

# 2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Valley - 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	
NV-SP-T-1	Palermo-Wyandotte 115 kV Line	Normal	A	Normal	<100	<100	108	Reconductor the tap.
NV-SP-T-2	Caribou-Palermo 115 kV Line	Caribou No.11 230/115/60 kV Transformer	B	T-1	146	148	148	Existing SPS
NV-SP-T-3	Cascade-Deschutes 60 kV Line	Cascade-Cottonwood 115 kV Line	B	L-1	120	<100	<100	Existing SPS
NV-SP-T-4	Coleman-Red Bluff 60 kV Line	Cottonwood-Red Bluff 60 kV Line	B	L-1	165	<100	<100	Existing SPS
NV-SP-T-5	Cottonwood-Red Bluff 60 kV Line	NewBus 230/60 kV Transformer	B	T-1	NA	<100	101	Dispatch local generator
NV-SP-T-6	Cottonwood-Red Bluff 60 kV Line	Coleman-Red Bluff 60 kV Line	B	L-1	104	<100	<100	Interim operating solution
NV-SP-T-7	Caribou No.11 230/115/60 kV Transformer	BUS FAULT AT 31482 PALERMO 115.00	C1	Bus	105	106	106	Add bus tie breaker at Palermo 115 kV bus or new 115/60 kV transformer at Caribou
NV-SP-T-8	Table Mountain-Butte No.1 115 kV Line	BUS FAULT AT 31504 TBLE MTN Bus 2 115.00	C1	Bus	112	<100	<100	Interim operating solution
NV-SP-T-9	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	146	<100	<100	Interim operating solution
NV-SP-T-10	Table Mountain-Paradise 115 kV Line	BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	111	<100	<100	Interim operating solution
NV-SP-T-11	Cascade-Deschutes 60 kV Line	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<100	<100	Interim operating solution
NV-SP-T-12	Coleman-Red Bluff 60 kV Line	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<100	<100	Interim operating solution
NV-SP-T-13	Cottonwood-Red Bluff 60 kV Line	BUS FAULT AT 31602 COLEMAN 60.00	C1	Bus	Diverge	<100	<100	Interim operating solution
NV-SP-T-14	Cottonwood-Red Bluff 60 kV Line	BUS FAULT AT 30107 NewBus 230.00	C1	Bus	NA	<100	102	Dispatch local generator
NV-SP-T-15	Pit No.1-Cottonwood(F) 230 kV Line (Cottonwood-Burney Forest Power)	ROUND MOUNTAIN SECTIONALING BKR STUCK	C2	Stuck Bkr	<100	<100	100	Existing SPS
NV-SP-T-16	Table Mountain-Butte No.1 115 kV Line	TBLE MTN BUS Section F PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	NA	155	156	Upgrade Table Mtn. 115 kV bus
NV-SP-T-17	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	TBLE MTN BUS 1 PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	NA	150	152	Upgrade Table Mtn. 115 kV bus
NV-SP-T-18	Table Mountain-Paradise 115 kV Line	TBLE MTN BUS 1 PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	NA	115	118	Upgrade Table Mtn. 115 kV bus
NV-SP-T-19	Cascade-Deschutes 60 kV Line	COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	102	<100	<100	Existing SPS

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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	
NV-SP-T-20	Round Mountain-Cottonwood(E) No.2 230 kV Line	Round Mountain No.1 500/230 kV Transformer & Cottonwood-Round Mountain 230 kV Line	C3	N-1-1	<100	101	101	Congestion Management
NV-SP-T-21	Round Mountain-Cottonwood(E) No.3 230 kV Line	Round Mountain-Cottonwood(E) No.2 230 kV Line & Round Mountain No.1 500/230 kV Transformer	C3	N-1-1	109	113	113	Congestion Management
NV-SP-T-22	Table Mountain-Butte No.1 115 kV Line	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line & Table Mountain-Butte No.2 115 kV Line	C3	N-1-1	134	<100	<100	Interim operating solution
NV-SP-T-23	Table Mountain-Butte No.2 115 kV Line	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line & Table Mountain-Butte No.1 115 kV Line	C3	N-1-1	133	<100	<100	Interim operating solution
NV-SP-T-24	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	Table Mountain-Butte No.1 115 kV Line & Table Mountain-Butte No.2 115 kV Line	C3	N-1-1	130	<100	<100	Interim operating solution
NV-SP-T-25	Cottonwood-Benton No.1 60 kV Line	Cottonwood No.2 230/60 kV Transformer & Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	Diverge	<100	<100	Interim operating solution
NV-SP-T-26	Benton-Deschutes 60 kV Line	Cottonwood No.2 230/60 kV Transformer & Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	Diverge	<100	<100	Interim operating solution
NV-SP-T-27	Cascade-Deschutes 60 kV Line	Cottonwood No.2 230/60 kV Transformer & Cottonwood No.3 230/60 kV Transformer	C3	N-1-1	Diverge	<100	<100	Interim operating solution
NV-SP-T-28	Coleman-Red Bluff 60 kV Line	NewBus 230/60 kV Transformer & Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	NA	107	119	Dispatch local generator
NV-SP-T-29	Coleman-Red Bluff 60 kV Line	Coleman-Cottonwood 60 kV Line & Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	148	<100	<100	Existing SPS

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### Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NV-SP-T-30	Cottonwood-Red Bluff 60 kV Line	Cascade-Benton-Deschutes 60 kV Line & Coleman-Cottonwood 60 kV Line	C3	N-1-1	127	<100	<100	Interim operating solution
NV-SP-T-31	Cottonwood-Red Bluff 60 kV Line	Cottonwood No.1 60 kV Line & NewBus 230/60 kV Transformer	C3	N-1-1	NA	107	120	Dispatch local generator
NV-SP-T-32	Table Mountain-Butte No.1 115 kV Line	Sycamore Creek-Notre Dame-Table Mountain and Table Mount	C5	DCTL	153	<100	<100	Interim operating solution

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 North Valley - Summer Peak**



## 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	
NV-SP-VD-1	VINA 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	<5.0	5.2	Dispatch local generator
NV-SP-VD-2	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	10.4	<5.0	<5.0	Interim operating solution
NV-SP-VD-3	TYLER 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	11.4	12.6	Dispatch local generator
NV-SP-VD-4	ANTLER 60 kV	Cascade No.1 115/60/13.8 kV Transformer	B	T-1	5.7	<5.0	<5.0	Interim operating solution
NV-SP-VD-5	GERBER 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	6.8	7.3	Dispatch local generator
NV-SP-VD-6	CR CANAL 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	11.3	12.6	Dispatch local generator
NV-SP-VD-7	DIRYVLE 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	<5.0	5.1	Dispatch local generator
NV-SP-VD-8	DIRYVLE 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	10.2	<5.0	<5.0	Interim operating solution
NV-SP-VD-9	LP FB SP 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	6.7	7.2	Dispatch local generator
NV-SP-VD-10	LS MLNSJ 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	<5.0	5.2	Dispatch local generator
NV-SP-VD-11	LS MLNSJ 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	10.3	<5.0	<5.0	Interim operating solution
NV-SP-VD-12	MTN GATE 60 kV	Cascade No.1 115/60/13.8 kV Transformer	B	T-1	5.7	<5.0	<5.0	Interim operating solution
NV-SP-VD-13	RASN JNT 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	11.1	12.3	Dispatch local generator
NV-SP-VD-14	RED BLFF 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	6.7	7.2	Dispatch local generator
NV-SP-VD-15	RED BLFF 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	14.0	<5.0	<5.0	Interim operating solution

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Study Area: **PG&E North Valley - Summer Peak**



## 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	
NV-SP-VD-16	STLLWATR 60 kV	Cascade No.1 115/60/13.8 kV Transformer	B	T-1	5.4	<5.0	<5.0	Interim operating solution
NV-SP-VD-17	SYCAMORE 115 kV	Sycamore Creek-Notre Dame-Table Mountain 115 kV Line	B	L-1	5.2	<5.0	<5.0	Interim operating solution
NV-SP-VD-18	VINA 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-19	TYLER 60 kV	BUS FAULT AT 31597 NewBus 60.00	C1	Bus	NA	12.1	12.4	Dispatch local generator
NV-SP-VD-20	VOLTA 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-21	GIRVAN 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-22	CHICO B 115 kV	BUS FAULT AT 31504 TBLE MTN Bus 1 115.00	C1	Bus	10.7	<10.0	<10.0	Interim operating solution
NV-SP-VD-23	ANDERSON 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-24	CLMN FSH 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-25	CR CANAL 60 kV	BUS FAULT AT 31597 NewBus 60.00	C1	Bus	NA	12.1	12.3	Dispatch local generator
NV-SP-VD-26	DESCHUTS 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-27	DIRYVLE 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-28	LS MLNSJ 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-29	RASN JNT 60 kV	BUS FAULT AT 31597 NewBus 60.00	C1	Bus	NA	11.8	12.1	Dispatch local generator
NV-SP-VD-30	RED BLFF 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution

Study Area: **PG&E North Valley - Summer Peak****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	
NV-SP-VD-31	WNTU PMS 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	<10.0	<10.0	Interim operating solution
NV-SP-VD-32	CHICO B 115 kV	TBLE MTN BUS 1 PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	<10.0	11.4	11.3	Upgrade Table Mtn. 115 kV bus

**High/Low Voltage**

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NV-SP-V-1	TYLER 60 kV	Base Case	A	Normal	0.92	>0.95	>0.95	Dispatch local generator
NV-SP-V-2	RASN JNT 60 kV	Base Case	A	Normal	0.92	>0.95	>0.95	Dispatch local generator
NV-SP-V-3	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.85	>0.9	>0.9	Interim operating solution
NV-SP-V-4	TYLER 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	0.91	0.89	Dispatch local generator
NV-SP-V-5	CR CANAL 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	0.91	0.89	Dispatch local generator
NV-SP-V-6	DIRYVLE 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.87	>0.9	>0.9	Interim operating solution
NV-SP-V-7	LS MLNSJ 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.85	>0.9	>0.9	Interim operating solution
NV-SP-V-8	RED BLFF 60 kV	Cottonwood-Red Bluff 60 kV Line	B	L-1	0.84	>0.9	>0.9	Interim operating solution
NV-SP-V-9	VINA 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-10	VOLTA 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-11	GIRVAN 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-12	ANDERSON 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-13	CLMN FSH 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-14	DESCHUTS 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-15	DIRYVLE 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-16	LS MLNSJ 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-17	RED BLFF 60 kV	BUS FAULT AT 31604 COTTONWD 60.00	C1	Bus	Diverge	>0.9	>0.9	Interim operating solution
NV-SP-V-18	VINA 60 kV	Cottonwood-Red Bluff 60 kV Line & Coleman-Cottonwood 60 kV Line	C3	N-1-1	0.68	>0.9	>0.9	Interim operating solution

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Study Area: **PG&E North Valley - 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	
NV-SP-V-19	ANTLER 60 kV	Cascade-Benton-Deschutes 60 kV Line & Cascade No.1 115/60/13.8 kV Transformer	C3	N-1-1	0.70	>0.9	>0.9	Interim operating solution
NV-SP-V-20	GERBER 60 kV	Cottonwood-Red Bluff 60 kV Line & NewBus 230/60 kV Transformer	C3	N-1-1	NA	>0.9	0.88	Dispatch local generator
NV-SP-V-21	CHESTER 60 kV	CRBOU2-3 11.50 Unit ID 1 & Caribou-Table Mountain 230 kV Line	C3	N-1-1	0.85	0.85	0.80	Dispatch local generator
NV-SP-V-22	GANSNER 60 kV	CRBOU2-3 11.50 Unit ID 2 & Caribou-Table Mountain 230 kV Line	C3	N-1-1	0.88	0.88	0.85	Dispatch local generator
NV-SP-V-23	KESWICK 60 kV	Cascade-Benton-Deschutes 60 kV Line & Cascade No.1 115/60/13.8 kV Transformer	C3	N-1-1	0.77	>0.9	>0.9	Interim operating solution
NV-SP-V-24	BIG MDWS 60 kV	CRBOU2-3 11.50 Unit ID 1 & Caribou-Table Mountain 230 kV Line	C3	N-1-1	0.88	0.87	0.83	Dispatch local generator
NV-SP-V-25	CLARK RD 60 kV	Table Mountain No.2 230/115/60 kV Transformer & DE SABLA Unit ID 1	C3	N-1-1	0.86	0.88	0.86	Table Mtn. 60 kV voltage support
NV-SP-V-26	CNTRVLE 60 kV	Table Mountain No.2 230/115/60 kV Transformer & DE SABLA Unit ID 1	C3	N-1-1	0.86	0.88	0.86	Table Mtn. 60 kV voltage support
NV-SP-V-27	DE SABLA 60 kV	Table Mountain No.2 230/115/60 kV Transformer & DE SABLA Unit ID 1	C3	N-1-1	0.85	0.88	0.85	Table Mtn. 60 kV voltage support
NV-SP-V-28	DIRYVLE 60 kV	Delevan 230 kV Tie Line & Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.86	>0.9	>0.9	Interim operating solution
NV-SP-V-29	EST QNCY 60 kV	CRBOU2-3 11.50 Unit ID 1 & Caribou-Table Mountain 230 kV Line	C3	N-1-1	0.89	0.89	0.84	Dispatch local generator
NV-SP-V-30	FRNCHGLH 60 kV	Cascade-Benton-Deschutes 60 kV Line & Cascade No.1 115/60/13.8 kV Transformer	C3	N-1-1	0.86	>0.9	>0.9	Interim operating solution
NV-SP-V-31	GRYS FLT 60 kV	CRBOU2-3 11.50 Unit ID 1 & Caribou-Table Mountain 230 kV Line	C3	N-1-1	0.88	0.87	0.83	Dispatch local generator

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Study Area: **PG&E North Valley - 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	
NV-SP-V-32	HMLTN BR 60 kV	CRBOU2-3 11.50 Unit ID 1 & Caribou-Table Mountain 230 kV Line	C3	N-1-1	0.88	0.87	0.82	Dispatch local generator
NV-SP-V-33	LS MLNSJ 60 kV	Cottonwood(E)-Logan Creek 230 kV Line & Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.85	>0.9	>0.9	Interim operating solution
NV-SP-V-34	LS MLNSJ 60 kV	Cottonwood-Red Bluff 60 kV Line & NewBus 230/60 kV Transformer	C3	N-1-1	NA	>0.9	0.89	Dispatch local generator
NV-SP-V-35	MTN GATE 60 kV	Cascade-Benton-Deschutes 60 kV Line & Cascade No.1 115/60/13.8 kV Transformer	C3	N-1-1	0.70	>0.9	>0.9	Interim operating solution
NV-SP-V-36	PEACHTON 60 kV	Table Mountain No.2 230/115/60 kV Transformer & DE SABLA Unit ID 1	C3	N-1-1	0.89	>0.9	>0.9	Table Mtn. 60 kV voltage support
NV-SP-V-37	RED BLFF 60 kV	Coleman-Cottonwood 60 kV Line & Cottonwood-Red Bluff 60 kV Line	C3	N-1-1	0.68	>0.9	>0.9	Interim operating solution
NV-SP-V-38	SPANSHCK 60 kV	CRBU 1 11.50 Unit ID 1 & Caribou No.11 230/115/60 kV Transformer	C3	N-1-1	0.81	0.78	0.87	Dispatch local generator or new 115/60 kV transformer at Caribou.
NV-SP-V-39	STLLWATR 60 kV	Cascade-Benton-Deschutes 60 kV Line & Cascade No.1 115/60/13.8 kV Transformer	C3	N-1-1	0.73	>0.9	>0.9	Interim operating solution
NV-SP-V-40	TRES VIS 60 kV	Table Mountain No.2 230/115/60 kV Transformer & DE SABLA Unit ID 1	C3	N-1-1	0.87	0.90	0.88	Table Mtn. 60 kV voltage support

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Study Area: **PG&E North Valley - Summer Peak**



*Transient Stability*

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NV-SP-TS-1	Cottonwood 230 kV Bus SLG fault with delayed clearing	C9	Bus SLG with delayed clearing	25 60 kV buses with voltage dip issues	No issue	No issue	SPS

## 2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Valley - Summer Peak**



### Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	

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

Study Area: **PG&E North Valley - Summer Peak**



*Single Source Substation with more than 100 MW Load*

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	

No single source substation with more than 100 MW Load

## 2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Valley - 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	
NV-NP-T-1	Caribou-Palermo 115 kV Line	Table Mountain 230 kV Bus Section 1D	C1	Bus	217	220		Existing SPS
NV-NP-T-2	Caribou-Palermo 115 kV Line	TABLE MOUNTAIN CB 202 BUS PARALLEL STUCK	C2	Stuck Bkr	223	231		Existing SPS
NV-NP-T-3	Trinity-Keswick 60 kV Line	COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	104	<100		Reduce Humboldt area generation
NV-NP-T-4	Keswick-Cascade 60 kV Line	COTTONWOOD BUS PARALLEL BKR STUCK 115KV	C2	Stuck Bkr	126	<100		Reduce Humboldt area generation
NV-NP-T-5	Keswick-Cascade 60 kV Line	Bridgeville-Cottonwood 115 kV Line & Trinity-Cottonwood 115 kV Line	C3	N-1-1	117	<100		Reduce Humboldt area generation
NV-NP-T-6	Benton-Deschutes 60 kV Line	Cascade-Cottonwood 115 kV Line & Coleman-South 60 kV Line	C3	N-1-1	112	<100		Existing SPS
NV-NP-T-7	Cascade-Deschutes 60 kV Line	Cascade-Cottonwood 115 kV Line & Keswick-Cascade 60 kV Line	C3	N-1-1	146	<100		Existing SPS

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.

**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	
NV-NP-VD-1	TYLER 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	5.6		Dispatch local generator
NV-NP-VD-2	GERBER 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	5.2		Dispatch local generator
NV-NP-VD-3	CR CANAL 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	5.6		Dispatch local generator
NV-NP-VD-4	EST QNCY 60 kV	Caribou No.11 230/115/60 kV Transformer	B	T-1	7.5	10.3		Dispatch local generator or new 115/60 kV transformer at Caribou
NV-NP-VD-5	LP FB SP 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	5.2		Dispatch local generator
NV-NP-VD-6	RASN JNT 60 kV	NewBus-Tyler 60 kV Line	B	L-1	NA	5.4		Dispatch local generator
NV-NP-VD-7	RED BLFF 60 kV	NewBus 230/60 kV Transformer	B	T-1	NA	5.3		Dispatch local generator
NV-NP-VD-8	EST QNCY 60 kV	Table Mountain 230 kV Bus Section 1D	C1	Bus	13.2	12.8		Dispatch local generator
NV-NP-VD-9	EST QNCY 60 kV	TABLE MOUNTAIN CB 202 BUS PARALLEL STUCK	C2	Stuck Bkr	16.3	16.0		Dispatch local generator
NV-NP-VD-10	PEACHTON 60 kV	Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	C5	DCTL	14.6	<10.0		Dispatch local generator

# 2013/2014 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Valley - 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	
NV-NP-V-1	PPL 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-2	OWID 115 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-3	VINA 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-4	BLACK 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-5	GLENN 230 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-6	PIT 4 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-7	PIT 6 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-8	PIT 7 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-9	TYLER 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-10	ANTLER 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-11	BENTON 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-12	DELEVN 230 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-13	GERBER 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-14	HONCUT 115 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-15	HRIDGE 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-16	JESSUP 115 kV	Normal	A	N-0	1.06	1.08	-	Under review for possible exemption
NV-NP-V-17	KILARC 60 kV	Normal	A	N-0	<1.05	1.08	-	Under review for possible exemption
NV-NP-V-18	NewBus 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-19	0105-WD 115 kV	Normal	A	N-0	<1.05	1.08	-	Under review for possible exemption
NV-NP-V-20	BIG BAR 60 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-21	CARBERRY 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-22	CASCADE 60 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-23	CASCADE 115 kV	Normal	A	N-0	1.05	1.07	-	Under review for possible exemption
NV-NP-V-24	HYAMPOM 60 kV	Normal	A	N-0	1.05	1.07	-	Under review for possible exemption
NV-NP-V-25	KESWICK 60 kV	Normal	A	N-0	1.05	1.07	-	Under review for possible exemption
NV-NP-V-26	PALERMO 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-27	PALERMO 115 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-28	PANRAMA 115 kV	Normal	A	N-0	1.07	1.09	-	Under review for possible exemption
NV-NP-V-29	SPI_AND 115 kV	Normal	A	N-0	1.06	1.08	-	Under review for possible exemption
NV-NP-V-30	TRINITY 60 kV	Normal	A	N-0	1.07	1.08	-	Under review for possible exemption
NV-NP-V-31	TRINITY 115 kV	Normal	A	N-0	1.07	1.08	-	Under review for possible exemption
NV-NP-V-32	WHEELBR 115 kV	Normal	A	N-0	1.07	1.09	-	Under review for possible exemption
NV-NP-V-33	APT ORVC 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption

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Study Area: **PG&E North Valley - 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	
NV-NP-V-34	CEDR CRK 60 kV	Normal	A	N-0	<1.05	1.08	-	Under review for possible exemption
NV-NP-V-35	CHALLENGE 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-36	COTWDPGE 115 kV	Normal	A	N-0	1.07	1.09	-	Under review for possible exemption
NV-NP-V-37	COVE_RD. 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-38	COVERDTP 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-39	COWCK TP 60 kV	Normal	A	N-0	<1.05	1.08	-	Under review for possible exemption
NV-NP-V-40	CR CANAL 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-41	DELEVNB1 230 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-42	DESCHUTS 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-43	DIRYVLE 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-44	FRBSTNTP 115 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-45	FRNCHGLH 60 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-46	FRSTGLEN 115 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-47	GROUSCRK 60 kV	Normal	A	N-0	1.05	1.07	-	Under review for possible exemption
NV-NP-V-48	HATLOSCK 60 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-49	HT CRKRG 60 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-50	KLLY RDE 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-51	LOGAN CR 230 kV	Normal	A	N-0	1.06	1.07	-	Under review for possible exemption
NV-NP-V-52	LP FB SP 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-53	LS MLNSJ 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-54	LSNA PCC 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-55	MALACHA1 115 kV	Normal	A	N-0	1.06	1.06	-	Under review for possible exemption
NV-NP-V-56	MTN GATE 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-57	NEO REDT 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-58	OLSEN JT 60 kV	Normal	A	N-0	<1.05	1.08	-	Under review for possible exemption
NV-NP-V-59	OREGNTRL 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-60	OREGNTRL 115 kV	Normal	A	N-0	1.05	1.07	-	Under review for possible exemption
NV-NP-V-61	OROENEGY 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-62	OROVILLE 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-63	PIT 4 JT 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption

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Study Area: **PG&E North Valley - 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	
NV-NP-V-64	PIT 5 JT 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-65	PIT 6 JT 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-66	PIT 7 JT 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-67	PIT 7JT2 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-68	RASN JNT 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-69	RED B JT 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-70	RED BLFF 60 kV	Normal	A	N-0	<1.05	1.07	-	Under review for possible exemption
NV-NP-V-71	ROUND MT 230 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-72	SLYCREEK 115 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-73	SMPSN-AN 115 kV	Normal	A	N-0	1.07	1.09	-	Under review for possible exemption
NV-NP-V-74	STLLWATR 60 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-75	WHITMORE 60 kV	Normal	A	N-0	<1.05	1.08	-	Under review for possible exemption
NV-NP-V-76	WILDWOOD 115 kV	Normal	A	N-0	1.07	1.07	-	Under review for possible exemption
NV-NP-V-77	WNTU PMS 60 kV	Normal	A	N-0	<1.05	1.06	-	Under review for possible exemption
NV-NP-V-78	WODLF TP 115 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-79	WYANDTTE 115 kV	Normal	A	N-0	1.05	1.06	-	Under review for possible exemption
NV-NP-V-80	GANSNER 60 kV	CRBU 4-5 13.80 Unit ID 1 & Caribou-Table Mountain 230 kV Line	B	G-1/L-1	0.89	>0.9	-	Dispatch local generator
NV-NP-V-81	SPANSACK 60 kV	CRBU 4-5 13.80 Unit ID 1 & Caribou-Table Mountain 230 kV Line	B	G-1/L-1	0.89	>0.9	-	Dispatch local generator
NV-NP-V-82	EST QNCY 60 kV	Table Mountain 230 kV Bus Section 1D	C1	Bus	0.88	0.89	-	Dispatch local generator
NV-NP-V-83	EST QNCY 60 kV	TABLE MOUNTAIN CB 202 BUS PARALLEL STUCK	C2	Stuck Bkr	0.84	0.86	-	Dispatch local generator
NV-NP-V-84	EST QNCY 60 kV	Caribou No.2 60 kV Line & Caribou No.11 230/115/60 kV Transformer	C3	N-1-1	0.89	0.85	-	Dispatch local generator
NV-NP-V-85	PEACHTON 60 kV	Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	C5	DCTL	0.87	>0.9	-	Table Mtn. 60 kV area voltage support