

## 2012/2013 ISO Reliability Assessment - 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
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Miss-SP-T-01	Dumbarton - Newark 115 kV Line	Eastshore-San Mateo 230kV Line	B	N-1	102%	N/A	N/A	East Shore - Oakland J 115 kV Reconductor project
Miss-SP-T-02	Moraga - San Leandro #1 115 kV Line	BUS FAULT AT 35101 SN LNDRO 115.00 Sec E	C1	Bus	126%	108%	114%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-03	East Shore - San Mateo 230 kV Line	CB FAULT AT 35105 EASTSHRE 115 CB302	C2	Breaker	103%	103%	104%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-04	NEWARK F 115/230kV Bank 11	CB FAULT AT NEWARK 230 CB810	C2	Breaker	107%	111%	116%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-05	Newark - Ames #1 115 kV Line	Eastshore-San Mateo 230kV Line _Newark-Ravenswood 230kV Line	C3	N-1-1	107%	N/A	N/A	South of San Mateo SPS South of San Mateo Capacity Project
Miss-SP-T-06	North Dublin - Cayetano 230 KV Line	Contra Costa-Las Positas 230kV Line _Tesla-Newark #2 230kV Line	C3	N-1-1	95%	99%	102%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-07	Newark - Vallecitos 60 kV Line	Radum-Livermore 60kV Line _San Ramon 230/60kV Transformer #1	C3	N-1-1	114%	118%	125%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-08	Dumbarton - Newark 115 kV Line	Pittsburg-Eastshore 230kV Line _Eastshore-San Mateo 230kV Line	C3	N-1-1	122%	N/A	N/A	East Shore - Oakland J 115 kV Reconductor project
Miss-SP-T-09	Dumbarton - Newark 115 kV Line	Eastshore-San Mateo 230kV Line _Oakland J - Grant 115kV Line	C3	N-1-1	102%	101%	N/A	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation

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					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Miss-SP-T-10	East Shore - San Mateo 230 kV Line	Eastshore 230/115kV Transformer #1 _Eastshore 230/115kV Transformer #2	C3	N-1-1	104%	103%	104%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-11	EASTSHRE - E. SHORE 115/230kV Bank 1	Eastshore-San Mateo 230kV Line _Eastshore 230/115kV Transformer #2	C3	N-1-1	112%	127%	129%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-12	EASTSHRE - E. SHORE 115/230kV Bank 2	Eastshore-San Mateo 230kV Line _Eastshore 230/115kV Transformer #1	C3	N-1-1	113%	127%	129%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-13	Grant - Oakland J 115 kV Line	Eastshore-San Mateo 230kV Line _Eastshore-Dumbarton 115kV Line	C3	N-1-1	N/A	123%	123%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-14	Grant - East Shore #1 115 kV Line	Eastshore-San Mateo 230kV Line _Grant- Eastshore #2 115kV Line	C3	N-1-1	N/A	104%	107%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-15	Grant - East Shore #2 115 kV Line	Eastshore-San Mateo 230kV Line _Grant- Eastshore #1 115kV Line	C3	N-1-1	N/A	104%	107%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate or reduce RCEC generation
Miss-SP-T-16	Newark - Livermore 60 kV Line	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	N/A	N/A	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 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Miss-SP-T-17	Lone Tree - Cayetano 230 kV Line	Contra Costa-Las Positas 230kV Line _Moraga-Castro Valley 230kV Line	C3	N-1-1	102%	104%	108%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-18	Moraga - San Leandro #1 115 kV Line	Moraga-San Leandro #2 115kV Line _Moraga-San Leandro #3 115kV Line	C3	N-1-1	150%	123%	130%	Moraga - Oakland J SPS
Miss-SP-T-19	Moraga - San Leandro #2 115 kV Line	Moraga-San Leandro #1 115kV Line _Moraga-San Leandro #3 115kV Line	C3	N-1-1	150%	124%	130%	Moraga - Oakland J SPS
Miss-SP-T-20	Moraga - San Leandro #3 115 kV Line	Moraga-San Leandro #1 115kV Line _Moraga-San Leandro #2 115kV Line	C3	N-1-1	120%	100%	106%	Moraga - Oakland J SPS
Miss-SP-T-21	Newark 115/60 kV Bank 2	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	100%	105%	114%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-22	Newark - Ames #3 115 kV Line	Eastshore-San Mateo 230kV Line _Newark-Ravenswood 230kV Line	C3	N-1-1	106%	N/A	N/A	South of San Mateo Capacity Project
Miss-SP-T-23	Newark - Ames #2 115 kV Line	Eastshore-San Mateo 230kV Line _Newark-Ravenswood 230kV Line	C3	N-1-1	108%	N/A	N/A	South of San Mateo Capacity Project
Miss-SP-T-24	NEWARK F 115/230kV Bank 11	Newark-Newark Dist 230kV section _Newark 230/115kV Transformer #7	C3	N-1-1	101%	107%	111%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-25	Newark - Vallecitos 60 kV Line	Radum-Livermore 60kV Line _San Ramon 230/60kV Transformer #1	C3	N-1-1	114%	118%	125%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-26	Lone Tree - Cayetano 230 kV Line	Contra Costa-Las Positas 230kV Line _Moraga-Castro Valley 230kV Line	C3	N-1-1	102%	104%	108%	Re-rate or reconductor line. Drop load either manually or thru SPS as appropriate
Miss-SP-T-27	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

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Study Area: **PG&E Greater Bay Area Mission - 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	
Miss-SP-T-28	Dumbarton - Newark 115 kV Line	Eastshore-San Mateo 230 kV and Pittsburg-San Mateo 230 kV lines	C5	DCTL	111%	88%	86%	East Shore - Oakland J 115 kV Reconductor project

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



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.

## 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	
Miss-SP-DV-01	GRANT 115kV	CB FAULT AT 35105 EASTSHRE 115 CB302	C2	Breaker	-6%	-9%	-10%	Add reactive support
Miss-SP-DV-02	CALMAT60 60kV	Livermore-Las Positas 60kV Line _San Ramon 230/60kV Transformer #1	C3	N-1-1	-14%	-15%	-16%	Add reactive support
Miss-SP-DV-04	E DUBLIN 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-15%	-16%	-18%	Add reactive support
Miss-SP-DV-05	GRANT 115kV	Grant-Eastshore #1 115kV Line _Grant-Eastshore #2 115kV Line	C3	N-1-1	-6%	-9%	-11%	Add reactive support
Miss-SP-DV-06	IUKA 60kV	Livermore-Las Positas 60kV Line _San Ramon 230/60kV Transformer #1	C3	N-1-1	-14%	-15%	-16%	Add reactive support
Miss-SP-DV-07	LIVERMRE 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-15%	-16%	-18%	Add reactive support
Miss-SP-DV-08	LIVRMR_2 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-15%	-16%	-18%	Add reactive support
Miss-SP-DV-09	LPOSTAS 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-16%	-17%	-19%	Add reactive support
Miss-SP-DV-10	NEWARK 60kV	Las Positas 230/60kV Transformer #4 _Newark 115/60kV Transformer #1	C3	N-1-1	-11%	-11%	-12%	Add reactive support
Miss-SP-DV-11	PARKS 60kV	Livermore-Las Positas 60kV Line _San Ramon 230/60kV Transformer #1	C3	N-1-1	-14%	-15%	-16%	Add reactive support
Miss-SP-DV-12	RADUM 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-15%	-16%	-18%	Add reactive support
Miss-SP-DV-13	SAN RAMN 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-16%	-17%	-19%	Add reactive support
Miss-SP-DV-14	SEAWEST 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-16%	-17%	-19%	Add reactive support
Miss-SP-DV-15	VASCO 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-16%	-17%	-19%	Add reactive support
Miss-SP-DV-16	ZONDWD 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-16%	-17%	-19%	Add reactive support

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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	
Miss-SP-DV-17	USWP-FRK 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-16%	-17%	-19%	Add reactive support
Miss-SP-DV-18	VALLECTS 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-11%	-12%	-14%	Add reactive support
Miss-SP-DV-19	SUNOL 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-10%	-11%	-12%	Add reactive support
Miss-SP-DV-20	VINEYARD 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	-15%	-16%	-18%	Add reactive support

## 2012/2013 ISO Reliability Assessment - Study Results

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



### 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	
Miss-OP-DV-01	SEAWEST 60kV	Wind Farms 60kV Line	B	N-1	-6%	-5%		Add reactive support
Miss-OP-DV-02	USWP-WKR 60kV	Vasco-Herdlyn 60kV Line	B	N-1	-6%	-3%		Add reactive support
Miss-OP-DV-03	ZONDWD 60kV	Wind Farms 60kV Line	B	N-1	-6%	-5%		Add reactive support
Miss-OP-DV-04	PARKS 60kV	San Ramon-Radum 60kV Line	B	N-1	-8%	-7%		Add reactive support
Miss-OP-DV-05	USWP-FRK 60kV	Wind Farms 60kV Line	B	N-1	-6%	-5%		Add reactive support
Miss-OP-DV-06	ALTAMONT 60kV	Vasco-Herdlyn 60kV Line	B	N-1	-6%	-3%		Add reactive support
Miss-OP-DV-07	IUKA 60kV	Radum-Vallecitos 60kV Line	B	N-1	-9%	-8%		Add reactive support
Miss-OP-DV-08	SUNOL 60kV	Newark-Vallecitos 60kV Line	B	N-1	-9%	-7%		Add reactive support
Miss-OP-DV-09	FLOWIND1 60kV	Wind Farms 60kV Line	B	N-1	-6%	-5%		Add reactive support
Miss-OP-DV-10	E DUBLIN 60kV	San Ramon-Radum 60kV Line	B	N-1	-8%	-7%		Add reactive support
Miss-OP-DV-11	CALMAT60 60kV	Radum-Livermore 60kV Line	B	N-1	-9%	-8%		Add reactive support
Miss-OP-DV-12	VINEYARD 60kV	Radum-Vallecitos 60kV Line	B	N-1	-9%	-8%		Add reactive support



# 2012/2013 ISO Reliability Assessment - 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
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Miss-SP-V-01	CALMAT 60 kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-02	DCTO JCT 60kV	Las Positas 230/60kV Transformer #4 _Newark 115/60kV Transformer #1	C3	N-1-1	0.89	0.89	0.88	Add reactive support
Miss-SP-V-03	E DUBLIN 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-04	FLOWIND1 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-05	IUKA 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.85	0.83	0.81	Add reactive support
Miss-SP-V-06	LIVERMRE 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-07	LIVRMR_2 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-08	LPOSTAS 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-09	SEAWEST 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-10	VASCO 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-11	ZONDWD 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-12	RADUM 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-13	PARKS 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-14	USWP-FRK 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support
Miss-SP-V-15	SAN RAMN 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support

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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
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
Miss-SP-V-16	VALLECTS 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.88	0.86	0.85	Add reactive support
Miss-SP-V-17	SUNOL 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.89	0.88	0.86	Add reactive support
Miss-SP-V-18	VINEYARD 60kV	San Ramon 230/60kV Transformer #1 _Las Positas 230/60kV Transformer #4	C3	N-1-1	0.84	0.83	0.81	Add reactive support

# 2012/2013 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Bay Area Mission - 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	
Miss-OP-V-01	NEWARK D 115kV	Normal	A	N-0	1.05	1.03		Add reactive support
Miss-OP-V-02	USWP-WKR 60kV	Normal	A	N-0	1.08	1.05		Add reactive support
Miss-OP-V-03	ALTAMONT 60kV	Normal	A	N-0	1.08	1.05		Add reactive support

## 2012/2013 ISO Reliability Assessment - Study Results

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



### 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**



*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



*Transient Stability*

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

No transient stability issues identified.



Transient Stability

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

No transient stability issues identified.