

2014-2015 ISO Reliability Assessment - Preliminary Study Results

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

Thermal Overloads



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

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

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BA-SP-T-19	Trimble-San Jose 'B' 115 kV Line	FAULT AT 35642 MTCALF D 115.00	C2	Breaker	106.2	103.4	104.3	Reconductor, rerate or explore the SPS option
BA-SP-T-20	Contra Costa-Moraga #1 230kV Line	FAULT AT 30525 C.COSTA 230 CB820	C2	Breaker	109.5	79.5	79.3	Short Term: Interim SPS Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-21	North Dublin-Cayetano 230kV Cable	FAULT AT 30525 C.COSTA 230 CB600	C2	Breaker	93.0	106.2	104.1	Reconductor, rerate or explore the SPS option
BA-SP-T-22	Contra Costa-Moraga #1 230kV Line	FAULT AT 30525 C.COSTA 230 CB820	C2	Breaker	113.1	70.2	69.6	Short Term: Interim SPS Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-23	Contra Costa-Moraga #2 230kV Line	FAULT AT 30525 C.COSTA 230 CB810	C2	Breaker	109.7	65.7	66.0	Short Term: Action Plan - Reduce Contra Costa Area gen Long Term: Contra Costa-Moraga Reconductor Project
BA-SP-T-24	Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	FAULT AT 30525 C.COSTA 230 CB600	C2	Breaker	93.5	107.1	105.4	Reconductor, rerate or explore the SPS option
BA-SP-T-25	Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	FAULT AT 30525 C.COSTA 230 CB600	C2	Breaker	99.1	112.8	111.1	Reconductor, rerate or explore the SPS option
BA-SP-T-26	Oakland D - Oakland L 115kV Cable	FAULT AT 32790 STATIN X 115.00 CB 372	C2	Breaker	64.8	105.2	105.0	Increase generation in the Oakland Area
BA-SP-T-27	Oakland C-Oakland L 115 kV Cable	FAULT AT 32780 CLARMNT 115.00 CB122	C2	Breaker	102.6	103.8	104.4	Claremont bus upgrade or explore the SPS option
BA-SP-T-28	Sobrante-Grizzly-Claremont #2 115kV Line (Hillside-Grizzly JCT)	FAULT AT 30550 MORAGA 230 CB202	C2	Breaker	101.1	85.3	84.4	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-29	Sobrante-Grizzly-Claremont #2 115kV Line (Hillside-Grizzly JCT)	FAULT AT 30550 MORAGA 230 CB202	C2	Breaker	104.5	88.6	87.7	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project

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BA-SP-T-30	Moraga-Claremont #1 115kV Line	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	77.6	109.6	111.7	Increase generation in the Oakland Area
BA-SP-T-31	Moraga-Claremont #2 115kV Line	FAULT AT 32790 STATIN X 115.00 CB 372	C2	Breaker	76.2	106.1	107.3	Increase generation in the Oakland Area
BA-SP-T-32	Moraga-Oakland J 115kV Line	FAULT AT 351001 SN LNDRO 115 CB102	C2	Breaker	135.4	76.1	73.5	Short Term: Action plan Long Term: Reconductor Moraga-Oakland J 115 kV Line
BA-SP-T-33	Sobrante-Moraga 115kV Line	FAULT AT 30550 MORAGA 230 CB202	C2	Breaker	130.4	98.0	96.2	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-34	Moraga-Station X # 1	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	74.9	104.0	104.9	Increase generation in the Oakland Area
BA-SP-T-35	Moraga-Oakland X #2 115kV Line	FAULT AT 32780 CLARMNT 115.00 CB122	C2	Breaker	81.1	100.6	100.4	Increase generation in the Oakland Area
BA-SP-T-36	Moraga-Station X # 3	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	79.8	122.5	124.5	Increase generation in the Oakland Area
BA-SP-T-37	Moraga-Station X # 4	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	79.8	122.5	124.5	Increase generation in the Oakland Area
BA-SP-T-38	Moraga-San Leandro #1 115kV Line	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	123.0	79.6	77.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-39	Moraga-San Leandro #2 115kV Line	FAULT AT 33020 MORAGA 115 CB432	C2	Breaker	150.3	94.7	92.7	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-40	Moraga-San Leandro #3 115kV Line	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	105.6	68.3	66.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project

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BA-SP-T-41	Moraga-Station X # 1	FAULT AT 33020 MORAGA 115 CB442	C2	Breaker	76.0	105.5	106.5	Increase generation in the Oakland Area
BA-SP-T-42	Moraga-Oakland X #2 115kV Line	FAULT AT 32780 CLARMNT 115.00 CB122	C2	Breaker	82.3	102.2	101.9	Increase generation in the Oakland Area
BA-SP-T-43	Moraga-Station X # 3	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	81.0	124.4	126.4	Increase generation in the Oakland Area
BA-SP-T-44	Moraga-Station X # 4	FAULT AT 33020 MORAGA 115 CB502	C2	Breaker	81.0	124.4	126.4	Increase generation in the Oakland Area
BA-SP-T-45	Potrero-Larkin #2 (AY-2) 115kV Cable	FAULT AT 33204 POTRERO 115 CB102	C2	Breaker	149.9	87.7	87.2	Short Term : Action Plan; Long Term : Potrero bus upgrade project.
BA-SP-T-46	Grant-Eastshore #1 115kV Line	FAULT AT 33020 MORAGA 115 CB602	C2	Breaker	27.1	102.5	103.0	Rerate or explore the SPS option.
BA-SP-T-47	Grant-Eastshore #2 115kV Line	FAULT AT 33020 MORAGA 115 CB602	C2	Breaker	27.1	102.5	103.0	Rerate or explore the SPS option.
BA-SP-T-48	Ravenswood-Palo Alto #2 115kV Line	FAULT AT RVNSWD 115 CB522	C2	Breaker	107.2	104.2	115.4	Palo Alto interim SPS
BA-SP-T-49	Oleum-Christie 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	101.8	101.7	73.2	Short Term : Action Plan ; Long Term : North Tower 115 kV Looping Project
BA-SP-T-50	Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	128.8	127.0	111.7	Short Term : Action Plan ; Long Term: Christie SPS
BA-SP-T-51	Martinez-Oleum 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	106.7	108.1	89.7	Short Term: Action Plan; Long Term :North Tower 115 kV Looping Project
BA-SP-T-52	Oleum-Martinez 115kV Line (OLEUM-MARTINEZ - From Oleum PP To 7/50)	Sobrante-G Nos. 1 & 2 115 kV lines	C5	N-2	99.7	101.0	83.8	North Tower 115 kV Loop project

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BA-SP-T-53	Moraga-San Leandro #1 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115	C5	N-2	129.5	84.7	82.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-54	Moraga-San Leandro #2 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115	C5	N-2	130.8	85.6	83.7	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-55	Moraga-San Leandro #3 115kV Line	Moraga-San Leandro Nos. 1 & 2 115 kV lines	C5	N-2	115.3	84.6	83.0	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-56	San Leandro - Oakland J #1 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115	C5	N-2	100.6	56.9	54.6	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-57	Newark-Dixon Landing 115kV Line	Swift - Metcalf & Piercy - Metcalf 115 kV Lines	C5	N-2	105.0	65.3	61.6	Short Term : Action Plan; Long Term : Evergreen-Mabury Voltage Conversion Project
BA-SP-T-58	Ravenswood-Cooley Landing #1 115kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	N-2	128.4	94.3	104.3	Palo Alto interim SPS
BA-SP-T-59	Cooley Landing-Palo Alto 115kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	N-2	110.1	113.1	130.3	Palo Alto interim SPS
BA-SP-T-60	Moraga 230/115kV Transformer #2	Moraga 230/115kV Transformer #3 & Moraga 230/115kV Transformer #1	C3	N-1-1	125.0	<90	<90	Short Term: Action Plan Long Term: Moraga 230/115 kV Transformer Replacement project
BA-SP-T-61	Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-El Cerrito STA G #1 115kV Line & Sobrante-El Cerrito STA G #2 115kV Line	C3	N-1-1	127.8	126.7	105.0	Short Term : Action Plan ; Long Term: Christie SPS
BA-SP-T-62	Oakland D - Oakland L 115kV Cable	Oakland C - Oakland X #2 115kV Cable & Oakland C - Oakland X #3 115kV Cable	C3	N-1-1	<90	105.5	105.3	Increase generation in the Oakland Area

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BA-SP-T-63	Oakland C - Oakland L #1 115kV Cable	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	102.9	104.0	104.6	Action plan or explore potential mitigation
BA-SP-T-64	Oakland C - Oakland X #2 115kV Cable	Oakland C - Oakland X #3 115kV Cable & Oakland D - Oakland L 115kV Cable	C3	N-1-1	<90	105.2	105.0	Increase generation in the Oakland Area
BA-SP-T-65	San Leandro - Oakland J #1 115kV Line	Moraga-Oakland J 115kV Line & Moraga-San Leandro #3 115kV Line	C3	N-1-1	100.6	<90	<90	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-66	San Leandro - Oakland J #1 115kV Line	Moraga-Oakland J 115kV Line & Oakland J - Grant 115kV Line	C3	N-1-1	<90	100.1	100.8	Action plan or explore potential mitigation
BA-SP-T-67	Pittsburg 230/115kV Transformer #12	LMEC GSU CST1 & Pittsburg 230/115kV Transformer #13	C3	N-1-1	131.3	90.3	<90	Short Term: Action plan Long Term: Pittsburg 230/115 kV Transformer Addition project
BA-SP-T-68	Pittsburg 230/115kV Transformer #13	LMEC GSU CST1 & Pittsburg 230/115kV Transformer #12	C3	N-1-1	152.2	100.0	94.3	Short Term: Action plan Long Term: Pittsburg 230/115 kV Transformer Addition project
BA-SP-T-69	Martinez-Oleum 115kV Line	Sobrante-El Cerrito STA G #2 115kV Line & Sobrante-El Cerrito STA G #1 115kV Line	C3	N-1-1	107.7	108.3	95.7	Short Term : Action Plan; Long Term : North Tower 115 kV Looping Project
BA-SP-T-70	Oleum-Martinez 115kV Line	Sobrante-El Cerrito STA G #2 115kV Line & Sobrante-El Cerrito STA G #1 115kV Line	C3	N-1-1	100.6	101.2	<90	Short Term : Action Plan; Long Term : North Tower 115 kV Looping Project
BA-SP-T-71	Moraga-Claremont #1 115kV Line	DEC GSU CTG3 & Moraga-Claremont #2 115kV Line	C3	N-1-1	90.7	104.1	105.8	Increase generation in the Oakland Area
BA-SP-T-72	Moraga-Claremont #2 115kV Line	DEC GSU CTG3 & Moraga-Claremont #1 115kV Line	C3	N-1-1	90.8	104.1	105.9	Increase generation in the Oakland Area

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BA-SP-T-73	Moraga-Station X 115 kV #1 Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-74	Moraga-Oakland X #2 115kV Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-75	Moraga-Station X 115 kV #3 Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-76	Moraga-Station X 115 kV #4 Line	Claremont K - Oakland D #1 115kV Cable & Claremont K - Oakland D #2 115kV Cable	C3	N-1-1	<90	102.3	102.1	Increase generation in the Oakland Area
BA-SP-T-77	Moraga-San Leandro #1 115kV Line	Moraga-San Leandro #2 115kV Line & Moraga-San Leandro #3 115kV Line	C3	N-1-1	143.8	101.4	99.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-78	Moraga-San Leandro #2 115kV Line	Moraga-San Leandro #1 115kV Line & Moraga-San Leandro #3 115kV Line	C3	N-1-1	144.2	101.9	99.9	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-79	Moraga-San Leandro #3 115kV Line	Moraga-San Leandro #1 115kV Line & Moraga-San Leandro #2 115kV Line	C3	N-1-1	115.3	<90	<90	Short Term : Action Plan ; Long Term : East Shore-Oakland J 115 kV Reconductoring Project
BA-SP-T-80	Potrero-Larkin #1 (AY-1) 115kV Cable	Mission-Larkin (XY-1) 115kV Cable & Martin-Larkin (HY-1) 115kV Cable	C3	N-1-1	144.4	140.5	134.4	Action plan or explore potential mitigation
BA-SP-T-81	Potrero-Larkin #2 (AY-2) 115kV Cable	Potrero-Larkin #1 (AY-1) 115kV Cable & Potrero-Mission (AX) 115kV Cable	C3	N-1-1	114.6	114.3	112.8	Action plan or explore potential mitigation

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BA-SP-T-82	Potrero-Mission (AX) 115kV Cable	Potrero-Larkin #1 (AY-1) 115kV Cable & Potrero-Larkin #2 (AY-2) 115kV Cable	C3	N-1-1	133.5	133.3	131.9	Short Term: Action Plan Long Term: Explore the option of modifying TBC DC Runback Scheme
BA-SP-T-83	Martin-Sneath Lane 60kV Line	Millbrae-San Mateo #1 115kV Line & Martin-Millbrae 115kV Line	C3	N-1-1	156.1	157.7	156.7	Reverse power relay at Millbrae
BA-SP-T-84	San Mateo-Belmont 115kV Line	Ravenswood 230/115kV Transformer #1 & Ravenswood 230/115kV Transformer #2	C3	N-1-1	99.9	100.1	103.8	Action plan or explore potential mitigation
BA-SP-T-85	Ravenswood-Palo Alto #1 115kV Line	Ravenswood-Palo Alto #2 115kV Line & Ravenswood-Cooley Landing #1 115kV Line	C3	N-1-1	105.3	102.7	114.1	Palo Alto interim SPS
BA-SP-T-86	Ravenswood-Palo Alto #2 115kV Line	Ravenswood-Palo Alto #1 115kV Line & Ravenswood-Cooley Landing #1 115kV Line	C3	N-1-1	105.1	102.6	114.0	Palo Alto interim SPS
BA-SP-T-87	Millbrae-Sneath Lane 60kV Line	Hillsdale JCT - Half Moon Bay 60kV Line & Martin-Sneath Lane 60kV Line	C3	N-1-1	120.8	125.4	132.4	Action plan or explore potential mitigation
BA-SP-T-88	Bair 115/60kV Transformer #1	Ravenswood-Cooley Landing #2 115kV Line & Cooley Landing 115/60kV Transformer #1	C3	N-1-1	102.6	107.9	106.0	Action plan or explore potential mitigation
BA-SP-T-89	Cooley Landing 115/60kV Transformer #2	Bair 115/60kV Transformer #1 & Cooley Landing 115/60kV Transformer #1	C3	N-1-1	103.8	<90	<90	Short Term : Action Plan ; Long Term : Cooley Landing 115/60 kV Transformer Capacity Upgrade
BA-SP-T-90	Jefferson-Stanford #1 60kV Line	Jefferson-Las Pulgas 60kV Line (Jefferson-Woodside) & Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	C3	N-1-1	99.2	108.4	110.5	Short Term: Action Plan Long Term: Jefferson-Stanford No. 2 60 kV Line

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BA-SP-T-91	Grant-Eastshore #1 115kV Line	San Leandro-Oakland J 115kV Line & Grant-Eastshore #2 115kV Line	C3	N-1-1	107.6	<90	<90	Short Term : Action Plan Long Term :East shore-Oakland project
BA-SP-T-92	Grant-Eastshore #1 115kV Line	Grant-Eastshore #2 115kV Line & Eastshore-San Mateo 230kV Line	C3	N-1-1	<90	100.3	100.4	Rerate or explore the SPS option.
BA-SP-T-93	Grant-Eastshore #2 115kV Line	San Leandro-Oakland J 115kV Line & Grant-Eastshore #1 115kV Line	C3	N-1-1	107.6	<90	<90	Short Term : Action Plan Long Term :East shore-Oakland project
BA-SP-T-94	Grant-Eastshore #2 115kV Line	Grant-Eastshore #1 115kV Line & Eastshore-San Mateo 230kV Line	C3	N-1-1	<90	100.3	100.4	Rerate or explore the SPS option.
BA-SP-T-95	Newark 115/60kV Transformer #1	Las Positas-Newark 230kV Line & Contra Costa-Las Positas 230kV Line	C3	N-1-1	149.8	149.8	150.9	Action plan or explore potential mitigation
BA-SP-T-96	Newark-Applied Materials 115kV Line	Newark-Lawrence 115 kV & Britton-Monta Vista 115 kV	C3	N-1-1	103.7	<90	<90	Short Term : Action Plan; Long Term : Monta Vista 230 kV Bus Upgrade Project
BA-SP-T-97	Newark-Milpitas #1 115kV Line	Newark-Milpitas 115 kV #2 & Swift-Metcalf 115 kV	C3	N-1-1	141.0	140.1	138.3	Action plan or explore potential mitigation
BA-SP-T-98	Newark-Milpitas #2 115kV Line	Newark-Milpitas 115 kV #1 & Swift-Metcalf 115 kV	C3	N-1-1	117.3	116.6	115.2	Action plan or explore potential mitigation
BA-SP-T-99	Livermore-Las Positas 60kV Line	Contra Costa-Las Positas 230kV Line & Las Positas-Newark 230kV Line	C3	N-1-1	199.8	200.3	200.5	Existing reverse power relay at Las Positas
BA-SP-T-100	Radum-Livermore 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	226.3	227.4	226.8	Existing reverse power relay at San Ramon
BA-SP-T-101	San Ramon 230/60kV Transformer #1	Contra Costa-Las Positas 230kV Line & Las Positas-Newark 230kV Line	C3	N-1-1	140.1	142.2	142.8	Existing reverse power relay at Las Positas
BA-SP-T-102	San Ramon-Radum 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	209.1	209.6	208.6	Existing reverse power relay at San Ramon

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

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-103	Radum-Vallecitos 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	146.4	146.7	146.4	Existing reverse power relay at San Ramon
BA-SP-T-104	Newark-Vallecitos 60kV Line	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	163.6	164.4	165.3	Existing reverse power relay at San Ramon
BA-SP-T-105	Las Positas 230/60kV Transformer #4	Pittsburg-San Ramon 230kV Line & San Ramon-Moraga 230kV Line	C3	N-1-1	136.2	138.7	139.2	Existing reverse power relay at San Ramon
BA-SP-T-106	Newark-Livermore 60kV Line	Contra Costa-Las Positas 230kV Line & Las Positas-Newark 230kV Line	C3	N-1-1	176.2	175.8	176.8	Existing reverse power relay at Las Positas
BA-SP-T-107	Monta Vista 230/60 kV Trans No. 5	Evergreen-Almaden 60 kV & Monta Vista 115/60 kV Transformer #6	C3	N-1-1	115.7	111.8	112.0	Action plan or explore potential mitigation
BA-SP-T-108	Monta Vista-Los Gatos 60 kV Line	Monta Vista 115/60 kV Transformer #6 & Evergreen-Almaden 60 kV	C3	N-1-1	147.9	102.1	<90	Short Term : Action Plan ; Long Term : Monta Vista-Los Gatos-Evergreen 60kV Line Reconductor Project
BA-SP-T-109	Swift-Metcalf 115 kV Line	Newark-Milpitas 115 kV #1 & Newark-Milpitas 115 kV #2	C3	N-1-1	103.6	<90	<90	Short Term : Action Plan ; Long Term : Swift-Metcalf reconductor project
BA-SP-T-110	Dixon Landing-McKee 115 kV Line (Mabury-Mabury J)	Newark-Dixon Landing 115 kV & Piercy-Metcalf 115 kV	C3	N-1-1	<90	108.3	105.2	Action plan or explore potential mitigation
BA-SP-T-111	Mabury-Jennings J. 115 kV Line	Newark-Dixon Landing 115 kV & Piercy-Metcalf 115 kV	C3	N-1-1	<90	125.7	122.4	Action plan or explore potential mitigation
BA-SP-T-112	Metcalf-Llagas 115 kV Line	Metcalf-Morgan Hill 115 kV & Llagas-Gilroy Foods 115 kV	C3	N-1-1	112.3	115.5	<90	Short Term: Action Plan Long Term: Morgan Hill Area Reinforcement Project
BA-SP-T-113	Markham No. 2 115 kV Tap	Markham #1 115 kV Tap & Metcalf-Evergreen #1 115 kV	C3	N-1-1	102.0	<90	<90	Short Term : Action Plan ; Long Term : Stone back-tie reconductor project

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

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-T-114	Los Esteros-Montague 115 kV Line	Nortech-NRS 115 kV & Los Esteros-Trimble 115 kV	C3	N-1-1	100.0	<90	<90	Short Term : Action Plan ; Long Term : Los Esteros-Montague 115 kV Substation Equipment Upgrade Project

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

Thermal Overloads



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

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

Thermal Overloads



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

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

Thermal Overloads



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

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

Thermal Overloads



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

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

Voltage Deviations



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

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Winter Peak	2019 Winter Peak	2024 Winter Peak	
BA-WP-VD-1	Pacifica 60 kV	Newark-Ravenswood 230kV Line	B	N-1	5.01	0.29	2.96	Review Martin transformer tap and voltage schedule settings
BA-WP-VD-2	Pacifica 60 kV	Eastshore-San Mateo 230kV Line	B	N-1	2.19	5.91	5.80	Review Martin transformer tap and voltage schedule settings
BA-WP-VD-3	Hlf Mnby 60 kV	Hillsdale JCT - Half Moon Bay 60kV Line	B	N-1	8.55	8.58	9.51	Check with PGE about the automatic load flip flop scheme
BA-WP-VD-4	Snth Lne 60 kV	Eastshore-San Mateo 230kV Line	B	N-1	2.18	5.88	5.77	Review Martin transformer tap and voltage schedule settings
BA-WP-VD-5	Sn Brnot 60 kV	Eastshore-San Mateo 230kV Line	B	N-1	2.14	5.71	5.60	Review Martin transformer tap and voltage schedule settings

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

Voltage Deviations



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

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

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
BA-SP-V-1	Domtar 115 kV	Base Case	A	Normal	1.06	1.05	1.05	Change Contra Costa 230/115 kV transformer tap setting
BA-SP-V-2	Crown Z 115 kV	Base Case	A	Normal	1.06	1.05	1.05	Change Contra Costa 230/115 kV transformer tap setting
BA-SP-V-3	Cc Sub 60 kV	Base Case	A	Normal	1.08	1.08	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-4	Du Pont 60 kV	Base Case	A	Normal	1.08	1.07	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-5	Marsh 60 kV	Base Case	A	Normal	1.07	1.06	1.05	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-6	Briones 60 kV	Base Case	A	Normal	1.06	1.06	1.05	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-7	Balfour 60 kV	Base Case	A	Normal	1.07	1.06	1.06	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-8	Antioch 60 kV	Base Case	A	Normal	1.08	1.08	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-9	Pittsbrg 60 kV	Base Case	A	Normal	1.07	1.07	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-10	Shll Chm 60 kV	Base Case	A	Normal	1.07	1.06	1.06	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-11	Wllw Pss 60 kV	Base Case	A	Normal	1.07	1.06	1.06	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-12	Shllchmt 60 kV	Base Case	A	Normal	1.07	1.07	1.07	Change Contra Costa 115/60 kV transformer tap setting
BA-SP-V-13	Martin 60 kV	Base Case	A	Normal	1.05	1.05	1.05	Review Martin transformer tap and voltage schedule settings
BA-SP-V-14	Almaden 60 kV	Evergreen-Almaden 60 kV	B	N-1	0.87	0.92	0.92	Almaden Shunt Capacitor Project
BA-SP-V-15	Almaden 60 kV	PTSB 7 20.00 Unit ID 1 & Evergreen-Almaden 60 kV	B	G-1/L-1	0.86	>0.90	>0.90	Almaden Shunt Capacitor Project
BA-SP-V-16	Los Gats 60 kV	PTSB 7 20.00 Unit ID 1 & Evergreen-Almaden 60 kV	B	G-1/L-1	0.89	>0.90	>0.90	Almaden Shunt Capacitor Project
BA-SP-V-17	Iuka 60 kV	San Ramon-Moraga 230kV Line & Pittsburg-San Ramon 230kV Line	C	N-1-1	0.61	0.61	0.61	Existing reverse power relay at San Ramon

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

High/Low Voltage



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

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

High/Low Voltage



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

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

High/Low Voltage



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

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

High/Low Voltage



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

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

High/Low Voltage



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



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

No transient stability concern identified.



Transient Stability

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

No transient stability concern identified.



Transient Stability

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

No transient stability concern identified.

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



Single Contingency Load Drop

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

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

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



Single Contingency Load Drop

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

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

Single Contingency Load Drop

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

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

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

Single Source Substation with more than 100 MW Load



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

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

Single Source Substation with more than 100 MW Load



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

No single source substation with more than 100 MW Load

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

Single Source Substation with more than 100 MW Load



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

No single source substation with more than 100 MW Load