

2012/2013 ISO Reliability Assessment - Preliminary Study Results

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

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Penn-SP-T-01	Bair - Cooley Landing #1 60 kV Line	BUS FAULT AT 33375 CLY LNDG 60.00 Bus #1	C1	Bus	95%	103%	111%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-02	Bair - Cooley Landing #2 60 kV Line	BUS FAULT AT 33367 BAIR 60.00	C1	Bus	95%	102%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-03	Ravenswood - San Mateo 115 kV Line	CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	105%	N/A	N/A	2014: South of San Mateo SPS South of San Mateo Capacity Project
Penn-SP-T-04	Ravenswood - Palo Alto #2 115 kV Line	CB FAULT AT RVNSWD 115 CB522	C2	Breaker	120%	124%	132%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-05	Ravenswood - Cooley Landing #1 115 kV Line	CB FAULT AT RVNSWD 115 CB532	C2	Breaker	101%	N/A	N/A	Ravenswood - Cooley Landing Reconductor Project
Penn-SP-T-06	Bair - Cooley Landing #1 60 kV Line	CB FAULT AT CLY LNDG 60 CB2	C2	Breaker	97%	105%	113%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-07	SANMATEO 115/230 kV Bank 6	CB FAULT AT 30700 SANMATEO 230 CB712	C2	Breaker	139%	144%	151%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-08	SANMATEO 115/230 kV Bank 7	CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	122%	127%	136%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-09	BAIR 60/115kV Bank 1	CB FAULT AT CLY LNDG 60 CB2	C2	Breaker	120%	129%	138%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Penn-SP-T-10	BAIR 60/115kV Bank 1	Ravenswood-Cooley Landing #2 115kV Lin_Cooley Landing 115/60kV Transformer #1	C3	N-1-1	113%	121%	129%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-11	San Mateo - Hillsdale JCT 60 kV Line	Jefferson 230/60kV Transformer #1 _Jefferson 230/60kV Transformer #2	C3	N-1-1	90%	95%	108%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-12	Bair - Cooley Landing #1 60 kV Line	Bair-Cooley Landing #2 60kV Line _Bair 115/60kV Transformer #1	C3	N-1-1	89%	95%	103%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-13	Cooley Landing - Palo Alto 115 kV Line	Ravenswood-Palo Alto #1 115kV Line _Ravenswood-Palo Alto #2 115kV Line	C3	N-1-1	124%	125%	131%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-14	Cooley Landing - Stanford 60 kV Line	Jefferson 230/60kV Transformer #1 _Jefferson 230/60kV Transformer #2	C3	N-1-1	88%	92%	102%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-15	Cooley Landing 115/60 kV Transformer No. 2	Bair 115/60kV Transformer #1 _Cooley Landing 115/60kV Transformer #1	C3	N-1-1	116%	121%	130%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-16	Jefferson - Stanford 60 kV Line	Cooley Landing-Stanford 60kV Line (Coo_Jefferson-Las Pulgas 60kV Line (Jefferso	C3	N-1-1	104%	111%	120%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-17	Cooley Landing - Stanford 60 kV Line	Jefferson 230/60kV Transformer #1 _Jefferson 230/60kV Transformer #2	C3	N-1-1	89%	94%	104%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-18	Martin - Sneath Lane 60 kV Line	Martin-Millbrae 115kV Line _Millbrae- San Mateo #1 115kV Line	C3	N-1-1	164%	173%	186%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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Penn-SP-T-19	Millbrae - Sneath Lane 60 kV Line	Martin-Sneath Lane 60kV Line _Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	125%	130%	153%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-20	Bair - Cooley Landing #2 60 kV Line	Bair-Cooley Landing #1 60kV Line _Bair 115/60kV Transformer #1	C3	N-1-1	95%	101%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-21	Bair - Cooley Landing #1 60 kV Line	Bair-Cooley Landing #2 60kV Line _Bair 115/60kV Transformer #1	C3	N-1-1	89%	94%	103%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-22	Bair - Cooley Landing #2 60 kV Line	San Mateo-Bair 60kV Line _Bair 115/60kV Transformer #1	C3	N-1-1	99%	106%	114%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-23	Ravenswood - Palo Alto #1 115 kV Line	Ravenswood-Palo Alto #2 115kV Line _Ravenswood-Cooley Landing #1 115kV Line	C3	N-1-1	118%	122%	130%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-24	San Mateo - Hillsdale JCT 60 kV Line	Jefferson 230/60kV Transformer #1 _Jefferson 230/60kV Transformer #2	C3	N-1-1	89%	93%	105%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-25	San Mateo - Belmont 115 kV Line	Ravenswood 230/115kV Transformer #1 _Ravenswood 230/115kV Transformer #2	C3	N-1-1	121%	123%	127%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-26	SANMATEO 115/230kV Bank5	San Mateo 230/115kV Transformer #6 _San Mateo 230/115kV Transformer #7	C3	N-1-1	108%	110%	116%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-27	SANMATEO 115/230kV Bank6	San Mateo 230/115kV Transformer #5 _San Mateo 230/115kV Transformer #7	C3	N-1-1	107%	110%	116%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Penn-SP-T-28	SANMATEO 115/230kV Bank7	San Mateo 230/115kV Transformer #5 _San Mateo 230/115kV Transformer #6	C3	N-1-1	110%	113%	119%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-29	SANMATEO 60/115 kV Bank3	San Mateo-Bair 60kV Line (San Carlos-B_San Mateo 115/60kV Transformer #8	C3	N-1-1	88%	92%	100%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-30	Millbrae - Sneath Lane 60 kV Line	Martin-Millbrae 115kV Line _Millbrae-San Mateo #1 115kV Line	C3	N-1-1	110%	116%	125%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-31	San Mateo - Hillsdale JCT 60 kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	DCTL	87%	92%	104%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-32	Cooley Landing - Palo Alto 115 kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	DCTL	124%	125%	131%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-33	Cooley Landing - Stanford 60 kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	DCTL	90%	95%	105%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-34	East Shore - San Mateo 230 kV Line	Newark-Ravenswood 230 kV and Tesla-Ravenswood 230 kV lines	C5	DCTL	100%	105%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Penn-SP-T-35	Cooley Landing - Stanford 60 kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	DCTL	92%	97%	107%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-36	San Mateo - Belmont 115 kV Line	Ravenswood-Bair Nos. 1 & 2 115 kV lines	C5	DCTL	98%	102%	103%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Penn-SP-T-37	Ravenswood - Palo Alto #2 115 kV Line	Ravenswood-Palo Alto No. 1 115 kV and Cooley Landing-Palo Alto 115 kV lines	C5	DCTL	104%	105%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-38	Ravenswood - Cooley Landing #1 115 kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	DCTL	144%	111%	120%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-39	San Mateo - Hillsdale JCT 60 kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	DCTL	86%	91%	102%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
Penn-WP-T-01	Ravenswood - San Mateo 115 kV Line	CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	100%	N/A	N/A	2014: South of San Mateo SPS South of San Mateo Capacity Project
Penn-WP-T-02	Ravenswood - Palo Alto #2 115 kV Line	CB FAULT AT RVNSWD 115 CB522	C2	Breaker	93%	96%	102%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-03	San Mateo 230/115 kV Transformer No. 6	CB FAULT AT 30700 SANMATEO 230 CB712	C2	Breaker	131%	135%	144%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-04	San Mateo 230/115 kV Transformer No. 7	CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	120%	124%	134%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-05	Bair 115/60 kV Transformer No. 1	CB FAULT AT CLY LNDG 60 CB2	C2	Breaker	104%	111%	119%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-06	San Mateo 230/115 kV Transformer No. 5	San Mateo 230/115kV Transformer #6 _San Mateo 230/115kV Transformer #7	C3	N-1-1	101%	102%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-07	San Mateo 230/115 kV Transformer No. 6	San Mateo 230/115kV Transformer #5 _San Mateo 230/115kV Transformer #7	C3	N-1-1	100%	102%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-08	San Mateo 230/115 kV Transformer No. 7	San Mateo 230/115kV Transformer #5 _San Mateo 230/115kV Transformer #6	C3	N-1-1	103%	105%	112%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-09	Martin 115/60 kV Transformer No. 6	Martin-Millbrae 115kV Line _Millbrae-San Mateo #1 115kV Line	C3	N-1-1	94%	99%	106%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
Penn-WP-T-10	Bair 115/60 kV Transformer No. 1	Ravenswood-Cooley Landing #2 115kV Line _Cooley Landing 115/60kV Transformer #1	C3	N-1-1	103%	108%	116%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-11	Cooley Landing 115/60 kV Transformer No. 2	Bair 115/60kV Transformer #1 _Cooley Landing 115/60kV Transformer #1	C3	N-1-1	106%	111%	119%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-12	San Mateo 115/60 kV Transformer No. 3	San Mateo-Bair 60kV Line (San Carlos-Bai_San Mateo 115/60kV Transformer #8	C3	N-1-1	95%	97%	109%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-13	Millbrae 115/60 kV Transformer No. 5	Martin-Sneath Lane 60kV Line _Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	101%	105%	124%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-14	Martin-Sneath Lane 60 kV Line	Martin-Millbrae 115kV Line _Millbrae-San Mateo #1 115kV Line	C3	N-1-1	132%	139%	150%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-15	Millbrae-Sneath Lane 60 kV Line	Martin-Sneath Lane 60kV Line _Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	104%	108%	131%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-16	Millbrae - Pacifica 60 kV Line	Martin-Sneath Lane 60kV Line _Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	133%	139%	167%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-17	San Mateo - Hillsdale JCT 60 kV Line	Jefferson 230/60kV Transformer #1 _Jefferson 230/60kV Transformer #2	C3	N-1-1	89%	93%	106%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-18	San Mateo - Hillsdale JCT 60 kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	DCTL	88%	92%	105%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

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Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
Penn-WP-T-19	Ravenswood-Cooley Landing 115 kV Line	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	DCTL	114%	88%	93%	Ravenswood - Cooley Landing Reconductor Project

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Summer Light Load	2017 Summer Off-Peak	N/A	

No thermal overloads identified.

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Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Penn-SP-DV-01	MILLBRAE 115kV	Martin-Millbrae 115kV Line San Mateo #1 115kV Line	C3	N-1-1	-10%	-11%	-12%	Reactive Support
Penn-SP-DV-02	SANPAULA 115kV	Martin-Millbrae 115kV Line San Mateo #1 115kV Line	C3	N-1-1	-10%	-11%	-12%	Reactive Support



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	

No voltage deviations identified.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2014 Summer Light Load	2017 Summer Off-Peak	N/A	

No voltage deviations identified.



High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	

No high/low voltage issues identified.

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	

No high/low voltage issues identified.

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

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2014 Summer Light Load	2017 Summer Off-Peak	N/A	
Penn-OP-V-01	RVNSWD E 115kV	Normal	A	N-0	1.06	1.04		Reactive Support
Penn-OP-V-02	CLY LND2 115kV	Normal	A	N-0	1.05	1.04		Reactive Support
Penn-OP-V-03	CLY LND 115kV	Normal	A	N-0	1.06	1.05		Reactive Support
Penn-OP-V-04	RVNSWD D 115kV	Normal	A	N-0	1.06	1.04		Reactive Support
Penn-OP-V-05	CCSF_TAP 115kV	Normal	A	N-0	1.06	1.04		Reactive Support
Penn-OP-V-06	CCSF 115kV	Normal	A	N-0	1.06	1.04		Reactive Support

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



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2014 Summer Light Load	2017 Summer Off-Peak	N/A	

No single source substation with more than 100 MW Load

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Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2014	2017	2022	

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

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Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	

No single source substation with more than 100 MW Load

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Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2014	2017	2022	

No single source substation with more than 100 MW Load