

2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E Greater Bay Area Mission - 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	
Miss-SP-T-01	North Dublin - Cayetano 230 kV Line	B2_1_Contra Costa-Las Positas 230kV Line	B	N-1	<100%	101%	101%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-02	Lone Tree - Cayetano 230 kV Line	B2_1_Contra Costa-Las Positas 230kV Line	B	N-1	<100%	106%	107%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-03	Lone Tree - Cayetano 230 kV Line	C1-4_BUS FAULT AT 30630 NEWARK D 230.00 Sec 1D	C1	Bus	<100%	104%	105%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-04	Lone Tree - Cayetano 230 kV Line	C2-3_CB FAULT AT NEWARK 230 CB810	C2	Breaker	<100%	104%	104%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-05	North Dublin - Cayetano 230 kV Line	B2_1_Contra Costa-Las Positas 230kV Line & B2_16_Tesla-Newark #1 230kV Line	C3	N-1-1	<100%	113%	113%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-06	North Dublin-Vineyard 230 kV Line	B2_16_Tesla-Newark #1 230kV Line & B2_1_Contra Costa-Las Positas 230kV Line	C3	N-1-1	<100%	103%	102%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-07	Lone Tree - Cayetano 230 kV Line	B2_16_Tesla-Newark #1 230kV Line & B2_1_Contra Costa-Las Positas 230kV Line	C3	N-1-1	103%	118%	119%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-08	East Shore 230/115 KV Transformer No. 1	B2_12_Eastshore-San Mateo 230kV Line & B3_6_Eastshore 230/115kV Transformer #2	C3	N-1-1	109%	114%	113%	Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-09	East Shore 230/115 KV Transformer No. 2	B2_12_Eastshore-San Mateo 230kV Line & B3_5_Eastshore 230/115kV Transformer #1	C3	N-1-1	109%	113%	113%	Drop load either manually or thru SPS as appropriate or reduce RCEC generation

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					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Miss-SP-T-10	Newark 115/60 kV Transformer No. 1	B3_7_Las Positas 230/60kV Transformer #4 & B3_1_San Ramon 230/60kV Transformer #1	C3	N-1-1	115%	118%	116%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-11	Livermore - Las Positas 60 kV Line	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	154%	157%	160%	Utilize Reverse Power Relay
Miss-SP-T-12	Radum - Livermore 60 kV Line	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	192%	194%	199%	Utilize Reverse Power Relay
Miss-SP-T-13	Sam Ramon 230/60 kV Transformer No. 1	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	119%	115%	118%	Utilize Reverse Power Relay
Miss-SP-T-14	San Ramon - Radum 60 kV Line	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	169%	171%	176%	Utilize Reverse Power Relay
Miss-SP-T-15	Radum - Vallecitos 60 kV Line	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	110%	110%	113%	Utilize Reverse Power Relay
Miss-SP-T-16	Newark - Vallecitos 60 kV Line	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	114%	113%	117%	Utilize Reverse Power Relay
Miss-SP-T-17	Newark - Vallecitos 60 kV Line	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	145%	144%	148%	Utilize Reverse Power Relay

2013/2014 ISO Reliability Assessment - Preliminary Study Results

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					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Miss-SP-T-18	Las Positas 230/60 kV Transformer No. 4	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	126%	129%	133%	Utilize Reverse Power Relay
Miss-SP-T-19	San Ramon - Radum 60 kV Line	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	171%	173%	178%	Utilize Reverse Power Relay
Miss-SP-T-20	Newark - Livermore 60 kV Line	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	115%	120%	124%	Utilize Reverse Power Relay
Miss-SP-T-21	North Dublin - Cayetano 230 kV Line	C5_5_Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	C5	DCTL	<100%	102%	102%	Reduce Oakley and/or Marsh Landing Generation
Miss-SP-T-22	Lone Tree - Cayetano 230 kV Line	C5_5_Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	C5	DCTL	<100%	106%	108%	Reduce Oakley and/or Marsh Landing Generation

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.

2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E Greater Bay Area Mission - 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	
Miss-OP-T-01	35203 LIVERMRE 60.0 35220 LPOSTAS 60.0 1	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	112%	101%	-	Utilize Reverse Power Relay
Miss-OP-T-02	35203 LIVERMRE 60.0 35222 CALMAT60 60.0 1	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	125%	109%	-	Utilize Reverse Power Relay
Miss-OP-T-03	35205 RADUM 60.0 35222 CALMAT60 60.0 1	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	120%	105%	-	Utilize Reverse Power Relay
Miss-OP-T-04	35209 SAN RAMN 60.0 35221 E DUBLIN 60.0 1	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	118%	101%	-	Utilize Reverse Power Relay
Miss-OP-T-05	35221 E DUBLIN 60.0 35223 PARKS TP 60.0 1	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	119%	102%	-	Utilize Reverse Power Relay
Miss-OP-T-06	35223 PARKS TP 60.0 35205 RADUM 60.0 1	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	119%	102%	-	Utilize Reverse Power Relay

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	
Miss-SP-VD-1	A100US 115kV	B3_5_Eastshore 230/115kV Transformer #1 & B3_6_Eastshore 230/115kV Transformer #2	C3	N-1-1	-11.00%	<10%	<10%	Add reactive support
Miss-SP-VD-2	CALMAT60	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	-27.00%	-26.00%	-27.00%	Utilize Reverse Power Relay
Miss-SP-VD-3	E DUBLIN 60kV	B3_7_Las Positas 230/60kV Transformer #4 & B3_1_San Ramon 230/60kV Transformer #1	C3	N-1-1	-16.00%	-15.00%	-14.00%	Utilize Reverse Power Relay
Miss-SP-VD-4	EASTSHRE 115kV	B3_6_Eastshore 230/115kV Transformer #2 & B3_5_Eastshore 230/115kV Transformer #1	C3	N-1-1	-11.00%	<10%	<10%	Add reactive support
Miss-SP-VD-5	IUKA 60kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	-28.00%	-28.00%	-28.00%	Utilize Reverse Power Relay
Miss-SP-VD-6	LS PSTAS 230kV	B2_15_Las Positas-Newark 230kV Line & B2_1_Contra Costa-Las Positas 230kV Line	C3	N-1-1	-32.00%	-33.00%	-33.00%	Utilize Reverse Power Relay
Miss-SP-VD-7	MT EDEN 115kV	B3_6_Eastshore 230/115kV Transformer #2 & B3_5_Eastshore 230/115kV Transformer #1	C3	N-1-1	-11.00%	<10%	<10%	Add reactive support
Miss-SP-VD-8	NEWARK 60kV	B3_7_Las Positas 230/60kV Transformer #4 & B3_11_Newark 115/60kV Transformer #1	C3	N-1-1	-10.00%	-12.00%	-11.00%	Utilize Reverse Power Relay

2013/2014 ISO Reliability Assessment - Preliminary Study Results

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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	
Miss-SP-VD-9	SAN RAMN 60kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	-46.00%	-46.00%	-47.00%	Utilize Reverse Power Relay
Miss-SP-VD-10	SANRAMON 230kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	-52.00%	-51.00%	-52.00%	Utilize Reverse Power Relay
Miss-SP-VD-11	USWP-FRK 60kV	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	-27.00%	-28.00%	-28.00%	Utilize Reverse Power Relay

2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E Greater Bay Area Mission - 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	
Miss-OP-DV-01	SAN RAMN 60kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	-24.00%	-14.00%	-	Utilize Reverse Power Relay
Miss-OP-DV-02	SANRAMON 230kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	-16.00%	-15.00%	-	Utilize Reverse Power Relay

2013/2014 ISO Reliability Assessment - Preliminary Study Results

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

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Miss-SP-V-01	CALMAT60 kV	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	0.79	0.78	0.79	Add reactive support
Miss-SP-V-02	LIVRMR_2 60kV	B2_51_Livermore-Las Positas 60kV Line & B3_1_San Ramon 230/60kV Transformer #1	C3	N-1-1	0.85	0.85	0.87	Add reactive support
Miss-SP-V-03	LS PSTAS 230kV	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	0.66	0.65	0.67	Add reactive support
Miss-SP-V-04	NEWARK 60kV	B3_7_Las Positas 230/60kV Transformer #4 & B3_11_Newark 115/60kV Transformer #1	C3	N-1-1	0.89	0.87	0.89	Add reactive support
Miss-SP-V-05	PARKS 60kV	B2_52_Radum-Livermore 60kV Line & B3_1_San Ramon 230/60kV Transformer #1	C3	N-1-1	0.88	0.87	0.89	Add reactive support
Miss-SP-V-06	RADUM 60kV	B2_54_San Ramon-Radum 60kV Line & B3_7_Las Positas 230/60kV Transformer #4	C3	N-1-1	0.82	0.82	0.84	Add reactive support
Miss-SP-V-07	SANRAMON 230kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	0.44	0.43	0.44	Add reactive support

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High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Miss-SP-V-08	SEAWEST 60kV	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	0.72	0.71	0.72	Utilize Reverse Power Relay
Miss-SP-V-09	SUNOL 60kV	B2_7_San Ramon-Moraga 230kV Line & B2_2_Pittsburg-San Ramon 230kV Line	C3	N-1-1	0.79	0.79	0.79	Utilize Reverse Power Relay
Miss-SP-V-10	USWP-FRK 60kV	B2_1_Contra Costa-Las Positas 230kV Line & B2_15_Las Positas-Newark 230kV Line	C3	N-1-1	0.72	0.71	0.72	Utilize Reverse Power Relay
Miss-SP-V-11	VINEYARD 60kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	0.69	0.69	0.69	Utilize Reverse Power Relay

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

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	
Miss-OP-V-01	VASCO 60kV	B2_49_Wind Farms 60kV Line	B	N-1	> 0.95	1.11	-	Under review for possible exemption or reactive device
Miss-OP-V-02	SAN RAMN 60kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	0.79	> 0.9	-	Utilize Reverse Power Relay
Miss-OP-V-03	SANRAMON 230kV	B2_2_Pittsburg-San Ramon 230kV Line & B2_7_San Ramon-Moraga 230kV Line	C3	N-1-1	0.74	0.89	-	Utilize Reverse Power Relay

2013/2014 ISO Reliability Assessment - Preliminary Study Results

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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 Mission - 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

2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E Greater Bay Area Mission - 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