

2013/2014 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
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Penn-SP-T-01	Bair 115/60 kV Transformer No. 1	C2-10_CB FAULT AT CLY LNDG 60 CB2	C2	Breaker	112%	121%	127%	Replace or Re-rate transformer. Drop load either manually or thru SPS as appropriate
Penn-SP-T-02	San Mateo - Belmont 115 kV Line	B3_5_Ravenswood 230/115kV Transformer #2 & B3_4_Ravenswood 230/115kV Transformer #1	C3	N-1-1	116%	111%	114%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-03	Ravenswood-Cooley Landing 115 kV Line	B2_33_Ravenswood-Palo Alto #1 115kV Line & B2_34_Ravenswood-Palo Alto #2 115kV Line	C3	N-1-1	141%	<100%	<100%	Action Plan until Ravenswood-Cooley Landing 115 kV Reconductor project complete
Penn-SP-T-04	Millbrae-Sneath Lane 60 kV Line	B2_14_Martin-Millbrae 115kV Line & B2_20_Millbrae-San Mateo #1 115kV Line	C3	N-1-1	109%	112%	119%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-05	Millbrae - Pacifica 60 kV Line	B2_48_Hillsdale JCT - Half Moon Bay 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	123%	130%	150%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-06	Bair 115/60 kV Transformer No. 1	B2_30_Ravenswood-Cooley Landing #2 115kV Line & B3_12_Cooley Landing 115/60kV Transformer #1	C3	N-1-1	105%	116%	121%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-SP-T-07	Cooley Landing 115/60 kV Transformer No. 2	B3_12_Cooley Landing 115/60kV Transformer #1 & B3_10_Bair 115/60kV Transformer #1	C3	N-1-1	106%	<100%	<100%	Drop load either manually or thru SPS as appropriate

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ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Penn-SP-T-08	Jefferson - Stanford 60 kV Line	B1_2_CARDINAL 12.47 Unit ID 1 & B2_52_Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	C3	N-1-1	130%	<100%	<100%	Action Plan until Jefferson-Stanford No. 2 60 kV Line addition complete
Penn-SP-T-09	Cooley Landing - Stanford 60 kV Line	B1_2_CARDINAL 12.47 Unit ID 1 & B2_55_Jefferson-Stanford #1 60kV Line	C3	N-1-1	119%	<100%	<100%	Action Plan until Jefferson-Stanford No. 2 60 kV Line addition complete
Penn-SP-T-10	Ravenswood-Cooley Landing 115 kV Line	C5_22_Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	C5	DCTL	141%	104%	105%	Long term - Ames - Palo Alto Project or City of Palo Alto Project. Short term - SPS
Penn-SP-T-11	Cooley Landing - Stanford 60 kV Line	C5_4_Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	C5	DCTL	<100%	<100%	103%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

San Onofre Nuclear Generation Station was retired on June 7, 2013 and therefore was removed from the base cases used for the 2013/14 ISO transmission planning process.

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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
					2015 Winter Peak	2018 Winter Peak	N/A	
Penn-WP-T-01	33401 CLY LN&1 60.0 33382 S.R.I. 60.0 1	B1_2_CARDINAL 12.47 Unit ID 1 & B2_55_Jefferson-Stanford #1 60kV Line	B	L-1/G-1	110%	<100%	-	Action Plan until Jefferson-Stanford No. 2 60 kV Line addition complete
Penn-WP-T-02	33401 CLY LN&1 60.0 33382 S.R.I. 60.0 1	B1_3_CARDINAL 12.47 Unit ID 2 & B2_55_Jefferson-Stanford #1 60kV Line	B	L-1/G-1	110%	<100%	-	Action Plan until Jefferson-Stanford No. 2 60 kV Line addition complete
Penn-WP-T-03	Bair 115/60 kV Transformer No. 1	C2-10_CB FAULT AT CLY LNDG 60 CB2	C2	Breaker	99%	105%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-04	Millbrae 115/60 kV Transformer No. 5	B2_17_Martin-Sneath Lane 60kV Line & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	102%	107%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-05	Millbrae 115/60 kV Transformer No. 5	B2_38_Jefferson-Hillsdale JCT 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	<100%	104%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-06	Millbrae 115/60 kV Transformer No. 5	B2_48_Hillsdale JCT - Half Moon Bay 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	102%	107%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-07	Millbrae-Sneath Lane 60 kV Line	B2_17_Martin-Sneath Lane 60kV Line & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	104%	111%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-08	Millbrae-Sneath Lane 60 kV Line	B2_38_Jefferson-Hillsdale JCT 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	100%	108%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-09	Millbrae-Sneath Lane 60 kV Line	B2_48_Hillsdale JCT - Half Moon Bay 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	104%	111%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	N/A	
Penn-WP-T-10	Millbrae - Pacifica 60 kV Line	B2_17_Martin-Sneath Lane 60kV Line & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	134%	143%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-11	Millbrae - Pacifica 60 kV Line	B2_38_Jefferson-Hillsdale JCT 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	129%	139%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-12	Millbrae - Pacifica 60 kV Line	B2_48_Hillsdale JCT - Half Moon Bay 60kV Line & B2_17_Martin-Sneath Lane 60kV Line	C3	N-1-1	134%	143%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-13	Bair 115/60 kV Transformer No. 1	B2_30_Ravenswood-Cooley Landing #2 115kV Line & B3_12_Cooley Landing 115/60kV Transformer #1	C3	N-1-1	<100%	102%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-14	Bair 115/60 kV Transformer No. 1	B3_11_Cooley Landing 115/60kV Transformer #2 & B3_12_Cooley Landing 115/60kV Transformer #1	C3	N-1-1	<100%	102%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-15	Bair 115/60 kV Transformer No. 1	B3_12_Cooley Landing 115/60kV Transformer #1 & B2_30_Ravenswood-Cooley Landing #2 115kV Line	C3	N-1-1	<100%	102%	-	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Penn-WP-T-16	Jefferson-Stanford 60 kV Line	B1_2_CARDINAL 12.47 Unit ID 1 & B2_52_Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	C3	N-1-1	107%	<100%	-	Action Plan until Jefferson-Stanford No. 2 60 kV Line addition complete
Penn-WP-T-17	Jefferson-Stanford 60 kV Line	B1_3_CARDINAL 12.47 Unit ID 2 & B2_52_Cooley Landing-Stanford 60kV Line (Cooley Landing-SRI)	C3	N-1-1	107%	<100%	-	Action Plan until Jefferson-Stanford No. 2 60 kV Line addition complete

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



Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	
Penn-OP-T-01	Millbrae 115/60 kV Transformer No. 5	B2_17_Martin-Sneath Lane 60kV Line & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	101%	<100%	-	Drop load either manually or thru SPS as appropriate

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Penn-SP-DV-08	CLY LND2 115kV	B2_30_Ravenswood-Cooley Landing #2 115kV Line & B3_12_Cooley Landing 115/60kV Transformer #1	C3	N-1-1	< 10.00%	15.00%	16.00%	Add Reactive Support
Penn-SP-DV-09	MILLBRAE 115kV	B2_20_Millbrae-San Mateo #1 115kV Line & B2_14_Martin-Millbrae 115kV Line	C3	N-1-1	10.00%	10.00%	11.00%	Add Reactive Support
Penn-SP-DV-10	SANPAULA 115kV	B2_14_Martin-Millbrae 115kV Line & B2_20_Millbrae-San Mateo #1 115kV Line	C3	N-1-1	10.00%	10.00%	11.00%	Add Reactive Support

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



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	N/A	
Penn-WP-VD-16	HLF MNBY 60kV	B3_14_Millbrae 115/60kV Transformer #5 & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	-10.00%	-12.00%	-	Add Reactive Support
Penn-WP-VD-19	MILLBRAE 115kV	B2_20_Millbrae-San Mateo #1 115kV Line & B2_14_Martin-Millbrae 115kV Line	C3	N-1-1	-9.00%	-11.00%	-	Add Reactive Support

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



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	
Penn-OP-DV-20	PACIFICA 60kV	C2-1_CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	-10.00%	< 10.00%	-	Add Reactive Support
Penn-OP-DV-21	SNTH LNE 60kV	C2-1_CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	-10.00%	< 10.00%	-	Add Reactive Support

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

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	N/A	
Penn-WP-V-1	CLY LND2 115kV	B2_30_Ravenswood-Cooley Landing #2 115kV Line & B3_12_Cooley Landing 115/60kV Transformer #1	C3	N-1-1	>0.9	0.87	-	Add Reactive Support
Penn-WP-V-2	HLF MNBY 60kV	B3_14_Millbrae 115/60kV Transformer #5 & B2_48_Hillsdale JCT - Half Moon Bay 60kV Line	C3	N-1-1	0.78	0.86	-	Add Reactive Support

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High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	
Penn-OP-V-01	CCSF 115kV	C1-1_BUS FAULT AT 30700 SANMATEO 230.00 Sec 1D	C1	Bus	> 0.9	1.10	-	Under review for possible exemption or reactive device
Penn-OP-V-02	SFIA 115kV	C1-7_BUS FAULT AT 33310 SANMATEO 115.00 Sec 1E	C1	Bus	> 0.9	1.10	-	Under review for possible exemption or reactive device
Penn-OP-V-03	BURLNGME 115kV	C1-8_BUS FAULT AT 33310 SANMATEO 115.00 Sec 2E	C1	Bus	> 0.9	1.10	-	Under review for possible exemption or reactive device
Penn-OP-V-04	CLY LND2 115kV	C1-12_BUS FAULT AT 33315 RVNSWD E 115.00 Sec 2E	C1	Bus	> 0.9	1.12	-	Under review for possible exemption or reactive device
Penn-OP-V-05	EST GRND 115kV	C1-6_BUS FAULT AT 33310 SANMATEO 115.00 Sec 2D	C1	Bus	> 0.9	1.10	-	Under review for possible exemption or reactive device
Penn-OP-V-06	MILLBRAE 60kV	C1-5_BUS FAULT AT 33310 SANMATEO 115.00 Sec 1D	C1	Bus	> 0.9	1.13	-	Under review for possible exemption or reactive device
Penn-OP-V-07	CLY LND 115kV	C2-1_CB FAULT AT 30700 SANMATEO 230 CB202	C2	Breaker	> 0.9	1.11	-	Under review for possible exemption or reactive device
Penn-OP-V-08	MLLBRETP 60kV	C2-4_CB FAULT AT 33310 SANMATEO 115 CB402	C2	Breaker	> 0.9	1.15	-	Under review for possible exemption or reactive device
Penn-OP-V-09	CLY LND 115kV	C5_1_Eastshore-San Mateo 230 kV and Pittsburg-San Mateo 230 kV I	C5	DCTL	> 0.9	1.11	-	Under review for possible exemption or reactive device
Penn-OP-V-10	CLY LND2 115kV	C5_20_Ravenswood-Cooley Landing Nos. 1 & 2 115 kV lines	C5	DCTL	> 0.9	1.13	-	Under review for possible exemption or reactive device
Penn-OP-V-11	DALY CTY 115kV	C5_3_Ravenswood-San Mateo Nos. 1 & 2 230 kV lines	C5	DCTL	> 0.9	1.12	-	Under review for possible exemption or reactive device
Penn-OP-V-12	MILLBRAE 60kV	C5_13_Millbrae-San Mateo No. 1 115 kV and East Grand-San Mateo N	C5	DCTL	> 0.9	1.14	-	Under review for possible exemption or reactive device
Penn-OP-V-13	MILLBRAE 115kV	C5_13_Millbrae-San Mateo No. 1 115 kV and East Grand-San Mateo N	C5	DCTL	> 0.9	1.12	-	Under review for possible exemption or reactive device
Penn-OP-V-14	SAN CRLS 60kV	C5_24_Bair-Cooley Landing Nos. 1 & 2 60 kV lines	C5	DCTL	> 0.9	1.10	-	Under review for possible exemption or reactive device
Penn-OP-V-15	SNANDRES 60kV	C5_13_Millbrae-San Mateo No. 1 115 kV and East Grand-San Mateo N	C5	DCTL	> 0.9	1.15	-	Under review for possible exemption or reactive device

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Single Contingency Load Drop

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

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

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



Single Contingency Load Drop

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

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

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



Single Contingency Load Drop

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

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

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Single Source Substation with more than 100 MW Load

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

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
		Select..	Select..	Select..	

No single source substation with more than 100 MW Load

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



Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW Load