96	Cottonwood...Benton... Scope under review
CASCADE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.96	0.89	0.88	1.06	1.03	0.89	0.89	0.92	0.92	0.88	Cottonwood...Benton... Scope under review
CASCADE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.89	0.88	1.06	1.03	0.90	0.73	0.83	0.99	0.73	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CASCADE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.89	0.89	1.06	1.03	0.90	0.87	0.88	1.00	0.86	Cottonwood...Benton... Scope under review
CASCADE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.96	0.89	0.88	1.06	1.03	0.89	0.89	0.92	0.92	0.88	Cottonwood...Benton... Scope under review
CASCADE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.90	0.88	1.06	1.03	0.90	0.88	0.88	1.00	0.84	Cottonwood...Benton... Scope under review
CASCADE 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.01	1.02	1.02	1.01	1.01	1.01	0.80	Cottonwood...Benton... Scope under review
CASCADE 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCAD	P6	N-1/N-1	0.67	0.40	0.58	0.94	0.88	0.39	0.41	0.38	0.72	0.58	Cottonwood...Benton... Scope under review
CEDR CRK 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.03	1.04	1.05	1.02	Load power factor correction and voltage support if needed
CEDR CRK 60	P2-2:A3:36:_CASCADE 115KV SECTION MA	P2	Bus	1.04	1.01	1.01	1.07	1.05	1.02	1.01	1.01	1.04	0.99	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.04	0.99	0.98	1.09	1.05	0.99	0.97	0.98	1.04	0.95	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.80	0.78	1.08	1.04	0.80	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-3:A3:38:_CASCADE - MA 115KV & CASCADE-COTTONWOOD L	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.07	1.05	1.02	1.01	1.01	1.04	1.00	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-3:A3:61:_CASCADE - MA 60KV & CASCADE-BENTON-DESCHUT	P2	Non-bus-tie breaker	1.04	1.01	1.00	1.09	1.05	1.01	0.99	1.00	1.04	0.99	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.04	0.81	0.78	1.09	1.04	0.82	0.51	0.68	1.01	0.51	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.09	1.04	0.82	0.77	0.78	1.04	0.76	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.80	0.78	1.08	1.04	0.80	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.82	0.80	1.09	1.04	0.83	0.79	0.78	1.04	0.72	Cottonwood...Benton... Scope under review
CEDR CRK 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.04	1.06	1.05	1.04	1.03	1.03	1.04	0.88	Cottonwood...Benton... Scope under review
CEDR CRK 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	P6				1.13							Load power factor correction and voltage support if needed
CHALLNGE 60	Base Case	P0	Normal	1.05	1.02	1.02	1.08	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
CHALLNGE 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.02	1.02	1.10	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
CHALLNGE 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.02	1.02	1.10	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
CHESTER 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.97	0.00	0.00	1.04	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CHESTER 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.97	0.00	0.00	1.04	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CHESTER 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.97	0.87	1.04	1.03	0.97	0.96	0.96	1.02	0.87	Load power factor correction and voltage support if needed
CHESTER 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.97	0.00	0.00	1.04	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
CHICO JT 60	Base Case	P0	Normal	1.02	1.02	1.02	1.04	1.05	1.03	1.02	1.03	1.04	1.02	Load power factor correction and voltage support if needed
CLMN FSH 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.54	0.43	Cottonwood...Benton... Scope under review
CLMN FSH 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.47	0.46	1.08	1.02	0.46	0.41	0.41	0.98	0.44	Cottonwood...Benton... Scope under review
CLMN FSH 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.54	0.43	Cottonwood...Benton... Scope under review
CLMN FSH 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.48	0.45	1.08	1.03	0.48	0.43	0.40	0.98	0.37	Cottonwood...Benton... Scope under review
CLMN FSH 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.93	0.91			0.94	0.86	0.90		0.90	Cottonwood...Benton... Scope under review
CLMN JCT 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.02	0.94	0.93	1.04	1.03	0.94	0.92	0.93	0.98	0.93	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLM	P2-1	Line Section w/o fault	1.02	0.93	0.92	1.04	1.03	0.93	0.91	0.92	0.97	0.92	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.02	0.93	0.92	1.04	1.03	0.93	0.91	0.92	0.97	0.92	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.27	0.27	0.26	1.05	0.99	0.27	0.23	0.26	0.39	0.28	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.02	0.93	0.92	1.04	1.03	0.93	0.91	0.92	0.97	0.92	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.93	0.30	0.27	1.07	1.00	0.30	0.00	0.15	0.86	0.11	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.01	0.32	0.32	1.09	1.02	0.31	0.27	0.29	0.93	0.30	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.27	0.27	0.26	1.05	0.99	0.27	0.23	0.26	0.39	0.28	Cottonwood...Benton... Scope under review
CLMN JCT 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.33	0.30	1.09	1.02	0.33	0.26	0.28	0.93	0.26	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CLMN JCT 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COTTONWD-RED BLFF 60KV [0]	P6	N-1/N-1		0.38	0.38			0.38	0.36	0.37		0.39	Cottonwood...Benton... Scope under review
CLMN TAP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.54	0.43	Cottonwood...Benton... Scope under review
CLMN TAP 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.47	0.46	1.08	1.03	0.46	0.41	0.41	0.98	0.44	Cottonwood...Benton... Scope under review
CLMN TAP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.54	0.43	Cottonwood...Benton... Scope under review
CLMN TAP 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.48	0.45	1.09	1.03	0.48	0.43	0.40	0.98	0.37	Cottonwood...Benton... Scope under review
CLMN TAP 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E2 230/60KV TB 2	P6	N-1/N-1		0.93	0.91			0.95	0.86	0.90		0.90	Cottonwood...Benton... Scope under review
CLOV TAP 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.04	1.04	1.05	1.02	Load power factor correction and voltage support if needed
CLOV TAP 60	P2-2:A3:36:_CASCADE 115KV SECTION MA	P2	Bus	1.04	1.02	1.01	1.07	1.05	1.02	1.01	1.02	1.04	1.00	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.04	0.99	0.98	1.09	1.05	1.00	0.97	0.99	1.04	0.96	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.80	0.78	1.09	1.05	0.80	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-3:A3:38:_CASCADE - MA 115KV & CASCADE-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.07	1.05	1.02	1.01	1.02	1.04	1.00	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-3:A3:61:_CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES 60KV [6310]	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.09	1.06	1.01	1.00	1.00	1.04	0.99	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.04	0.81	0.79	1.09	1.04	0.82	0.51	0.69	1.01	0.52	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.05	0.82	0.81	1.09	1.04	0.83	0.77	0.79	1.04	0.76	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.80	0.78	1.09	1.05	0.80	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.05	0.82	0.80	1.09	1.04	0.83	0.79	0.78	1.04	0.72	Cottonwood...Benton... Scope under review
CLOV TAP 60	P2-4:A3:8:_COTWDPG 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.04	1.06	1.05	1.04	1.03	1.03	1.04	0.89	Cottonwood...Benton... Scope under review
CLOV TAP 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1/N-1				1.13							Load power factor correction and voltage support if needed
COLEMAN 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.55	0.43	Cottonwood...Benton... Scope under review
COLEMAN 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.47	0.43	1.08	1.02	0.47	0.08	0.25	0.94	0.19	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
COLEMAN 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.47	0.46	1.08	1.03	0.47	0.41	0.41	0.98	0.44	Cottonwood...Benton... Scope under review
COLEMAN 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.55	0.43	Cottonwood...Benton... Scope under review
COLEMAN 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.48	0.45	1.09	1.03	0.48	0.43	0.40	0.98	0.37	Cottonwood...Benton... Scope under review
COLEMAN 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COTTONWD-RED BLFF 60KV [0]	P6	N-1/N-1		0.56	0.56			0.56	0.54	0.55		0.57	Cottonwood...Benton... Scope under review
CORNSWCH 60	Base Case	P0	Normal	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
COTTONWD 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.77	0.75	1.06	1.03	0.78	0.75	0.81	0.85	0.75	Cottonwood...Benton... Scope under review
COTTONWD 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.78	0.75	1.06	1.02	0.79	0.47	0.67	0.96	0.50	Cottonwood...Benton... Scope under review
COTTONWD 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.02	0.78	0.77	1.06	1.02	0.80	0.73	0.76	0.96	0.73	Cottonwood...Benton... Scope under review
COTTONWD 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.77	0.75	1.06	1.03	0.78	0.75	0.81	0.85	0.75	Cottonwood...Benton... Scope under review
COTTONWD 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.79	0.76	1.06	1.02	0.80	0.74	0.75	0.96	0.70	Cottonwood...Benton... Scope under review
COTTONWD 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E2 230/60KV TB 2	P6	N-1/N-1		0.92	0.90			0.94	0.85	0.89	0.98	0.89	Cottonwood...Benton... Scope under review
COTWD_E2 230	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.00	0.97	0.97	0.99	0.99	0.97	0.97	0.97	0.98	0.92	Cottonwood...Benton... Scope under review
COTWDPGE 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.04	1.04	1.02	1.03	Load power factor correction and voltage support if needed
COTWDPGE 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.05	1.02	1.01	1.03	1.03	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
COWCK TP 60	Base Case	P0	Normal	1.05	1.03	1.03	1.07	1.05	1.04	1.03	1.04	1.04	1.02	Load power factor correction and voltage support if needed
COWCK TP 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.04	0.98	0.97	1.08	1.05	0.99	0.97	0.98	1.02	0.95	Cottonwood...Benton... Scope under review
COWCK TP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.79	0.77	1.08	1.04	0.79	0.78	0.82	0.87	0.77	Cottonwood...Benton... Scope under review
COWCK TP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.80	0.78	1.08	1.04	0.81	0.50	0.68	1.00	0.51	Cottonwood...Benton... Scope under review
COWCK TP 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.08	1.04	0.82	0.76	0.78	1.02	0.76	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
COWCK TP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.79	0.77	1.08	1.04	0.79	0.78	0.82	0.87	0.77	Cottonwood...Benton... Scope under review
COWCK TP 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.81	0.79	1.08	1.04	0.82	0.78	0.77	1.02	0.72	Cottonwood...Benton... Scope under review
COWCK TP 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.03	1.05	1.05	1.04	1.03	1.03	1.04	0.88	Cottonwood...Benton... Scope under review
COWCK TP 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	P6				1.12							Load power factor correction and voltage support if needed
CR CANAL 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
CR CANAL 60	P2-1:A3:98:_COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JN	P2-1	Line Section w/o fault	1.02	0.92	0.91	1.01	0.99	0.97	0.91	0.92	0.95	0.91	Cottonwood...Benton... Scope under review
CRESTA 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	Load power factor correction and voltage support if needed
DE SABLA 60	Base Case	P0	Normal	1.04	1.02	1.03	1.05	1.05	1.03	1.02	1.02	1.03	1.03	Load power factor correction and voltage support if needed
DESCHUTS 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.04	1.02	1.01	1.02	1.02	1.01	Load power factor correction and voltage support if needed
DESCHUTS 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.02	0.96	0.96	1.06	1.04	0.97	0.95	0.96	1.00	0.94	Cottonwood...Benton... Scope under review
DESCHUTS 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.87	0.77	0.75	1.06	1.03	0.77	0.76	0.80	0.84	0.75	Cottonwood...Benton... Scope under review
DESCHUTS 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.01	0.78	0.76	1.06	1.03	0.79	0.47	0.65	0.98	0.50	Cottonwood...Benton... Scope under review
DESCHUTS 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.79	0.78	1.06	1.03	0.80	0.74	0.76	0.99	0.74	Cottonwood...Benton... Scope under review
DESCHUTS 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.87	0.77	0.75	1.06	1.03	0.77	0.76	0.80	0.84	0.75	Cottonwood...Benton... Scope under review
DESCHUTS 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.79	0.77	1.06	1.03	0.80	0.76	0.75	0.99	0.70	Cottonwood...Benton... Scope under review
DESCHUTS 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.03	1.02	1.02	1.03	1.03	1.02	1.01	1.01	1.02	0.87	Cottonwood...Benton... Scope under review
DESCHUTS 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.94	0.93			0.96	0.89	0.92		0.93	Cottonwood...Benton... Scope under review
DIRYVLE 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.02	0.92	0.92	1.04	1.03	0.92	0.90	0.91	0.97	0.91	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLM	P2-1	Line Section w/o fault	1.02	0.91	0.90	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.02	0.91	0.90	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Cottonwood...Benton... Scope under review

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
DIRYVLE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.26	0.25	0.24	1.05	0.99	0.24	0.21	0.23	0.37	0.26	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.02	0.91	0.90	1.04	1.03	0.92	0.89	0.91	0.96	0.90	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.93	0.28	0.25	1.07	1.00	0.27	0.00	0.13	0.85	0.10	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.01	0.29	0.29	1.09	1.02	0.29	0.24	0.26	0.92	0.27	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.26	0.25	0.24	1.05	0.99	0.24	0.21	0.23	0.37	0.26	Cottonwood...Benton... Scope under review
DIRYVLE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.30	0.28	1.09	1.02	0.30	0.23	0.25	0.92	0.24	Cottonwood...Benton... Scope under review
DIRYVLE 60	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUS	P3	G-1/N-1		0.92				0.92	0.90	0.91			Cottonwood...Benton... Scope under review
DIRYVLE 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_C	P6	N-1/N-1		0.35	0.34			0.34	0.33	0.33		0.36	Cottonwood...Benton... Scope under review
ELGN JCT 60	Base Case	P0	Normal	1.03	1.01	1.02	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
ELGN JCT 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	1.00	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction and voltage support if needed
ELGN JCT 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.01	0.99	Load power factor correction and voltage support if needed
ELGN JCT 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.01	0.99	Load power factor correction and voltage support if needed
ELGN JCT 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.12	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
ELGN JCT 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
ELGN JCT 60	P1-1:A3:62:_OROVLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE	P3	G-1/N-1				1.11							Load power factor correction and voltage support if needed
ELGN JCT 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
ELIZ JT1 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ JT1 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ JT1 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.04	0.93	0.89	1.05	1.02	0.93	0.93	0.93	1.00	0.89	Substation upgrade or voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
ELIZ JT1 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ JT2 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ JT2 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ JT2 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.93	0.89	1.05	1.02	0.93	0.93	0.93	1.00	0.89	Substation upgrade or voltage support if needed
ELIZ JT2 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ TWN 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.87	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ TWN 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.87	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ELIZ TWN 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.95	0.95	1.01	0.87	Substation upgrade or voltage support if needed
ELIZ TWN 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.87	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST Q JT 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST Q JT 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST Q JT 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.01	0.87	Substation upgrade or voltage support if needed
EST Q JT 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST Q1 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST Q1 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST Q1 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.01	0.87	Substation upgrade or voltage support if needed
EST Q1 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST QNCY 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST QNCY 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
EST QNCY 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.01	0.87	Substation upgrade or voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
EST QNCY 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
FRBSTNTP 115	Base Case	P0	Normal	1.05	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.02	1.02	1.11	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
FRBSTNTP 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.03	1.03	1.13	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.03	1.03	1.13	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.02	1.02	1.10	1.03	1.02	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
FRBSTNTP 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.05	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.05	1.04	1.04	1.11	1.05	1.03	1.03	1.04	1.04	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.03	1.03	1.13	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.12	1.04	1.02	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.04	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.13	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRBSTNTP 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.66	N/A	N/A	1.11	N/A	0.52	N/A	N/A	N/A	N/A	Substation upgrade or voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
FRBSTNTP 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
FRBSTNTP 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
FRNCHGLH 60	Base Case	P0	Normal	1.04	1.03	1.03	1.05	1.05	1.03	1.03	1.03	1.02	1.01	Load power factor correction and voltage support if needed
FRNCHGLH 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	1.00	0.95	0.95	1.06	1.04	0.96	0.96	0.97	0.97	0.94	Cottonwood...Benton... Scope under review
FRNCHGLH 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.04	0.96	0.95	1.06	1.04	0.96	0.86	0.92	1.01	0.85	Cottonwood...Benton... Scope under review
FRNCHGLH 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.04	0.96	0.95	1.06	1.04	0.96	0.94	0.95	1.01	0.93	Cottonwood...Benton... Scope under review
FRNCHGLH 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	1.00	0.95	0.95	1.06	1.04	0.96	0.96	0.97	0.97	0.94	Cottonwood...Benton... Scope under review
FRNCHGLH 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.96	0.95	1.06	1.04	0.97	0.95	0.95	1.01	0.92	Cottonwood...Benton... Scope under review
FRNCHGLH 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.07	1.06	1.06	0.98	1.06	1.03	1.02	0.99	1.06	0.83	Cottonwood...Benton... Scope under review
FRNCHGLH 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_	P6	N-1/N-1				0.95	0.97					0.89	Sensitivity only
FRNCHGLH 60	P1-2:A3:37:_TRINITY-COTTONWOOD 115KV [4040] P1-2:A3:38:_	P6	N-1/N-1				1.10							Load power factor correction and voltage support if needed
FRNCHGLH 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCAD	P6	N-1/N-1	0.83	0.67	0.77		0.96	0.67	0.67	0.66	0.87	0.77	Cottonwood...Benton... Scope under review
FRSTGLEN 115	Base Case	P0	Normal	1.06	1.04	1.04	1.06	1.07	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
FRSTGLEN 115	P2-1:A3:27:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDW	P2-1	Line Section w/o fault	1.06	1.04	1.05	1.07	1.12	1.04	1.04	1.03	1.08	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115	P2-1:A3:28:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDW	P2-1	Line Section w/o fault	1.08	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.10	1.06	Load power factor correction and voltage support if needed
FRSTGLEN 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.08	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.10	1.06	Load power factor correction and voltage support if needed
FRSTGLEN 115	P2-3:A3:35:_COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD	P2	Non-bus-tie breaker	1.07	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.09	1.06	Load power factor correction and voltage support if needed
FRSTGLEN 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.13	1.11	1.12	1.06	1.15	1.05	1.04	1.03	1.15	1.03	Load power factor correction and voltage support if needed
GANSNER 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GANSNER 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GANSNER 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.04	0.93	0.89	1.05	1.02	0.93	0.92	0.92	1.00	0.89	Substation upgrade or voltage support if needed
GANSNER 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GERBER 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.17	0.17	0.17	1.04	0.97	0.17	0.14	0.15	0.28	0.18	Cottonwood...Benton... Scope under review
GERBER 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.87	0.20	0.17	1.06	0.98	0.19	0.00	0.08	0.79	0.06	Cottonwood...Benton... Scope under review
GERBER 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.17	0.17	0.17	1.04	0.97	0.17	0.14	0.15	0.28	0.18	Cottonwood...Benton... Scope under review
GERBER 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.86	0.85			0.88	0.79	0.83	0.94	0.84	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.02	0.92	0.91	1.06	1.03	0.93	0.90	0.92	0.97	0.89	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.77	0.75	1.06	1.03	0.78	0.76	0.81	0.85	0.76	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.01	0.78	0.75	1.06	1.02	0.79	0.48	0.67	0.96	0.50	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.02	0.79	0.77	1.06	1.02	0.80	0.74	0.76	0.97	0.73	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.77	0.75	1.06	1.03	0.78	0.76	0.81	0.85	0.76	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.79	0.77	1.06	1.02	0.80	0.75	0.75	0.97	0.70	Cottonwood...Benton... Scope under review
GIRVAN 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.03	1.04	1.02	1.02	1.02	1.02	0.94	Cottonwood...Benton... Scope under review
GIRVAN 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.92	0.90			0.94	0.86	0.89		0.89	Cottonwood...Benton... Scope under review
GLENN 60	Base Case	P0	Normal	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
GRBR JCT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.19	0.18	0.18	1.04	0.97	0.18	0.15	0.17	0.30	0.20	Cottonwood...Benton... Scope under review
GRBR JCT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.89	0.21	0.19	1.06	0.98	0.21	0.00	0.09	0.80	0.07	Cottonwood...Benton... Scope under review
GRBR JCT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.19	0.18	0.18	1.04	0.97	0.18	0.15	0.17	0.30	0.20	Cottonwood...Benton... Scope under review
GRBR JCT 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.88	0.86			0.90	0.81	0.85	0.95	0.85	Cottonwood...Benton... Scope under review
GRIZ JCT 115	Base Case	P0	Normal	1.04	1.03	1.03	1.06	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GRIZ JCT 115	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.89	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRIZ JCT 115	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.89	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRIZ JCT 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.02	0.88	0.86	1.06	1.04	0.89	0.88	0.88	1.00	0.86	Existing Caribou RAS should trip the generator
GRIZ JCT 115	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.89	0.00	0.00	1.06	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRIZ JCT 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CAR	P3	G-1/N-1				1.12							Load power factor correction and voltage support if needed
GRIZ JCT 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
GRIZZLY1 115	Base Case	P0	Normal	1.04	1.04	1.03	1.06	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed
GRIZZLY1 115	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.90	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRIZZLY1 115	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.89	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRIZZLY1 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.02	0.89	0.86	1.06	1.04	0.89	0.88	0.88	1.00	0.86	Substation upgrade or voltage support if needed
GRIZZLY1 115	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.89	0.00	0.00	1.07	1.05	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRIZZLY1 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CAR	P3	G-1/N-1				1.12							Load power factor correction and voltage support if needed
GRIZZLY1 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.14							Load power factor correction and voltage support if needed
GROUSCRK 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.06	1.06	1.06	1.02	1.07	1.04	1.03	1.00	1.07	0.96	Cottonwood...Benton... Scope under review
GROUSCRK 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_	P6	N-1/N-1				0.90	0.94			0.95		0.85	Cottonwood...Benton... Scope under review
GRS F JT 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.90	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRS F JT 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.90	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRS F JT 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.95	0.89	1.04	1.02	0.95	0.94	0.94	1.01	0.89	Substation upgrade or voltage support if needed
GRS F JT 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.90	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRYS FLT 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GRYS FLT 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
GRYS FLT 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.93	0.89	1.04	1.02	0.93	0.93	0.93	1.00	0.89	Substation upgrade or voltage support if needed
GRYS FLT 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
HAMILTON 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.06	1.03	1.02	1.03	1.04	1.02	Load power factor correction and voltage support if needed
HAT CRK1 60	Base Case	P0	Normal	1.03	1.04	1.04	1.07	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
HAT CRK1 60	P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2 P1-3:A3:60:_HAT	P3	G-1/N-1				1.10							Load power factor correction and voltage support if needed
HAT CRK1 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:60:_HAT CRK1 6.6KV	P6	N-1/N-1				1.10	1.11						Load power factor correction and voltage support if needed
HAT CRK2 60	Base Case	P0	Normal	1.02	1.04	1.04	1.07	1.06	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
HAT CRK2 60	P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2 P1-3:A3:60:_HAT	P3	G-1/N-1				1.10							Load power factor correction and voltage support if needed
HAT CRK2 60	P1-1:A3:67:_HAT CRK1 6.60KV GEN UNIT 1 P1-3:A3:11:_PIT	P3	G-1/N-1					1.11						Load power factor correction and voltage support if needed
HAT CRK2 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:62:_HT CRKRG 60KV	P6	N-1/N-1					1.11						Load power factor correction and voltage support if needed
HAT CRK2 60	P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1 P1-1:A3:42:_PIT 1 U1	P6	N-1/N-1				1.10							Load power factor correction and voltage support if needed
HATLOSCK 60	Base Case	P0	Normal	1.05	1.05	1.05	1.08	1.07	1.06	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
HEADGATE 60	Base Case	P0	Normal	1.03	1.03	1.03	1.04	1.05	1.04	1.03	1.04	1.04	1.03	Load power factor correction and voltage support if needed
HMLTN BR 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
HMLTN BR 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
HMLTN BR 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.02	0.96	0.90	1.04	1.02	0.96	0.95	0.95	1.01	0.90	Substation upgrade or voltage support if needed
HMLTN BR 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	
HMLTN JT 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.06	1.03	1.02	1.03	1.04	1.02	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HONC JT1 115	Base Case	P0	Normal	1.05	1.02	1.02	1.09	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT1 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.00	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.01	1.01	1.13	1.02	1.01	1.01	1.01	1.00	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.05	1.02	1.02	1.12	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT1 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.10	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT1 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.02	1.11	1.04	1.02	1.02	1.03	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT1 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.11	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.02	1.11	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT1 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.01	1.12	1.05	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
HONC JT1 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.72	N/A	N/A	1.10	N/A	0.57	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
HONC JT1 115	P1-1:A3:65:_DE SABLA 6.90KV GEN UNIT 1 P1-2:A3:29:_IDLE	P3	G-1/N-1				1.13							Load power factor correction and voltage support if needed
HONC JT1 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
HONC JT1 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.02	1.02	1.10	1.04	1.02	1.02	1.02	1.01	1.02	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HONC JT3 115	Base Case	P0	Normal	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONC JT3 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.01	1.01	Load power factor correction and voltage support if needed
HONC JT3 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.06	1.02	1.02	1.13	1.03	1.03	1.02	1.02	1.01	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.03	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.03	1.03	1.12	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONC JT3 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.03	1.03	1.10	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONC JT3 115	P2-1:A3:42:_PALERMO-BOGUE 115KV [3200] (PALERMO-HONC J	P2-1	Line Section w/o fault	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONC JT3 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.03	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P2-2:A3:38:_PALERMO 115KV SECTION 1D	P2	Bus	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.01	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.01	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HONC JT3 115	P2-3:A3:39:_PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:40:_PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:42:_PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:43:_PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONC JT3 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.70	N/A	N/A	1.11	N/A	0.56	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
HONC JT3 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
HONC JT3 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115	Base Case	P0	Normal	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONCUT 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.01	1.01	Load power factor correction and voltage support if needed
HONCUT 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.06	1.02	1.02	1.13	1.03	1.03	1.02	1.02	1.01	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.03	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.03	1.03	1.12	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONCUT 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.03	1.03	1.10	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONCUT 115	P2-1:A3:42:_PALERMO-BOGUE 115KV [3200] (PALERMO-HONC J	P2-1	Line Section w/o fault	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HONCUT 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.03	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P2-2:A3:38:_PALERMO 115KV SECTION 1D	P2	Bus	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.02	1.01	1.10	1.03	1.01	1.02	1.02	1.01	1.01	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.01	1.10	1.03	1.01	1.02	1.02	1.01	1.01	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:39:_PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:40:_PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:42:_PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:43:_PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
HONCUT 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.70	N/A	N/A	1.11	N/A	0.56	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
HONCUT 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
HONCUT 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.02	1.03	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HOWELLS 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
HOWELLS 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
HOWELLS 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.93	0.89	1.04	1.02	0.93	0.93	0.93	1.00	0.89	Substation upgrade or voltage support if needed
HOWELLS 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
HT CRKRG 60	Base Case	P0	Normal	1.05	1.05	1.05	1.08	1.06	1.06	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
HYAMPOM 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.06	1.06	1.06	1.02	1.07	1.04	1.02	1.00	1.07	0.96	Cottonwood...Benton... Scope under review
HYAMPOM 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:	P6	N-1/N-1				0.90	0.94			0.95		0.85	Cottonwood...Benton... Scope under review
HYMPOMJT 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.06	1.06	1.06	1.02	1.07	1.04	1.02	1.00	1.07	0.96	Cottonwood...Benton... Scope under review
HYMPOMJT 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:	P6	N-1/N-1				0.90	0.94			0.95		0.85	Cottonwood...Benton... Scope under review
INSKIP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.52	0.51	0.50	1.06	1.02	0.50	0.47	0.52	0.62	0.51	Cottonwood...Benton... Scope under review
INSKIP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.99	0.55	0.51	1.08	1.03	0.55	0.11	0.34	0.96	0.22	Cottonwood...Benton... Scope under review
INSKIP 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.54	0.54	1.09	1.03	0.54	0.49	0.50	1.00	0.52	Cottonwood...Benton... Scope under review
INSKIP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.52	0.51	0.50	1.06	1.02	0.50	0.47	0.52	0.62	0.51	Cottonwood...Benton... Scope under review
INSKIP 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.55	0.53	1.09	1.03	0.56	0.51	0.49	1.00	0.46	Cottonwood...Benton... Scope under review
INSKIP 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COT	P6	N-1/N-1		0.64	0.64			0.64	0.63	0.63		0.65	Cottonwood...Benton... Scope under review
JACINTO 60	Base Case	P0	Normal	1.01	1.00	1.00	1.05	1.06	1.01	1.00	1.01	1.02	1.00	Load power factor correction and voltage support if needed
JESSTAP 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.04	1.04	1.02	1.03	Load power factor correction and voltage support if needed
JESSTAP 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.05	1.02	1.02	1.03	1.03	1.02	1.02	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
JESSTAP 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.11	1.10	1.10	1.01	1.11	1.06	1.05	1.02	1.12	0.94	Cottonwood...Benton... Scope under review
JESSUP 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
JESSUP 115	P2-1:A3:34:_CASCADE-COTTONWOOD 115KV [1240] (COTWDPG	P2-1	Line Section w/o fault	1.04	1.02	1.02	1.07	1.05	1.02	1.01	1.02	1.03	0.97	Cottonwood...Benton... Scope under review

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
JESSUP 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.04	1.02	1.02	1.06	1.05	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
JESSUP 115	P2-3:A3:34:_COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.06	1.04	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
JESSUP 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.05	1.01	1.01	1.03	1.03	1.02	1.01	1.01	1.02	0.96	Cottonwood...Benton... Scope under review
JESSUP 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.77	Cottonwood...Benton... Scope under review
JESSUPJ1 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
JESSUPJ1 115	P2-1:A3:34:_CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE)	P2-1	Line Section w/o fault	1.04	1.02	1.02	1.07	1.05	1.02	1.01	1.02	1.03	0.97	Cottonwood...Benton... Scope under review
JESSUPJ1 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.04	1.02	1.02	1.06	1.05	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
JESSUPJ1 115	P2-3:A3:34:_COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.06	1.04	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
JESSUPJ1 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.05	1.01	1.01	1.03	1.03	1.02	1.01	1.01	1.02	0.96	Cottonwood...Benton... Scope under review
JESSUPJ1 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.77	Cottonwood...Benton... Scope under review
KANAKAJT 115	Base Case	P0	Normal	1.05	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KANAKAJT 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.03	1.02	1.13	1.04	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KANAKAJT 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.05	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL)	P2-1	Line Section w/o fault	1.05	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.03	1.03	1.03	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
KANAKAJT 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.04	1.02	1.02	1.03	1.03	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.02	1.03	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.66	N/A	N/A	1.11	N/A	0.52	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
KANAKAJT 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-2:A3:29:_IDLE L	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
KANAKAJT 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KESWICK 60	Base Case	P0	Normal	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
KESWICK 60	P2-1:A3:81:_KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWA	P2-1	Line Section w/o fault	1.00	0.96	0.96	1.04	1.04	0.97	0.96	0.96	0.98	0.94	Cottonwood...Benton... Scope under review
KESWICK 60	P2-2:A3:54:_CASCADE 60KV SECTION MA	P2	Bus	1.00	0.96	0.96	1.04	1.04	0.97	0.96	0.96	0.98	0.95	Cottonwood...Benton... Scope under review
KESWICK 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.98	0.91	0.90	1.06	1.04	0.91	0.91	0.94	0.94	0.90	Cottonwood...Benton... Scope under review
KESWICK 60	P2-3:A3:61:_CASCADE - MA 60KV & CASCADE-BENTON-DESCHUT	P2	Non-bus-tie breaker	1.00	0.96	0.96	1.04	1.04	0.97	0.96	0.96	0.98	0.95	Cottonwood...Benton... Scope under review
KESWICK 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.91	0.90	1.06	1.04	0.92	0.77	0.86	1.00	0.77	Cottonwood...Benton... Scope under review
KESWICK 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.91	0.91	1.06	1.04	0.92	0.89	0.90	1.00	0.88	Cottonwood...Benton... Scope under review
KESWICK 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.98	0.91	0.90	1.06	1.04	0.91	0.91	0.94	0.94	0.90	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
KESWICK 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.92	0.91	1.06	1.04	0.92	0.90	0.90	1.00	0.86	Cottonwood...Benton... Scope under review
KESWICK 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.03	1.03	0.99	1.03	1.02	1.01	1.00	1.03	0.79	Cottonwood...Benton... Scope under review
KESWICK 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCAD	P6	N-1/N-1	0.73	0.49	0.64	0.96	0.91	0.49	0.50	0.48	0.78	0.65	Cottonwood...Benton... Scope under review
KILARC 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.04	1.04	1.05	1.02	Load power factor correction and voltage support if needed
KILARC 60	P2-2:A3:36:_CASCADE 115KV SECTION MA	P2	Bus	1.04	1.02	1.01	1.07	1.05	1.02	1.01	1.02	1.04	1.00	Cottonwood...Benton... Scope under review
KILARC 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.05	0.99	0.98	1.09	1.05	1.00	0.98	0.99	1.04	0.96	Cottonwood...Benton... Scope under review
KILARC 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.80	0.78	1.09	1.05	0.81	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
KILARC 60	P2-3:A3:38:_CASCADE - MA 115KV & CASCADE-COTTONWOOD L	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.07	1.05	1.02	1.01	1.02	1.04	1.00	Cottonwood...Benton... Scope under review
KILARC 60	P2-3:A3:61:_CASCADE - MA 60KV & CASCADE-BENTON-DESCHUT	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.09	1.06	1.01	1.00	1.00	1.04	0.99	Cottonwood...Benton... Scope under review
KILARC 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.04	0.81	0.79	1.09	1.04	0.82	0.51	0.69	1.01	0.52	Cottonwood...Benton... Scope under review
KILARC 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.05	0.82	0.81	1.09	1.05	0.83	0.77	0.79	1.04	0.76	Cottonwood...Benton... Scope under review
KILARC 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.80	0.78	1.09	1.05	0.81	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
KILARC 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.05	0.82	0.80	1.09	1.05	0.83	0.79	0.78	1.04	0.72	Cottonwood...Benton... Scope under review
KILARC 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.06	1.04	1.04	1.06	1.05	1.04	1.04	1.04	1.05	0.89	Cottonwood...Benton... Scope under review
KILARC 60	P1-1:A3:47:_SOUTH G 4.16KV GEN UNIT 1 P1-2:A3:64:_CAS	P3	G-1/N-1											Cottonwood...Benton... Scope under review
KILARC 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P1 P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
KLLY RDE 60	Base Case	P0	Normal	1.04	1.02	1.03	1.07	1.04	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
KLLY RDE 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.04	1.01	1.01	1.11	1.03	1.02	1.01	1.01	1.01	1.00	Load power factor correction and voltage support if needed
KLLY RDE 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.01	1.01	1.11	1.04	1.01	1.00	1.01	1.02	1.00	Load power factor correction and voltage support if needed
KLLY RDE 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.01	1.01	1.11	1.04	1.01	1.00	1.01	1.02	1.00	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
KLLY RDE 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.12	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
KLLY RDE 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.11	1.04	1.01	1.00	1.00	1.02	1.00	Load power factor correction and voltage support if needed
KLLY RDE 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE	P3	G-1/N-1				1.11							Load power factor correction and voltage support if needed
KLLY RDE 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
LOMS JCT 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
LOMS JCT 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.02	0.96	0.96	1.06	1.03	0.97	0.95	0.96	0.99	0.94	Cottonwood...Benton... Scope under review
LOMS JCT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.81	0.80	1.06	1.03	0.82	0.81	0.85	0.87	0.80	Cottonwood...Benton... Scope under review
LOMS JCT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.82	0.80	1.06	1.03	0.83	0.57	0.72	0.98	0.58	Cottonwood...Benton... Scope under review
LOMS JCT 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.83	0.82	1.06	1.03	0.84	0.79	0.80	0.99	0.78	Cottonwood...Benton... Scope under review
LOMS JCT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.81	0.80	1.06	1.03	0.82	0.81	0.85	0.87	0.80	Cottonwood...Benton... Scope under review
LOMS JCT 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.83	0.81	1.06	1.03	0.84	0.80	0.80	0.99	0.75	Cottonwood...Benton... Scope under review
LOMS JCT 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.02	1.03	1.02	1.02	1.01	1.02	0.86	Cottonwood...Benton... Scope under review
LP FB SP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.19	0.18	0.18	1.04	0.97	0.18	0.15	0.17	0.29	0.20	Cottonwood...Benton... Scope under review
LP FB SP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.88	0.21	0.19	1.06	0.98	0.21	0.00	0.09	0.80	0.07	Cottonwood...Benton... Scope under review
LP FB SP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.19	0.18	0.18	1.04	0.97	0.18	0.15	0.17	0.29	0.20	Cottonwood...Benton... Scope under review
LP FB SP 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD	P6	N-1/N-1		0.88	0.86			0.90	0.81	0.85	0.95	0.85	Cottonwood...Benton... Scope under review
LS ML JT 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.02	0.91	0.91	1.04	1.03	0.92	0.90	0.91	0.96	0.91	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLM	P2-1	Line Section w/o fault	1.01	0.90	0.89	1.04	1.03	0.91	0.89	0.90	0.96	0.89	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.90	0.96	0.89	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.25	0.24	0.23	1.05	0.99	0.23	0.20	0.22	0.36	0.25	Cottonwood...Benton... Scope under review

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
LS ML JT 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.02	0.90	0.89	1.04	1.03	0.91	0.89	0.90	0.96	0.89	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.93	0.27	0.24	1.07	1.00	0.26	0.00	0.13	0.84	0.09	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.01	0.28	0.28	1.09	1.02	0.27	0.23	0.25	0.92	0.26	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.25	0.24	0.23	1.05	0.99	0.23	0.20	0.22	0.36	0.25	Cottonwood...Benton... Scope under review
LS ML JT 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.29	0.26	1.09	1.02	0.29	0.22	0.24	0.92	0.23	Cottonwood...Benton... Scope under review
LS ML JT 60	P1-1:A3:8:_NEO REDB 13.80KV GEN UNIT 1 P1-2:A3:73:_CO	P3	G-1/N-1		0.91	0.90				0.89	0.90			Cottonwood...Benton... Scope under review
LS ML JT 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_CO	P6	N-1/N-1		0.33	0.33			0.33	0.31	0.32		0.34	Cottonwood...Benton... Scope under review
LS ML JT 60	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff	P7	DCTL	1.02	0.92	0.91	1.04	1.03	0.92	0.90	0.91	0.96	0.91	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.02	0.91	0.91	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLM	P2-1	Line Section w/o fault	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.89	0.96	0.89	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.90	0.96	0.89	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.25	0.23	0.23	1.05	0.99	0.23	0.19	0.22	0.36	0.24	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.90	0.96	0.89	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.93	0.27	0.24	1.07	1.00	0.26	0.00	0.12	0.84	0.09	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.01	0.27	0.28	1.09	1.02	0.27	0.23	0.25	0.92	0.26	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.25	0.23	0.23	1.05	0.99	0.23	0.19	0.22	0.36	0.24	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.29	0.26	1.09	1.02	0.29	0.22	0.24	0.92	0.23	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUS	P3	G-1/N-1		0.91				0.91	0.89	0.90			Cottonwood...Benton... Scope under review
LS MLNSJ 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_CO	P6	N-1/N-1		0.33	0.33			0.33	0.31	0.31		0.34	Cottonwood...Benton... Scope under review
LS MLNSJ 60	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff	P7	DCTL	1.01	0.91	0.91	1.04	1.03	0.92	0.90	0.91	0.96	0.91	Cottonwood...Benton... Scope under review
LSNA PCC 60	Base Case	P0	Normal	1.03	1.01	1.01	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
LSNA PCC 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	0.99	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction and voltage support if needed
LSNA PCC 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
LSNA PCC 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
LSNA PCC 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.12	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
LSNA PCC 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.03	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.00	0.99	Load power factor correction and voltage support if needed
LSNA PCC 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE	P3	G-1/N-1				1.11							Load power factor correction and voltage support if needed
LSNA PCC 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
MTN GATE 60	P1-3:A3:42:_CASCADE 115/60KV TB 1	P1	N-1	0.97	0.95	0.94	1.01	1.00	0.95	0.95	0.94	0.97	0.94	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-2:A3:37:_CASCADE 115KV SECTION 1D	P2	Bus	0.97	0.95	0.94	1.01	1.00	0.95	0.95	0.94	0.97	0.94	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.01	0.96	0.96	1.05	1.02	0.97	0.96	0.96	0.98	0.94	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.86	0.85	1.05	1.02	0.87	0.87	0.90	0.90	0.86	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.88	0.70	0.80	0.98	0.70	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.01	0.87	0.87	1.05	1.02	0.88	0.85	0.86	0.98	0.83	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.86	0.85	1.05	1.02	0.87	0.87	0.90	0.90	0.86	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.88	0.86	1.05	1.02	0.88	0.86	0.85	0.98	0.82	Cottonwood...Benton... Scope under review
MTN GATE 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.02	1.00	1.00	1.00	1.01	1.00	1.00	0.99	1.00	0.77	Cottonwood...Benton... Scope under review
MTN GATE 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCAD	P6	N-1/N-1	0.64	0.36	0.54	0.93	0.86	0.35	0.37	0.34	0.70	0.55	Cottonwood...Benton... Scope under review
NEO REDT 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
OLSEN JT 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.04	1.04	1.05	1.02	Load power factor correction and voltage support if needed
OLSEN JT 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.04	0.99	0.98	1.09	1.05	0.99	0.97	0.98	1.04	0.96	Cottonwood...Benton... Scope under review
OLSEN JT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.80	0.78	1.09	1.04	0.80	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
OLSEN JT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.04	0.81	0.78	1.09	1.04	0.82	0.51	0.68	1.01	0.52	Cottonwood...Benton... Scope under review
OLSEN JT 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.09	1.04	0.82	0.77	0.79	1.03	0.76	Cottonwood...Benton... Scope under review
OLSEN JT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.80	0.78	1.09	1.04	0.80	0.78	0.83	0.88	0.77	Cottonwood...Benton... Scope under review
OLSEN JT 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.82	0.80	1.09	1.04	0.83	0.79	0.78	1.03	0.72	Cottonwood...Benton... Scope under review
OLSEN JT 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.04	1.06	1.05	1.04	1.03	1.03	1.04	0.89	Cottonwood...Benton... Scope under review
OLSEN JT 60	P1-1:A3:47:_SOUTH G 4.16KV GEN UNIT 1 P1-2:A3:64:_CAS	P3	G-1/N-1											Cottonwood...Benton... Scope under review
OLSEN JT 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P1 P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
OREGNTRL 115	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.03	1.02	1.02	Load power factor correction and voltage support if needed
OREGNTRL 115	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	1.00	0.95	0.94	1.07	1.04	0.95	0.96	0.98	0.97	0.95	Cottonwood...Benton... Scope under review
OREGNTRL 115	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.95	0.94	1.07	1.04	0.96	0.86	0.92	1.01	0.85	Cottonwood...Benton... Scope under review
OREGNTRL 115	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.95	0.95	1.07	1.04	0.96	0.94	0.95	1.01	0.92	Cottonwood...Benton... Scope under review
OREGNTRL 115	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	1.00	0.95	0.94	1.07	1.04	0.95	0.96	0.98	0.97	0.95	Cottonwood...Benton... Scope under review
OREGNTRL 115	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.95	0.95	1.07	1.04	0.96	0.94	0.95	1.01	0.91	Cottonwood...Benton... Scope under review
OREGNTRL 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.79	Cottonwood...Benton... Scope under review
OREGNTRL 60	Base Case	P0	Normal	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
OREGNTRL 60	P1-3:A3:42:_CASCADE 115/60KV TB 1	P1	N-1	0.99	0.97	0.97	1.02	1.02	0.97	0.97	0.97	0.99	0.96	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-2:A3:37:_CASCADE 115KV SECTION 1D	P2	Bus	0.99	0.97	0.97	1.02	1.02	0.97	0.97	0.97	0.99	0.96	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.03	0.97	0.97	1.06	1.04	0.98	0.96	0.97	1.00	0.95	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.85	0.83	1.06	1.03	0.85	0.85	0.88	0.90	0.84	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.03	0.86	0.84	1.06	1.03	0.86	0.63	0.77	0.99	0.64	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
OREGNTRL 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.86	0.85	1.06	1.03	0.87	0.83	0.84	1.00	0.82	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.85	0.83	1.06	1.03	0.85	0.85	0.88	0.90	0.84	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.86	0.85	1.06	1.03	0.87	0.84	0.83	1.00	0.79	Cottonwood...Benton... Scope under review
OREGNTRL 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.02	1.03	1.02	1.02	1.01	1.02	0.83	Cottonwood...Benton... Scope under review
ORL B JT 60	Base Case	P0	Normal	1.04	1.03	1.03	1.04	1.05	1.04	1.03	1.04	1.04	1.03	Load power factor correction and voltage support if needed
ORLAND B 60	Base Case	P0	Normal	1.04	1.03	1.03	1.04	1.05	1.04	1.03	1.04	1.04	1.03	Load power factor correction and voltage support if needed
ORLND JT 60	Base Case	P0	Normal	1.04	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed
OROENEGY 60	Base Case	P0	Normal	1.03	1.01	1.02	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
OROENEGY 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	1.00	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction and voltage support if needed
OROENEGY 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
OROENEGY 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
OROENEGY 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.12	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
OROENEGY 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.01	0.99	Load power factor correction and voltage support if needed
OROENEGY 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
OROVILLE 60	Base Case	P0	Normal	1.03	1.01	1.01	1.07	1.03	1.02	1.01	1.01	1.01	1.00	Load power factor correction and voltage support if needed
OROVILLE 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	0.99	1.10	1.02	1.01	1.00	1.00	1.00	0.98	Load power factor correction and voltage support if needed
OROVILLE 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.01	0.99	Load power factor correction and voltage support if needed
OROVILLE 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.01	0.99	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OROVILLE 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.12	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
OROVILLE 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.03	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.00	0.98	Load power factor correction and voltage support if needed
OROVILLE 60	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690] P1-3:A3:2	P6	N-1/N-1						0.91			0.92	0.90	Load power factor correction and voltage support if needed
OROVILLE 60	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690] P1-3:A3:3	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
OWID 115	Base Case	P0	Normal	1.05	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.02	1.02	1.11	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
OWID 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.03	1.02	1.13	1.04	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
OWID 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
OWID 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.05	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
OWID 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
OWID 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
OWID 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.04	1.02	1.02	1.03	1.03	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OWID 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
OWID 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.02	1.03	1.02	Load power factor correction and voltage support if needed
OWID 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.66	N/A	N/A	1.11	N/A	0.52	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
OWID 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
OWID 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
PALERMO 115	Base Case	P0	Normal	1.06	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
PALERMO 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
PALERMO 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.02	1.01	1.13	1.03	1.03	1.02	1.02	1.01	1.01	Load power factor correction and voltage support if needed
PALERMO 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.02	1.13	1.06	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
PALERMO 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
PALERMO 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
PALERMO 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
PALERMO 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
PALERMO 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.02	1.13	1.06	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
PALERMO 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
PALERMO 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
PALERMO 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
PALERMO 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.03	1.01	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
PALERMO 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
PALERMO 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.13	1.05	1.02	1.01	1.02	1.02	1.02	Load power factor correction and voltage support if needed
PALERMO 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.63	N/A	N/A	1.11	N/A	0.49	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
PALERMO 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MTN	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
PALERMO 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
PALERMO 230	P1-2:A3:40:_WOODLEAF-PALERMO 115KV [4220] P1-2:A3:2:_TABLE MTN	P6	N-1/N-1						0.88			0.89	0.89	Load power factor correction and voltage support if needed
PALERMO 60	Base Case	P0	Normal	1.04	1.01	1.02	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
PALERMO 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	1.00	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction and voltage support if needed
PALERMO 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
PALERMO 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction and voltage support if needed
PALERMO 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	N/A	N/A	N/A	1.11	N/A	N/A	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
PALERMO 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-3:A3:2:_TABLE MTN	P3	G-1/N-1				1.10							Load power factor correction and voltage support if needed
PALRMO M 230	P1-2:A3:40:_WOODLEAF-PALERMO 115KV [4220] P1-2:A3:2:_TABLE MTN	P6	N-1/N-1						0.88			0.89	0.89	Sensitivity only
PANRAMA 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.02	1.03	Load power factor correction and voltage support if needed
PANRAMA 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.04	1.02	1.01	1.03	1.03	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
PEACHTON 60	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV	P7	DCTL	1.01	0.98	0.99	1.02	1.00	0.99	0.98	0.98	0.82	0.99	Sensitivity only
PIT 1 60	Base Case	P0	Normal	1.03	1.04	1.04	1.07	1.06	1.04	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed
PIT 1 60	P2-2:A3:66:_PIT 1 60KV SECTION MA	P2	Bus	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
PIT 1 60	P2-3:A3:77:_PIT 1 - MA 60KV & PIT #1-MCARTHUR LINE	P2	Non-bus-tie breaker	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed
PIT 1 60	P2-3:A3:78:_PIT 1 - MA 60KV & HAT CREEK #1-PIT #1 LINE	P2	Non-bus-tie breaker	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed
PIT 1 60	P2-3:A3:79:_PIT 1 - MA 60KV & PIT #1-HAT CREEK #2-BURNEY LIN	P2	Non-bus-tie breaker	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed
PIT 1 60	P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2 P1-3:A3:60:_HAT	P3	G-1/N-1				1.10							Load power factor correction and voltage support if needed
PIT 1 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:62:_HT CRKRG 60	P6	N-1/N-1					1.11						Load power factor correction and voltage support if needed
PIT 1 60	P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1 P1-1:A3:42:_PIT 1 U1	P6	N-1/N-1				1.10							Load power factor correction and voltage support if needed
PLMS JCT 60	P1-1:A3:64:_SPIQUINCY 13.80KV GEN UNIT 1	P1	N-1	0.98	0.96	N/A	1.01	0.98	0.96	N/A	0.96	0.96	N/A	Load power factor correction and voltage support if needed
PLMS JCT 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
PLMS JCT 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
PLMS JCT 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.01	0.87	Substation upgrade or voltage support if needed
PLMS JCT 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
POE 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.02	1.01	1.01	1.02	1.02	Load power factor correction and voltage support if needed
PPL 60	P1-3:A3:42:_CASCADE 115/60KV TB 1	P1	N-1	0.96	0.94	0.94	1.01	1.00	0.94	0.94	0.94	0.96	0.93	Cottonwood...Benton... Scope under review
PPL 60	P2-2:A3:37:_CASCADE 115KV SECTION 1D	P2	Bus	0.96	0.94	0.94	1.01	1.00	0.94	0.94	0.94	0.96	0.93	Cottonwood...Benton... Scope under review
PPL 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.00	0.96	0.95	1.05	1.02	0.96	0.95	0.95	0.98	0.93	Cottonwood...Benton... Scope under review
PPL 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Cottonwood...Benton... Scope under review
PPL 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.99	0.86	0.85	1.05	1.02	0.87	0.69	0.80	0.97	0.69	Cottonwood...Benton... Scope under review
PPL 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.87	0.84	0.85	0.98	0.83	Cottonwood...Benton... Scope under review
PPL 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Cottonwood...Benton... Scope under review

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PPL 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.88	0.85	0.85	0.98	0.81	Cottonwood...Benton... Scope under review
PPL 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.01	1.00	1.00	1.00	1.01	0.99	0.99	0.99	0.99	0.77	Cottonwood...Benton... Scope under review
PPL 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCAD	P6	N-1/N-1	0.63	0.35	0.53	0.93	0.86	0.33	0.35	0.33	0.69	0.54	Cottonwood...Benton... Scope under review
RASN JNT 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
RED B JT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.21	0.20	0.20	1.05	0.98	0.20	0.16	0.18	0.32	0.21	Cottonwood...Benton... Scope under review
RED B JT 60	P2-2:A3:64:_RED BLFF 60KV SECTION 1D	P2	Bus	1.04	1.04	1.04	1.03	1.04	1.05	1.05	1.05	1.04	1.04	Cottonwood...Benton... Scope under review
RED B JT 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.02	0.94	0.93	1.04	1.03	0.95	0.93	0.94	0.98	0.93	Cottonwood...Benton... Scope under review
RED B JT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.90	0.23	0.20	1.06	0.98	0.22	0.00	0.10	0.81	0.08	Cottonwood...Benton... Scope under review
RED B JT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.21	0.20	0.20	1.05	0.98	0.20	0.16	0.18	0.32	0.21	Cottonwood...Benton... Scope under review
RED B JT 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.27	0.24	1.09	1.01	0.27	0.20	0.23	0.91	0.21	Cottonwood...Benton... Scope under review
RED B JT 60	P2-3:A3:74:_RED BLFF - 1D 60KV & COLEMAN-RED BLUFF LINE	P2	Non-bus-tie breaker	1.03	1.04	1.04	1.03	1.04	1.05	1.05	1.05	1.04	1.04	Cottonwood...Benton... Scope under review
RED B JT 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.87	0.85			0.89	0.79	0.84		0.84	Cottonwood...Benton... Scope under review
RED BLFF 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.01	0.90	0.89	1.05	1.02	0.90	0.88	0.89	0.95	0.89	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLM	P2-1	Line Section w/o fault	1.02	0.94	0.93	1.04	1.03	0.94	0.93	0.94	0.98	0.93	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.02	0.94	0.93	1.04	1.03	0.94	0.93	0.94	0.98	0.93	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.21	0.20	0.20	1.05	0.98	0.20	0.16	0.18	0.32	0.21	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.02	0.94	0.93	1.04	1.03	0.95	0.93	0.94	0.98	0.93	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.90	0.23	0.20	1.06	0.98	0.23	0.00	0.10	0.81	0.08	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.00	0.26	0.26	1.09	1.01	0.25	0.21	0.24	0.91	0.24	Cottonwood...Benton... Scope under review
RED BLFF 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.21	0.20	0.20	1.05	0.98	0.20	0.16	0.18	0.32	0.21	Cottonwood...Benton... Scope under review

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
RED BLFF 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.27	0.24	1.09	1.01	0.27	0.20	0.23	0.91	0.21	Cottonwood...Benton... Scope under review
RED BLFF 60	P1-1:A3:68:_COLEMAN 6.60KV GEN UNIT 1 P1-2:A3:73:_CO	P3	G-1/N-1		0.90	0.89			0.90	0.87	0.89		0.89	Cottonwood...Benton... Scope under review
RED BLFF 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_C	P6	N-1/N-1		0.31	0.30			0.30	0.29	0.29		0.32	Cottonwood...Benton... Scope under review
RED BLFF 60	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff	P7	DCTL	1.00	0.90	0.89	1.05	1.02	0.90	0.88	0.89	0.95	0.89	Cottonwood...Benton... Scope under review
RK C JT1 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
RK C JT2 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	Load power factor correction and voltage support if needed
ROCKCK 1 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
ROCKCK 2 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	Load power factor correction and voltage support if needed
RWSN J2 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.19	0.19	0.19	1.04	0.97	0.19	0.15	0.17	0.30	0.20	Cottonwood...Benton... Scope under review
RWSN J2 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.89	0.22	0.19	1.06	0.98	0.21	0.00	0.09	0.80	0.07	Cottonwood...Benton... Scope under review
RWSN J2 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.19	0.19	0.19	1.04	0.97	0.19	0.15	0.17	0.30	0.20	Cottonwood...Benton... Scope under review
RWSN J2 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.27	0.24	1.09	1.01	0.27	0.20	0.23	0.91	0.21	Cottonwood...Benton... Scope under review
RWSN J2 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.88	0.87			0.90	0.81	0.85	0.95	0.86	Cottonwood...Benton... Scope under review
SLYCREEK 115	Base Case	P0	Normal	1.06	1.04	1.04	1.10	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.04	1.03	1.13	1.04	1.04	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.04	1.04	1.13	1.05	1.04	1.03	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.04	1.04	1.11	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SLYCREEK 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.04	1.04	1.13	1.05	1.04	1.03	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.04	1.03	1.12	1.04	1.03	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.13	1.05	1.04	1.03	1.04	1.04	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.68	N/A	N/A	1.11	N/A	0.53	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
SLYCREEK 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
SLYCREEK 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.04	1.04	1.11	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SMPSN-AN 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.02	1.03	Load power factor correction and voltage support if needed
SMPSN-AN 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.04	1.02	1.01	1.03	1.03	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SOUTH 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.57	0.55	0.54	1.07	1.03	0.55	0.52	0.56	0.65	0.55	Cottonwood...Benton... Scope under review
SOUTH 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.99	0.59	0.55	1.08	1.03	0.59	0.14	0.39	0.97	0.25	Cottonwood...Benton... Scope under review
SOUTH 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.58	0.58	1.09	1.03	0.58	0.53	0.54	1.00	0.55	Cottonwood...Benton... Scope under review
SOUTH 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.57	0.55	0.54	1.07	1.03	0.55	0.52	0.56	0.65	0.55	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
SOUTH 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.59	0.57	1.09	1.03	0.60	0.55	0.53	1.00	0.50	Cottonwood...Benton... Scope under review
SOUTH 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COTTONWD-RED BLFF 60KV [0]	P6	N-1/N-1		0.68	0.68			0.68	0.67	0.67		0.69	Cottonwood...Benton... Scope under review
SPANSHCK 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL)	P2-1	Line Section w/o fault	0.95	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPANSHCK 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPANSHCK 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.93	0.89	1.05	1.02	0.93	0.93	0.93	1.00	0.89	Substation upgrade or voltage support if needed
SPANSHCK 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.94	0.00	0.00	1.06	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPI_AND 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
SPI_AND 115	P2-1:A3:34:_CASCADE-COTTONWOOD 115KV [1240] (COTWDPG	P2-1	Line Section w/o fault	1.04	1.02	1.02	1.07	1.05	1.02	1.01	1.02	1.03	0.97	Cottonwood...Benton... Scope under review
SPI_AND 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.04	1.02	1.02	1.06	1.05	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SPI_AND 115	P2-3:A3:34:_COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWO	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.06	1.04	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SPI_AND 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.05	1.01	1.01	1.03	1.03	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SPI_AND 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.04	1.02	1.01	1.01	1.02	0.77	Cottonwood...Benton... Scope under review
SPIAND2 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
SPIAND2 115	P2-1:A3:34:_CASCADE-COTTONWOOD 115KV [1240] (COTWDPG	P2-1	Line Section w/o fault	1.04	1.02	1.02	1.07	1.05	1.02	1.01	1.02	1.03	0.97	Cottonwood...Benton... Scope under review
SPIAND2 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.04	1.02	1.02	1.06	1.05	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SPIAND2 115	P2-3:A3:34:_COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWO	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.06	1.04	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SPIAND2 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.05	1.01	1.01	1.03	1.03	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
SPIAND2 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.04	1.02	1.01	1.01	1.02	0.77	Cottonwood...Benton... Scope under review
SPIQUINCY 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPIQUINCY 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SPIQUINCY 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.02	0.87	Substation upgrade or voltage support if needed
SPIQUINCY 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPIQUINCYJCT60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPIQUINCYJCT60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
SPIQUINCYJCT60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.02	0.87	Substation upgrade or voltage support if needed
SPIQUINCYJCT60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	0.86	0.00	0.00	1.05	1.03	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
STLLWATR 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
STLLWATR 60	P1-3:A3:42:_CASCADE 115/60KV TB 1	P1	N-1	0.99	0.96	0.96	1.02	1.02	0.97	0.96	0.97	0.98	0.95	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-1:A3:81:_KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWA	P2-1	Line Section w/o fault	0.99	0.95	0.95	1.04	1.04	0.96	0.95	0.95	0.97	0.93	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-2:A3:37:_CASCADE 115KV SECTION 1D	P2	Bus	0.99	0.96	0.96	1.02	1.02	0.97	0.96	0.97	0.98	0.95	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-2:A3:54:_CASCADE 60KV SECTION MA	P2	Bus	0.99	0.95	0.95	1.04	1.04	0.96	0.95	0.95	0.98	0.93	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.96	0.89	0.88	1.06	1.03	0.89	0.90	0.92	0.93	0.88	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-3:A3:61:_CASCADE - MA 60KV & CASCADE-BENTON-DESCHUT	P2	Non-bus-tie breaker	0.99	0.95	0.95	1.04	1.04	0.96	0.95	0.95	0.98	0.94	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.89	0.88	1.06	1.03	0.90	0.73	0.83	0.99	0.73	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.02	0.90	0.89	1.06	1.03	0.90	0.87	0.88	1.00	0.86	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.96	0.89	0.88	1.06	1.03	0.89	0.90	0.92	0.93	0.88	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.90	0.89	1.06	1.03	0.91	0.88	0.88	1.00	0.84	Cottonwood...Benton... Scope under review
STLLWATR 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.00	1.02	1.02	1.01	1.01	1.02	0.79	Cottonwood...Benton... Scope under review
STLLWATR 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCAD	P6	N-1/N-1	0.68	0.41	0.59	0.95	0.89	0.40	0.42	0.39	0.73	0.59	Cottonwood...Benton... Scope under review
TAP 65 60	Base Case	P0	Normal	1.05	1.04	1.04	1.05	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed

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Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
TAP 65 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.10	1.09	1.09	1.01	1.11	1.05	1.04	1.01	1.11	0.93	Load power factor correction and voltage support if needed
TAP 65 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_TRINITY-COTTONWOOD 115KV [4040]	P6	N-1/N-1				0.91	0.94			0.95		0.85	Cottonwood...Benton... Scope under review
TAP 65 60	P1-2:A3:37:_TRINITY-COTTONWOOD 115KV [4040] P1-2:A3:38:_COTWDPGE 115KV - SECTION 2D & 1D	P6	N-1/N-1				1.10							Load power factor correction and voltage support if needed
TBLE MTN 115	Base Case	P0	Normal	1.04	1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.04	1.04	Load power factor correction and voltage support if needed
TKO TAP 60	Base Case	P0	Normal	1.05	1.03	1.03	1.07	1.05	1.04	1.03	1.04	1.04	1.02	Load power factor correction and voltage support if needed
TKO TAP 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.04	0.98	0.97	1.08	1.05	0.99	0.97	0.98	1.02	0.95	Cottonwood...Benton... Scope under review
TKO TAP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.79	0.77	1.08	1.04	0.79	0.78	0.82	0.87	0.77	Cottonwood...Benton... Scope under review
TKO TAP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.80	0.78	1.08	1.04	0.81	0.50	0.68	1.00	0.51	Cottonwood...Benton... Scope under review
TKO TAP 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.08	1.04	0.82	0.76	0.78	1.02	0.76	Cottonwood...Benton... Scope under review
TKO TAP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.79	0.77	1.08	1.04	0.79	0.78	0.82	0.87	0.77	Cottonwood...Benton... Scope under review
TKO TAP 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.81	0.79	1.08	1.04	0.82	0.78	0.77	1.02	0.72	Cottonwood...Benton... Scope under review
TKO TAP 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.03	1.05	1.05	1.04	1.03	1.03	1.04	0.88	Cottonwood...Benton... Scope under review
TKO TAP 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310] P1-2:A3:65:_BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1				1.12							Load power factor correction and voltage support if needed
TRES VIS 60	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.02	0.99	0.99	1.03	1.01	1.00	0.99	0.99	0.88	0.99	Sensitivity only
TRINITY 115	Base Case	P0	Normal	1.05	1.04	1.04	1.05	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed
TRINITY 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.10	1.09	1.10	1.01	1.11	1.05	1.04	1.02	1.12	0.94	Cottonwood...Benton... Scope under review
TRINITY 115	P1-2:A3:37:_TRINITY-COTTONWOOD 115KV [4040] P1-2:A3:38:_COTWDPGE 115KV - SECTION 2D & 1D	P6	N-1/N-1				1.10							Load power factor correction and voltage support if needed
TRINITY 60	Base Case	P0	Normal	1.05	1.04	1.04	1.05	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed
TRINITY 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.10	1.09	1.09	1.01	1.11	1.05	1.04	1.01	1.11	0.93	Cottonwood...Benton... Scope under review
TRINITY 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_TRINITY-COTTONWOOD 115KV [4040]	P6	N-1/N-1				0.91	0.94			0.95		0.85	
TYLER 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
TYLER 60	P2-1:A3:98:_COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JN	P2-1	Line Section w/o fault	1.02	0.92	0.91	1.01	0.99	0.97	0.91	0.92	0.95	0.91	Cottonwood...Benton... Scope under review
TYLERJT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.19	0.19	0.18	1.04	0.97	0.18	0.15	0.17	0.30	0.20	Cottonwood...Benton... Scope under review
TYLERJT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.89	0.21	0.19	1.06	0.98	0.21	0.00	0.09	0.80	0.07	Cottonwood...Benton... Scope under review
TYLERJT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.19	0.19	0.18	1.04	0.97	0.18	0.15	0.17	0.30	0.20	Cottonwood...Benton... Scope under review
TYLERJT 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_	P6	N-1/N-1		0.88	0.87			0.90	0.81	0.85	0.95	0.86	Cottonwood...Benton... Scope under review
ULTR WSD 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ULTR WSD 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
ULTR WSD 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.02	0.96	0.90	1.04	1.02	0.96	0.95	0.96	1.01	0.90	Substation upgrade or voltage support if needed
ULTR WSD 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
VINA 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.02	0.91	0.91	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Cottonwood...Benton... Scope under review
VINA 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLM	P2-1	Line Section w/o fault	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.89	0.96	0.89	Cottonwood...Benton... Scope under review
VINA 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.89	0.96	0.89	Cottonwood...Benton... Scope under review
VINA 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.25	0.23	0.23	1.05	0.99	0.23	0.19	0.22	0.36	0.24	Cottonwood...Benton... Scope under review
VINA 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD L	P2	Non-bus-tie breaker	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.90	0.96	0.89	Cottonwood...Benton... Scope under review
VINA 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	0.93	0.26	0.24	1.07	1.00	0.26	0.00	0.12	0.84	0.09	Cottonwood...Benton... Scope under review
VINA 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.01	0.27	0.28	1.09	1.02	0.27	0.23	0.25	0.92	0.26	Cottonwood...Benton... Scope under review
VINA 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.25	0.23	0.23	1.05	0.99	0.23	0.19	0.22	0.36	0.24	Cottonwood...Benton... Scope under review
VINA 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.28	0.26	1.09	1.02	0.29	0.22	0.24	0.92	0.23	Cottonwood...Benton... Scope under review
VINA 60	P1-1:A3:47:_SOUTH G 4.16KV GEN UNIT 1 P1-2:A3:73:_COT	P3	G-1/N-1		0.91	0.90				0.89	0.90		0.90	Cottonwood...Benton... Scope under review
VINA 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_C	P6	N-1/N-1		0.33	0.32			0.33	0.31	0.31		0.34	Cottonwood...Benton... Scope under review
VINA 60	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff	P7	DCTL	1.01	0.91	0.91	1.04	1.03	0.92	0.90	0.91	0.96	0.91	Cottonwood...Benton... Scope under review
VOLTA 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.64	0.59	0.58	1.06	1.03	0.59	0.56	0.61	0.70	0.59	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
VOLTA 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.01	0.62	0.59	1.07	1.03	0.63	0.14	0.41	0.98	0.24	Cottonwood...Benton... Scope under review
VOLTA 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.04	0.63	0.62	1.08	1.03	0.63	0.57	0.58	1.01	0.59	Cottonwood...Benton... Scope under review
VOLTA 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.64	0.59	0.58	1.06	1.03	0.59	0.56	0.61	0.70	0.59	Cottonwood...Benton... Scope under review
VOLTA 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.64	0.61	1.08	1.03	0.64	0.60	0.57	1.01	0.53	Cottonwood...Benton... Scope under review
VOLTA 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.03	1.03	1.04	1.04	1.03	1.03	1.03	1.03	0.98	Cottonwood...Benton... Scope under review
VOLTA 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COT	P6	N-1/N-1		0.73	0.73			0.73	0.72	0.73		0.74	Cottonwood...Benton... Scope under review
WESTWOOD 60	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
WESTWOOD 60	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
WESTWOOD 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	1.02	0.96	0.90	1.04	1.01	0.96	0.95	0.96	1.01	0.90	Substation upgrade or voltage support if needed
WESTWOOD 60	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230K	P2	Bus-tie breaker	0.96	0.00	0.00	1.04	1.02	0.00	0.00	0.00	0.00	0.00	Existing Caribou RAS should trip the generator
WHEELBR 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.02	1.03	Load power factor correction and voltage support if needed
WHEELBR 115	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 2	P2	Bus-tie breaker	1.04	1.02	1.02	1.03	1.03	1.02	1.01	1.02	1.02	0.96	Cottonwood...Benton... Scope under review
WHITMORE 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.03	1.04	1.04	1.02	Load power factor correction and voltage support if needed
WHITMORE 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.04	0.99	0.98	1.09	1.05	0.99	0.97	0.98	1.03	0.96	Cottonwood...Benton... Scope under review
WHITMORE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.79	0.78	1.08	1.04	0.80	0.78	0.83	0.87	0.77	Cottonwood...Benton... Scope under review
WHITMORE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.04	0.81	0.78	1.08	1.04	0.82	0.51	0.68	1.01	0.51	Cottonwood...Benton... Scope under review
WHITMORE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.09	1.04	0.82	0.77	0.78	1.03	0.76	Cottonwood...Benton... Scope under review
WHITMORE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.79	0.78	1.08	1.04	0.80	0.78	0.83	0.87	0.77	Cottonwood...Benton... Scope under review
WHITMORE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.82	0.80	1.09	1.04	0.83	0.79	0.78	1.03	0.72	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WHITMORE 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.04	1.05	1.05	1.04	1.03	1.03	1.04	0.89	Cottonwood...Benton... Scope under review
WHITMORE 60	P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P1-2:A	N-1/N-1				1.12							Load power factor correction and voltage support if needed
WILDWOOD 115	Base Case	P0	Normal	1.06	1.04	1.04	1.06	1.06	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
WILDWOOD 115	P2-1:A3:28:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDW	P2-1	Line Section w/o fault	1.08	1.05	1.05	1.09	1.13	1.05	1.04	1.04	1.10	1.06	Load power factor correction and voltage support if needed
WILDWOOD 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.08	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.10	1.06	Load power factor correction and voltage support if needed
WILDWOOD 115	P2-3:A3:35:_COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD	P2	Non-bus-tie breaker	1.07	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.09	1.06	Load power factor correction and voltage support if needed
WILDWOOD 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.13	1.11	1.12	1.06	1.15	1.05	1.04	1.03	1.15	1.03	Load power factor correction and voltage support if needed
WNTU PMS 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.04	1.03	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
WNTU PMS 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.02	0.95	0.95	1.06	1.03	0.96	0.94	0.95	0.99	0.93	Cottonwood...Benton... Scope under review
WNTU PMS 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.80	0.79	1.06	1.03	0.81	0.79	0.84	0.87	0.79	Cottonwood...Benton... Scope under review
WNTU PMS 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD	P2	Non-bus-tie breaker	1.02	0.81	0.79	1.06	1.03	0.82	0.54	0.71	0.98	0.56	Cottonwood...Benton... Scope under review
WNTU PMS 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LIN	P2	Non-bus-tie breaker	1.03	0.82	0.80	1.06	1.03	0.83	0.77	0.79	0.98	0.77	Cottonwood...Benton... Scope under review
WNTU PMS 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.80	0.79	1.06	1.03	0.81	0.79	0.84	0.87	0.79	Cottonwood...Benton... Scope under review
WNTU PMS 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.82	0.80	1.06	1.03	0.83	0.79	0.79	0.98	0.74	Cottonwood...Benton... Scope under review
WNTU PMS 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.03	1.04	1.03	1.02	1.02	1.02	0.89	Cottonwood...Benton... Scope under review
WNTU PMS 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2	P1-3:A3:5:_COTWD_	N-1/N-1		0.94	0.93			0.96	0.89	0.92		0.92	Cottonwood...Benton... Scope under review
WODLF TP 115	Base Case	P0	Normal	1.05	1.04	1.04	1.10	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
WODLF TP 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.03	1.03	1.13	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WODLF TP 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.03	1.03	1.13	1.05	1.03	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.05	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
WODLF TP 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.05	1.04	1.04	1.11	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
WODLF TP 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
WODLF TP 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.03	1.03	1.13	1.05	1.03	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.10	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.10	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.12	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
WODLF TP 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.13	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WODLF TP 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.67	N/A	N/A	1.11	N/A	0.53	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
WODLF TP 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
WODLF TP 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.05	1.04	1.04	1.11	1.05	1.04	1.04	1.04	1.03	1.04	Load power factor correction and voltage support if needed
WYANDJT1 115	Base Case	P0	Normal	1.06	1.02	1.02	1.09	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT1 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.01	1.00	1.10	1.03	1.00	1.00	1.01	1.00	1.00	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
WYANDJT1 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.01	1.01	1.13	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.02	1.02	1.12	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.10	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.02	1.02	1.03	1.03	1.02	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.12	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.05	1.02	1.02	1.02	1.03	1.02	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.01	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
WYANDJT1 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.63	N/A	N/A	1.11	N/A	0.48	N/A	N/A	N/A	N/A	Load power factor correction and voltage support if needed
WYANDJT1 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
WYANDJT1 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.02	1.02	1.11	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT2 115	Base Case	P0	Normal	1.06	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WYANDJT2 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.02	1.02	1.13	1.03	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT2 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.02	1.13	1.06	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT2 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.02	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL	P2-1	Line Section w/o fault	1.00	0.62	0.57	1.09	1.05	0.63	0.64	0.59	0.56	0.55	Existing Caribou RAS should trip the generator
WYANDJT2 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL	P2-1	Line Section w/o fault	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	1.00	0.62	0.57	1.09	1.05	0.63	0.56	0.65	0.60	0.54	Existing Caribou RAS should trip the generator
WYANDJT2 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.02	1.13	1.06	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.02	1.01	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.03	1.01	1.02	1.02	1.02	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.13	1.05	1.02	1.01	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	0.95	0.32	0.30	1.08	1.00	0.31	0.29	0.30	0.87	0.30	Substation upgrade or voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WYANDJT2 115	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	1.00	0.62	0.54	1.09	1.06	0.60	0.54	0.60	0.59	0.54	Load power factor correction and voltage support if needed
WYANDJT2 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.48	N/A	N/A	1.11	N/A	0.34	N/A	N/A	N/A	N/A	Existing Caribou RAS should trip the generator
WYANDJT2 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MTN-PALERMO 230KV [5690]	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
WYANDJT2 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table MTN-PALERMO 230KV [5690]	P7	DCTL	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115	Base Case	P0	Normal	1.06	1.02	1.02	1.09	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction and voltage support if needed
WYANDTTE 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.01	1.01	1.13	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.02	1.02	1.12	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PAL)	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.10	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.02	1.02	1.02	1.03	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.12	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

Voltage Deviations



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WYANDTTE 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.02	1.11	1.05	1.02	1.02	1.02	1.03	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.01	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LIN	P2	Non-bus-tie breaker	0.95	0.32	0.30	1.08	1.00	0.31	0.29	0.30	0.87	0.30	Substation upgrade or voltage support if needed
WYANDTTE 115	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.63	N/A	N/A	1.11	N/A	0.48	N/A	N/A	N/A	N/A	Existing Caribou RAS should trip the generator
WYANDTTE 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE M	P6	N-1/N-1				1.13							Load power factor correction and voltage support if needed
WYANDTTE 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table M	P7	DCTL	1.06	1.02	1.02	1.11	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage (PU)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CR CANAL 60	P1-3:A3:59:_NEO REDT 60/13.8KV TB 1	P1	N-1	4.3	10.7	11.7	4.2	5.2	7.3	11.7	11.0	8.6	11.2	Cottonwood...Benton... Scope under review
NEO REDT 60	P1-3:A3:59:_NEO REDT 60/13.8KV TB 1	P1	N-1	4.3	10.8	11.7	4.2	5.2	7.3	11.8	11.1	8.6	11.2	Cottonwood...Benton... Scope under review
TYLER 60	P1-3:A3:59:_NEO REDT 60/13.8KV TB 1	P1	N-1	4.3	10.7	11.6	4.2	5.2	7.3	11.7	11.0	8.6	11.1	Cottonwood...Benton... Scope under review

Study Area: PG&E North Valley

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..	
Colusa Generator fault (steam unit)	P1-1		0	0	0	1	1						Under review with PTO
Table Mountain to Thermalito 230 kV line fault	P1-2		0	0	0	0	0						No Violation
Round Mountain 500/230 kV Transformer fault	P1-3		0	0	0	0	0						No Violation
Delevan SVD fault	P1-4		0	1	1	0	1						Under review with PTO
Round Mountain 230 kV Bus Section fault	P2-2		1	1	1	1	1						Under review with PTO
Round Mountain 230 kV non-bus-tie breaker fault	P2-3		1	1	1	1	1						Under review with PTO
Round Mountain 230 kV bus-tie breaker fault	P2-4		1	1	1	1	1						Under review with PTO
Colusa steam unit out and gas unit fault	P3-1		0	0	0	1	1						Under review with PTO
Colusa steam unit out and Table Mountain to Thermalito 230 kV line fault	P3-2		0	0	0	1	1						Under review with PTO
Colusa generator out and Round Mountain 500/230 kV Transformer	P3-3		0	0	0	1	1						Under review with PTO
Colusa generator out and Delevan SVD fault	P3-4		0	1	1	1	1						Under review with PTO
Colusa steam and gas units fault + stuck breaker	P4-1		0	0	0	1	1						Under review with PTO
Table Mountain -Rio Oso and Table Mountain-Palermo 230 kV line fault + stuck breaker	P4-2		1	1	1	1	1						Under review with PTO
Round Mountain transformer and Round Mountain - Cottonwood 230 kV lines + stuck breaker	P4-3		0	0	0	0	0						No Violation
Delevan SVD fault plus stuck breaker	P4-4		0	1	1	0	1						Under review with PTO
Round Mountain bus section fault plus stuck breaker (non-bus-tie breaker)	P4-5		0	0	0	0	0						No Violation
Round Mountain bus section fault plus stuck breaker (bus-tie breaker)	P4-6		1	1	1	1	1						Under review with PTO
Colusa gas turbine fault plus relay failure	P5-1		0	0	0	1	1						Under review with PTO
Table Mountain - Rio Oso 230 kV line fault plus relay failure	P5-2		0	0	0	0	0						No Violation
Round Mountain 500/230 kV Transformer fault plus relay failure	P5-3		0	0	0	0	0						No Violation
Delevan SVD fault plus relay failure	P5-4		0	1	1	0	1						Under review with PTO
Round Mountain 230 kV Bus section fault plus relay failure	P5-5		1	1	1	1	1						Under review with PTO
Tesla 230 kV Bus section fault plus relay failure	P5-5		0	0	0	0	0						No Violation
Round Mountain Transformer and Round Mountain - Thermalito and Hyatt 230 kV lines	P6-1		0	0	0	0	0						No Violation
Round Mountain and Table Mountain transformer faults	P6-2		0	0	0	0	0						No Violation
Delevan and Cottonwood SVD faults	P6-3		0	1	1	0	1						Under review with PTO
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Temporary DCTL fault	P7-1		1	1	1	1	1						Under review with PTO
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Permanent DCTL fault	P7-1		0	1	1	1	1						Under review with PTO

Study Area: PG&E North Valley



Single Contingency Load Drop

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

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

Study Area: **PG&E North Valley**



Single Source Substation with more than 100 MW Load

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

No single Source Substation with more than 100 MW Load.