

**Thermal Overloads**

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Kern-SP-T-1	Midway-Wheeler Ridge #1 230kV (Midway-Buena Vista Section)	Bus 1D Fault at Midway 230kV	C1	Bus	161%	138%	137%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-T-2	Midway-Wheeler Ridge #2 230kV (Midway-Buena Vista Section)	Bus 2D Fault at Midway 230kV	C1	Bus	160%	137%	136%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-T-3	Semitropic-Midway 115kV	Bus 2E Fault at Midway 115kV	C1	Bus	107%	<90%	<90%	Midway-Semitropic 115kV Reconductor Project mitigates later years. Action Plan
Kern-SP-T-4	Midway-Kern PP #1 230kV	Midway 230kV CB662 Failure	C2	Breaker	123%	130%	147%	Recommend new project to upgrade limiting 230kV line. 2013 Request Window Project - Midway-Kern PP #2 230kV
Kern-SP-T-5	Midway-Wheeler Ridge #1 230kV (Midway-Buena Vista Section)	Midway 230kV CB642 Failure	C2	Breaker	169%	135%	135%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - 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	
Kern-SP-T-6	Midway-Wheeler Ridge #2 230kV (Midway-Buena Vista Section)	Midway 230kV CB632 Failure	C2	Breaker	161%	137%	136%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-T-7	Midway-Shafter 115kV	Midway 115kV CB302 Failure	C2	Breaker	145%	148%	151%	Recommend new project to upgrade limiting 115kV line
Kern-SP-T-8	Midway-Semitrpic 115kV	Midway 115kV CB182 Failure	C2	Breaker	107%	<90%	<90%	Midway-Semitrpic 115kV Reconductor Project mitigates later years. Action Plan
Kern-SP-T-9	Midway-Kern PP #3 230kV	Midway-Kern PP #1 & #4 230kV	C3	L-1-1	103%	109%	124%	Recommend project to upgrade limiting 230kV line. 2013 Request Window Project - Midway-Kern PP #2 230kV may mitigate
Kern-SP-T-10	Kern PP #4 230/115kV	Kern PP #3 & #5 230/115kV	C3	T-1-1	106%	<90%	<90%	Kern PP 230kV Area Reinforcement Project mitigates later years. Action Plan
Kern-SP-T-11	Kern PP #3 230/115kV	Kern PP #4 & #5 230/115kV	C3	T-1-1	94%	104%	120%	Add "Upgrade limiting terminal equipment on #3 & #5" to scope of Kern PP 230kV Reinforcement Project

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.

**Thermal Overloads**

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	
Kern-NP-T-1	Fellows-Taft 115kV (Fellows-Morgan Section worst)	Midway-Taft 115kV	B	L-1	98%	110%		DEC Texaco Sunset generation
Kern-NP-T-2	Fellows-Taft 115kV (Fellows-Morgan Section)	Midway-Taft 115kV & Carneras-Taft 70kV	C3	L-1-1	111%	121%		DEC Texaco Sunset generation
Kern-NP-T-3	Midsun-Fellows 115kV	Midway-Taft 115kV & Carneras-Taft 70kV	C3	L-1-1	97%	107%		DEC Texaco Sunset generation
Kern-NP-T-4	Fellows-Taft 115kV (Morgan-Midset Section)	Midway-Taft 115kV & Carneras-Taft 70kV	C3	L-1-1	105%	115%		DEC Texaco Sunset generation

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - 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	
Kern-SP-VD-1	Kern Ridge 115kV	Midway-Temblor 115kV & Kern Ridge generation	B	L-1/G-1	12.50%	<10%	<10%	Midway-Temblor 115kV reconductor and reactive support mitigates later years. Action Plan
Kern-SP-VD-2	Buena Vista 1 230kV	Bus 1D Fault at Midway 230kV	C1	Bus	21.07%	<10%	<10%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-VD-3	Buena Vista 2 230kV	Bus 2D Fault at Midway 230kV	C1	Bus	20.63%	<10%	<10%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-VD-4	Buena Vista 1 230kV	Midway 230kV CB632 Failure	C2	Breaker	21.02%	<10%	<10%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-VD-5	Buena Vista 2 230kV	Midway 230kV CB642 Failure	C2	Breaker	25.47%	<10%	<10%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-VD-6	Rio Bravo Tomato 115kV	Midway 115kV CB302 Failure	C2	Breaker	11.92%	12.15%	12.58%	Add dynamic reactive support

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - 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	
Kern-NP-VD-1	Temblor 115kV	Midway-Temblor 115kV	B	L-1	9.35%	<10%		Midway-Temblor 115kV reconductor and reactive support mitigates later years. Action Plan
Kern-NP-VD-2	Kern Ridge 115kV	Midway-Temblor 115kV & Kern Ridge generation	B	L-1/G-1	13.20%	<10%		Midway-Temblor 115kV reconductor and reactive support mitigates later years. Action Plan

# 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - 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	
Kern-SP-V-1	Wheeler Ridge 70kV	None	A	N-0	0.95	>0.90	>0.90	Wheeler Ridge 230kV Voltage Project mitigates later years. Action Plan
Kern-SP-V-2	Nations Petroleum 70kV	None	A	N-0	0.93	>0.90	>0.90	RPS Project mitigates later years. Action Plan
Kern-SP-V-3	Temblor 115kV	Midway-Temblor 115kV & Kern Ridge generation	B	L-1/G-1	0.89	>0.90	>0.90	Midway-Temblor 115kV reconductor project moves PSE-McKittrick from tap on Midway-Temblor 115kV to bay at Temblor 115kV. Action Plan
Kern-SP-V-4	Buena Vista 1 230kV	Bus 1D Fault at Midway 230kV	C1	Bus	0.76	>0.90	>0.90	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-V-5	Buena Vista 2 230kV	Bus 2D Fault at Midway 230kV	C1	Bus	0.76	>0.90	>0.90	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-V-6	Buena Vista 1 230kV	Midway 230kV CB632 Failure	C2	Breaker	0.76	>0.90	>0.90	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-V-7	Buena Vista 2 230kV	Midway 230kV CB642 Failure	C2	Breaker	0.72	>0.90	>0.90	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.
Kern-SP-V-8	Wheeler Ridge 70kV	Midway-Wheeler Ridge #1 230kV & Kern Cyn-Magunden-Weedpatch 70kV	C3	L-1-1	<1.10	1.12	<1.10	Use SVC at Wheeler Ridge 230kV to reduce voltage

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - 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	
Kern-NP-V-1	Kern 115kV Area (Taft 115kV worst)	None	A	N-0	<1.05	1.06		DEC area generation to reduce voltage
Kern-NP-V-2	Kern Ridge 115kV	Midway-Temblor 115kV & Texaco Lost Hills Generation	B	L-1/G-1	0.90	>0.90		Midway-Temblor 115kV Reconductor Project mitigates

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - Summer Peak**



### Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Kern-SP-TS-1	Fault on Midway Bus Section and CB632 fails to operate	C9	SLG Bus Section Fault with delayed clearing	30 violations of NERC/WECC Trans Voltage Dip Std (CatC) (30% Voltage Dip)	No NERC/WECC violations - STABLE	No NERC/WECC violations - STABLE	Wheeler Ridge 230kV project mitigates later years

**Post-Transient Thermal Overloads**

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
Kern-SP-PTT-1	Midway-Kern #3 230kV	Fault on Kern #5 230/115kV and CB582 fails to operate	C7	SLG transformer with delayed clearing	<90%	<90%	105%	Add "Upgrade limiting terminal equipment on #3 & #5" to scope of Kern PP 230kV Reinforcement Project
Kern-SP-PTT-2	Midway-Wheeler Ridge #2 230kV	Fault on Midway Bus Section and CB632 fails to operate	C9	SLG Bus Section Fault with delayed clearing	NOT SOLVED	134%	133%	Open other end of Midway-Wheeler Ridge #2 230kV. 2013 Request Window Project - Wheeler Ridge Junction 230kV substation between Kern PP and Wheeler Ridge may mitigate.

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno - Summer Partial Peak**

### Post-Transient 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	
Kern-SP-PTVD-1	Wheeler Ridge 230kV	Midway Bus Fault and CB632 fails to operate	C9	SLG Bus Fault with delayed clearing	NOT SOLVED	<10%	<10%	Wheeler Ridge 230kV Project mitigates later years. Action Plan

**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.

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - Summer Off-Peak & Summer Light Load**



### Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2015 Summer Off-Peak	2018 Summer Light Load	N/A	

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

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - 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	
	Bakersfield 230kV	89	94	102	2013 Request Window Project - Wheeler Ridge Jct Substation mitigates.
	Stockdale 230kV	155	164	179	2013 Request Window Project - Wheeler Ridge Jct Substation mitigates.

## 2013/2014 ISO Reliability Assessment - Study Results

Study Area: **PG&E Kern - Summer Off-Peak & Summer Light Load**



### *Single Source Substation with more than 100 MW Load*

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2015 Summer Off-Peak	2018 Summer Light Load	N/A	

No single source substation with more than 100 MW Load