

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E Central Valley Sierra - Summer Peak**

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014	2017	2022	
Siera-T-01	Drum - Higgins 115 kV Line	Normal	A	N-0	82%	95%	101%	Drum-Placer area reinforcement
Siera-T-02	Placer 115/60 kV Transformer No. 1	Normal	A	N-0	90%	95%	104%	Drum-Placer area reinforcement
Siera-T-03	Drum - Grass Valley - Weimar 60 kV Line	Colgate-Grass Valley 60 kV Line _ROLLINSF 9.11 Unit ID 1	B	L-1/G-1	110%	118%	131%	Drum-Placer area reinforcement
Siera-T-04	Gold Hill 230/115 kV Transformer No. 1	Gold Hill 230/115 kV Transformer No. 2	B	N-1	87%	91%	101%	Drum-Placer area reinforcement
Siera-T-05	Gold Hill 230/115 kV Transformer No. 2	Gold Hill 230/115 kV Transformer No. 1	B	N-1	87%	91%	101%	Drum-Placer area reinforcement
Siera-T-06	Palermo - Pease 115 kV Line	Pease - Marysville - Harter 60 kV Line_GRNLEAF2 13.80 Unit ID 1	B	L-1/G-1	99%	106%	70%	Interim operation solution.
Siera-T-07	Pease 115/60 kV Transformer No. 2	Pease - Marysville - Harter 60 kV Line_GRNLEAF2 13.80 Unit ID 1	B	L-1/G-1	50%	96%	107%	Add second 115/60 kV bank.
Siera-T-08	Placer 115/60 kV Transformer No. 1	HALSEY F 6.60 Unit ID 1	B	N-1	88%	93%	101%	Drum-Placer area reinforcement
Siera-T-09	Bogue - Rio Oso 115 kV Line	BUS FAULT AT 30330 RIO OSO 230.00 Bus 1	C1	Bus	102%	N/A	N/A	Interim operation solution.
Siera-T-10	Drum - Higgins 115 kV Line	BUS FAULT AT 30337 GOLDHILL 230.00 Bus 2	C1	Bus	84%	98%	110%	Drum-Placer area reinforcement
Siera-T-11	Gold Hill 230/115 kV Transformer No. 2	BUS FAULT AT 32018 GOLDHILL 115.00 Section 1E	C1	Bus	87%	91%	101%	Drum-Placer area reinforcement
Siera-T-12	Pease - Rio Oso 115 kV Line	BUS FAULT AT 30330 RIO OSO 230.00 Bus 1	C1	Bus	110%	N/A	N/A	Interim operation solution.
Siera-T-13	Rio Oso - Atlantic 230 kV Line No. 1	BUS FAULT AT 30337 GOLDHILL 230.00 Bus 2	C1	Bus	101%	60%	65%	Interim operation solution.
Siera-T-14	Bogue - Rio Oso 115 kV Line	RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	131%	N/A	N/A	Interim operation solution.
Siera-T-15	East Nicolaus - Rio Oso 115 kV Line	RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	132%	N/A	N/A	Interim operation solution.

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Siera-T-16	Palermo - Bogue 115 kV Line	RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	111%	N/A	N/A	Interim operation solution.
Siera-T-17	Palermo - Pease 115 kV Line	RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	118%	N/A	N/A	Interim operation solution.
Siera-T-18	Pease - Rio Oso 115 kV Line	RIO OSO 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	142%	N/A	N/A	Interim operation solution.
Siera-T-19	Rio Oso - Brighton 230 kV Line	RIO OSO 115 kV Bus 1 and 2 - CB 102 Failure	C2	Stuck Bkr	109%	N/A	N/A	Interim operation solution.
Siera-T-20	Bogue - Rio Oso 115 kV Line	Table Mountain - Rio Oso 230 kV Line _Colgate - Rio Oso 230 kV Line	C3	N-1-1	108%	102%	56%	Interim operation solution.
Siera-T-21	Drum - Higgins 115 kV Line	Placer - Gold Hill 115 kV Line No. 1 _Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	157%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-T-22	Drum - Rio Oso 115 kV No. 1 Line	Drum - Rio Oso 115 kV No. 2 Line _Higgins - Bell 115 kV Line	C3	N-1-1	149%	173%	172%	Drum-Placer area reinforcement
Siera-T-23	Drum - Rio Oso 115 kV No. 2 Line	Drum - Rio Oso 115 kV No. 1 Line _Higgins - Bell 115 kV Line	C3	N-1-1	131%	154%	156%	Drum-Placer area reinforcement
Siera-T-24	East Nicolaus - Rio Oso 115 kV Line	Table Mountain - Rio Oso 230 kV Line _Colgate - Rio Oso 230 kV Line	C3	N-1-1	104%	84%	37%	Interim operation solution.
Siera-T-25	Gold Hill 230/115 kV Transformer No. 1	Drum - Higgins 115 kV Line _Gold Hill 230/115 kV Transformer No. 2	C3	N-1-1	115%	123%	136%	Drum-Placer area reinforcement
Siera-T-26	Gold Hill 230/115 kV Transformer No. 2	Drum - Higgins 115 kV Line _Gold Hill 230/115 kV Transformer No. 1	C3	N-1-1	115%	123%	137%	Drum-Placer area reinforcement
Siera-T-27	Lincoln - Pleasant Grove 115 kV Line	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	128%	22%	23%	Interim operation solution.
Siera-T-28	Missouri Flat - Gold Hill 115 kV No. 1 Line	Gold Hill - Clarksville 115 kV Line _Missouri Flat - Gold Hill 115 kV No. 2 L	C3	N-1-1	89%	94%	105%	Rerate.
Siera-T-29	Palermo - Pease 115 kV Line	Colgate - Rio Oso 230 kV Line _Pease - Marysville - Harter 60 kV Line	C3	N-1-1	97%	105%	71%	Interim operation solution.
Siera-T-30	Pease - Rio Oso 115 kV Line	Table Mountain - Rio Oso 230 kV Line _Colgate - Rio Oso 230 kV Line	C3	N-1-1	119%	112%	65%	Interim operation solution.

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					2014	2017	2022	
Siera-T-31	Placer - Gold Hill 115 kV Line No. 1	Placer - Gold Hill 115 kV Line No. 2 _Drum - Higgins 115 kV Line	C3	N-1-1	121%	128%	149%	Drum-Placer area reinforcement
Siera-T-32	Placer - Gold Hill 115 kV Line No. 2	Placer - Gold Hill 115 kV Line No. 1 _Drum - Higgins 115 kV Line	C3	N-1-1	125%	132%	157%	Drum-Placer area reinforcement
Siera-T-33	Rio Oso - Lincoln 115 kV Line	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	113%	28%	29%	Interim operation solution.
Siera-T-34	Rio Oso 230/115 kV Bank No. 1	Rio Oso - Brighton 230 kV Line _Rio Oso 230/115 kV Bank No. 2	C3	N-1-1	105%	50%	51%	Interim operation solution.
Siera-T-35	Rio Oso 230/115 kV Bank No. 2	Rio Oso - Brighton 230 kV Line _Rio Oso 230/115 kV Bank No. 1	C3	N-1-1	100%	50%	51%	Interim operation solution.
Siera-T-36	Bogue - Rio Oso 115 kV Line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C5	DCTL	108%	102%	56%	Interim operation solution.
Siera-T-37	Drum - Higgins 115 kV Line	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	157%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-T-38	East Nicolaus - Rio Oso 115 kV Line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C5	DCTL	104%	84%	37%	Interim operation solution.
Siera-T-39	Pease - Rio Oso 115 kV Line	Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	C5	DCTL	119%	112%	65%	Interim operation solution.
Siera-T-40	Rio Oso - Brighton 230 kV Line	Loss of Rio Oso 115 kV substation	D8	Loss of substation	109%	64%	63%	Under Review
Siera-T-41	Palermo - Pease 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	118%	110%	77%	Under Review
Siera-T-42	Palermo - Pease 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	118%	110%	77%	Under Review
Siera-T-43	Pease - Rio Oso 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	142%	124%	73%	Under Review
Siera-T-44	Palermo - Bogue 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	111%	97%	108%	Under Review
Siera-T-45	Bogue - Rio Oso 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	131%	114%	63%	Under Review

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					2014	2017	2022	
Siera-T-46	East Nicolaus - Rio Oso 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	132%	93%	40%	Under Review
Siera-T-47	Pease - Rio Oso 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	102%	83%	45%	Under Review
Siera-T-48	Pease - Rio Oso 115 kV Line	Loss of Rio Oso 230 kV substation	D8	Loss of substation	128%	108%	61%	Under Review

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Study Area: **PG&E Central Valley Sierra - 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	
Siera-OP-T-01	Pease 115/60 kV Transformer No. 2	Table Mountain - Pease 60 kV Line	B	N-1	103%	96%		Reduce Pease 60 kV generation
Siera-OP-T-02	Table Mountain - Pease 60 kV Line	Pease 115/60 kV Transformer No. 2	B	N-1	115%	104%		Reduce Pease 60 kV generation
Siera-OP-T-03	Drum - Higgins 115 kV Line	GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	89%	150%		Drum-Placer area reinforcement.
Siera-OP-T-04	Drum - Higgins 115 kV Line	Gold Hill 230/115 kV Transformer No. 1_Gold Hill 230/115 kV Transformer No. 2	C3	N-1-1	59%	108%		Drum-Placer area reinforcement.
Siera-OP-T-05	Drum - Rio Oso 115 kV No. 1 Line	Drum - Rio Oso 115 kV No. 2 Line _Higgins - Bell 115 kV Line	C3	N-1-1	129%	137%		Drum-Placer area reinforcement.
Siera-OP-T-06	Drum - Rio Oso 115 kV No. 2 Line	Drum - Rio Oso 115 kV No. 1 Line _Higgins - Bell 115 kV Line	C3	N-1-1	105%	113%		Drum-Placer area reinforcement.
Siera-OP-T-07	Table Mountain - Pease 60 kV Line	Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	C5	DCTL	101%	85%		Reduce Pease 60 kV generation

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2014	2017	2022	
Siera-DV-01	PLACER 115 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-20%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-DV-02	HIGGINS 115 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-17%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-DV-03	BELL PGE 115 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-19%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-DV-04	PENRYN 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-21%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-DV-05	HALSEY 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-20%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-DV-06	AUBURN 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-20%	Diverge	Diverge	Drum-Placer area reinforcement
Siera-DV-07	MTN_QUAR 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	-20%	Diverge	Diverge	Drum-Placer area reinforcement

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	
Siera-OP-DV-01	MRYSVLE 60 kV	Pease 115/60 kV Transformer No. 2	B	N-1	-6%	-5%		Reduce Pease area 60 kV generation
Siera-OP-DV-02	MRYSVLE 60 kV	Pease 115/60 kV Transformer No. 2	B	N-1	-6%	-5%		Reduce Pease area 60 kV generation
Siera-OP-DV-03	ENCINAL 60 kV	Pease 115/60 kV Transformer No. 2	B	N-1	-7%	-6%		Reduce Pease area 60 kV generation
Siera-OP-DV-04	HARTER 60 kV	Pease 115/60 kV Transformer No. 2	B	N-1	-7%	-4%		Reduce Pease area 60 kV generation
Siera-OP-DV-05	LIVE OAK 60 kV	Pease 115/60 kV Transformer No. 2	B	N-1	-8%	-6%		Reduce Pease area 60 kV generation

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High/Low Voltage



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					2014	2017	2022	
Siera-V-01	GRSS VLY 60 kV	Colgate-Grass Valley 60 kV Line _ROLLINSF 9.11 Unit ID 1	B	L-1/G-1	0.902	0.897	0.879	Drum-Placer area reinforcement
Siera-V-02	FORST HL 60 kV	Colgate-Grass Valley 60 kV Line _OXBOW F 9.11 Unit ID 1	B	L-1/G-1	0.903	0.896	0.876	Drum-Placer area reinforcement
Siera-V-03	Diverge	BUS FAULT AT 32018 GOLDHILL 115.00 Section 2E	C1	Bus	Diverge	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-04	Diverge	GOLDHILL 230 kV Bus 1 and 2 - CB 202 Failure	C2	Stuck Bkr	Diverge	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-05	Diverge	GOLDHILL 115 kV Bus 1 and Bus 2 - CB 102 Failure	C2	Stuck Bkr	Diverge	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-06	PLACER 115 kV	Placer - Gold Hill 115 kV Line No. 1 _Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.776	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-07	HORSESHE 115 kV	Placer - Gold Hill 115 kV Line No. 1 _Drum - Higgins 115 kV Line	C3	N-1-1	0.904	0.916	0.867	Drum-Placer area reinforcement
Siera-V-08	HIGGINS 115 kV	Placer - Gold Hill 115 kV Line No. 1 _Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.816	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-09	FLINT 115 kV	Placer - Gold Hill 115 kV Line No. 1 _Drum - Higgins 115 kV Line	C3	N-1-1	0.838	0.844	0.772	Drum-Placer area reinforcement
Siera-V-10	BELL PGE 115 kV	Placer - Gold Hill 115 kV Line No. 1 _Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.783	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-11	ROCKLIN 60 kV	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.71	0.975	0.98	Interim operating solution.
Siera-V-12	TAYLOR 60 kV	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.712	0.977	0.982	Interim operating solution.
Siera-V-13	PENRYN 60 kV	Placer - Gold Hill 115 kV Line No. 1 _Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.801	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-14	DEL MAR 60 kV	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.688	0.961	0.965	Interim operating solution.
Siera-V-15	SIERRAPI 60 kV	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.688	0.961	0.965	Interim operating solution.
Siera-V-16	LINCLN 115 kV	Rio Oso - Atlantic 230 kV Line No. 1 _Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.894	1.024	1.027	Interim operating solution.

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High/Low Voltage



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					2014	2017	2022	
Siera-V-17	FORST HL 60 kV	ROLLINSF 9.11 Unit ID 1 _ OXBOW F 9.11 Unit ID 1	C3	N-1-1	0.892	0.888	0.873	Drum-Placer area reinforcement
Siera-V-18	HALSEY 60 kV	Placer - Gold Hill 115 kV Line No. 1 _ Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.814	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-19	AUBURN 60 kV	Placer - Gold Hill 115 kV Line No. 1 _ Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.816	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-20	PLSNT GR 115 kV	Rio Oso - Atlantic 230 kV Line No. 1 _ Atlantic - Gold Hill 230 kV Line	C3	N-1-1	0.847	1.018	1.024	Interim operating solution.
Siera-V-21	MTN_QUAR 60 kV	Placer - Gold Hill 115 kV Line No. 1 _ Placer - Gold Hill 115 kV Line No. 2	C3	N-1-1	0.81	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-22	Diverge	Gold Hill 230/115 kV Transformer No. 1_Gold Hill 230/115 kV Transformer No. 2	C3	N-1-1	Diverge	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-23	PLACER 115 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.776	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-24	HIGGINS 115 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.816	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-25	BELL PGE 115 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.783	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-26	PENRYN 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.801	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-27	HALSEY 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.814	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-28	AUBURN 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.816	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-29	MTN_QUAR 60 kV	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	0.81	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-30	Diverge	Placer-Gold Hill No. 1 115 kV Line & Placer-Gold Hill No. 2 115 kV Line	C5	DCTL	Diverge	Diverge	Diverge	Drum-Placer area reinforcement
Siera-V-31	Diverge	Loss of Gold Hill 230 kV substation	D8	Loss of substation	Diverge	Diverge	Diverge	Drum-Placer area reinforcement

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Study Area: **PG&E Central Valley Sierra - 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	
Siera-OP-V-01	GOLDHILL 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-02	E.NICOLS 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-03	RIO OSO 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-04	DRUM 115 kV	Normal	A	N-0	1.05	1.05		Under review for possible exemption.
Siera-OP-V-05	DTCH FL1 115 kV	Normal	A	N-0	1.05	1.05		Under review for possible exemption.
Siera-OP-V-06	DTCH FL2 115 kV	Normal	A	N-0	1.05	1.05		Under review for possible exemption.
Siera-OP-V-07	CHCGO PK 115 kV	Normal	A	N-0	1.05	1.05		Under review for possible exemption.
Siera-OP-V-08	BRNSWKTP 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-09	BRNSWALT 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-10	HORSHE1 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-11	HORSESHE 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-12	HORSHE2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-13	HIGGINS 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-14	NEWCSTL1 115 kV	Normal	A	N-0	1.05	1.03		Under review for possible exemption.
Siera-OP-V-15	NEWCSTLE 115 kV	Normal	A	N-0	1.05	1.03		Under review for possible exemption.

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High/Low Voltage



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					2014 Summer Light Load	2017 Summer Off-Peak	N/A	
Siera-OP-V-16	NEWCSL2 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-17	FLINT 115 kV	Normal	A	N-0	1.05	1.03		Under review for possible exemption.
Siera-OP-V-18	FLINT2 115 kV	Normal	A	N-0	1.05	1.03		Under review for possible exemption.
Siera-OP-V-19	BRNSWCKP 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-20	ELDORAD 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-21	APPLE HL 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-22	PLCRVLB2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-23	PLCRVLT1 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-24	PLCRVLB3 115 kV	Normal	A	N-0	1.05	1.04		Under review for possible exemption.
Siera-OP-V-25	PLCRVLT2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-26	DMND SPR 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-27	DIMOND_2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-28	MIZOU_T2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-29	MIZOU_T1 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-30	SHPRING1 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.

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Study Area: **PG&E Central Valley Sierra - 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	
Siera-OP-V-31	CLRKSVLE 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-32	CLRKSVLT 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-33	SHPRING 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-34	DIMOND_1 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-35	SHPRING2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-36	CPM TAP 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-37	CPM 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-38	SPICAMIN 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-39	LINCLN 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-40	ULTRA JT 115 kV	Normal	A	N-0	1.07	1.04		Under review for possible exemption.
Siera-OP-V-41	ULTR-RCK 115 kV	Normal	A	N-0	1.07	1.04		Under review for possible exemption.
Siera-OP-V-42	SPI JCT 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.
Siera-OP-V-43	PLSNT GR 115 kV	Normal	A	N-0	1.07	1.04		Under review for possible exemption.
Siera-OP-V-44	ATLANTIC 115 kV	Normal	A	N-0	1.08	1.05		Under review for possible exemption.
Siera-OP-V-45	APLHTAP2 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.

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Study Area: **PG&E Central Valley Sierra - 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	
Siera-OP-V-46	APLHTAP1 115 kV	Normal	A	N-0	1.06	1.04		Under review for possible exemption.

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Study Area: **PG&E Central Valley Sierra - Summer Peak**



Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2014	2017	2022	
Siera-TS-1	Gold Hill 230 kV Bus SLG fault with delayed clearing	C9	Bus SLG fault with delayed clearing	Unstable	Unstable	Unstable	SPS or voltage support.

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E Central Valley Sierra - 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	
Siera-OP-TS-1	Gold Hill 230 kV Bus SLG fault with delayed clearing	C9	Bus SLG fault with delayed clearing	Unstable	Unstable	Unstable	SPS or voltage support.

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Study Area: **PG&E Central Valley Sierra**



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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Study Area: **PG&E Central Valley Sierra - Summer Peak**

Single Source Substation with more than 100 MW Load



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2014	2017	2022	
Siera-LS-01	Clarksville 115 kV	105.80	111.70	123.60	Loop the station.