

**Thermal Overloads**

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
HUMB-S-T-1	Humboldt Bay-Humboldt 60 kV Line #1 Between HUMBOLDT and HMBLT JT	Humboldt-Humboldt Bay 60 kV #2	B	L-1	110.00%	109%	108%	PG&E maintenance project to reconductor the line. Line may overload with high generation from Humboldt Bay 60 kV and low from Humboldt Bay 115 kV. Implement operating procedure to reduce output from Humboldt Bay Power Plant 60 kV generators after first contingency for C contingencies if there is overload after line upgrade.
		Humboldt-Humboldt Bay 60 kV #2 and FAIRHAVEN 13.8 KV	B	G-1 / L-1	100.00%	99%	98%	
		Humboldt - Eureka 60 kV Line & Humboldt Bay - Humboldt No.2 60 kV Line	C	L-1-1	144%	140%	136%	
		Humboldt Bay - Humboldt No.2 60 kV Line & Humboldt Bay - Eureka 60 kV Line	C	L-1-1	197%	197%	198%	
HUMB-S-T-2	Humboldt Bay-Humboldt 60 kV line # 1 between HMBLT JC and HUMBOLDT BAY	Humboldt-Humboldt Bay 60 kV #2 60 KV and Humboldt Bay-Eureka 60 KV	C	L-1-1	137%	136%	137%	
HUMB-S-T-3	Rio Dell Jct-Bridgeville 60 kV between Carlotta-Rio Dell Tap 60 kV	Humboldt - Bridgeville 115 kV Line	B	L-1	106%	102%	94%	Install SPS to trip new generation project at Rio Dell for overload
		Humboldt - Bridgeville 115 kV Line & Humboldt-Trinity 115 kV Line (more L-1-1 overloads)	C	L-1-1	161%	149%	132%	Reduce Humboldt Bay 60 kV generation after first contingency
HUMB-S-T-4	Rio Dell Jct-Bridgeville 60 kV between Carlotta-Swms Flat - Bridgeville 60 kV	Humboldt - Bridgeville 115 kV Line	B	L-1	101%	96%	88%	Install SPS to trip new generation project at Rio Dell for overload
		Humboldt - Bridgeville 115 kV Line & Humboldt-Trinity 115 kV Line (more L-1-1 overloads)	C	L-1-1	155%	143%	125%	Reduce Humboldt Bay 60 kV generation after first contingency
HUMB-S-T-5	Bridgeville-Garberville 60 kV between Bridgeville-Frut Ld Jct 60 kV	Humboldt- Trinity 115 kV and Bridgeville-Cottonwood 115 kV (more L-1-1 and T-1/L-1 overloads)	C	L-1-1	134%	127%	34%	PG&E project to build a new Bridgeville - Gareberville 115kV line
HUMB-S-T-6	Bridgeville-Garberville 60 kV between Frut Ld Jct and Fort Seward Jct	Humboldt- Trinity 115 kV and Bridgeville-Cottonwood 115 kV (more L-1-1 and T-1/L-1 overloads)	C	L-1-1	135%	127%	17%	PG&E project to build a new Bridgeville - Gareberville 115kV line

## 2012/2013 ISO Reliability Assessment - Final Study Results

Study Area: **PG&E Humboldt - 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	
HUMB-S-T-7	Bridgeville-Garberville 60 kV between Frut Ld Jct and Fort Seward Jct	Humboldt- Trinity 115 kV and Bridgeville-Cottonwood 115 kV (more L-1-1 and T-1/L-1 overloads)	C	L-1-1	133%	125%	19%	PG&E project to build a new Bridgeville - Gareberville 115kV line
HUMB-S-T-8	Bridgeville 115/60 kV Bank #1	Bridgeville - Cottonwood 115 kV Line & Rio Dell Jct - Bridgeville 60 kV Line	C	L-1-1	105%	108%	26%	PG&E maintenace project to replace Bridgeville bank in 2012. New rating will be 90 MVA
HUMB-S-T-9	Humboldt Bay - Eureka 60 kV Line #1	Humboldt Bay - Humboldt No.1 60 kV & Humboldt Bay - Humboldt No.2 60 kV Line	C	L-1-1	133%	132%	134%	Recondutor the line with the new renewable project (in LGIA). Prior to that, implement operating procedure to reduce output from Humboldt Bay 60 kV generation following first contingency for Category C
HUMB-S-T-10	Humboldt - Maple Creek	Humboldt-Trinity 115 kV Line & Bridgeville - Cottonwood 115 kV Line	C	L-1-1	102%	91%	53%	Generation adjustment at Humboldt bay

**Thermal Overloads**

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
HUMB-W-T-1	Humboldt Bay-Humboldt 60 kV Line #1 Between HUMBOLDT and HMBLT JT	Humboldt Bay - Humboldt No.2 60 kV Line & Humboldt Bay - Eureka 60 kV Line	C	L-1-1	134%	132%	134%	Humboldt Bay - Humboldt No.1 60 kV Line Reconductoring Project for category B overloads in 2012. Implement operating procedure to reduce output from Humboldt Bay Power Plant 60 kV generators after first contingency for C contingencies if there is overload after line upgrade.
HUMB-W-T-2	Bridgeville 115/60 kV Bank #1	Humboldt 115/60 No.1 Transformer & Humboldt 115/60 No.2 Transformer	C	T-1-1	105%	128%	88%	PG&E maintenace project to replace Bridgeville bank in 2012. New rating of the xfmr will be 90 MVA.

**Thermal Overloads**

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2014 Summer Light Load	2017 Summer Off-Peak	N/A	
HUMB-OP-T-1	Rio Dell Jct-Bridgeville 60 kV between Carlotta-Rio Dell Tap 60 kV	115kV Bus Fault at Humboldt	C	Bus Fault	33%	102%		Adjust generation Humboldt at Humboldt bay
HUMB-OP-T-2	Rio Dell Jct-Bridgeville 60 kV between Carlotta-Swns Flat 60 kV		C	Bus Fault	36%	105%		
HUMB-OP-T-3	Rio Dell Jct-Bridgeville 60 kV between Swns Flat - Bridgeville 60 kV		C	Bus Fault	36%	105%		
HUMB-OP-T-4	Bridgeville 115/60 kV Bank #1		C	Bus Fault	<95%	114%		PG&E maintenace project to replace Bridgeville bank in 2012. New rating will be 90 MVA

**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	
HUMB-S-DV-1	RDGE CBN 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	-8.68%	1.87%	1.55%	Maple Creek reactive support project
HUMB-S-DV-2	MPLE CRK 60kV		B	L-1	-11.10%	2.83%	2.50%	
HUM-S-DV-3	RUSS RCH 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	-11.19%	2.84%	2.52%	
HUM-S-DV-4	WILLWCRK 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	-11.50%	2.91%	2.59%	
HUM-S-DV-5	Hoopa 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	-11.63%	2.94%	2.62%	
HUMB-S-DV-6	GRBRVLE 60kV	Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	B	L-1	6.16%	-0.62%	0.85%	Garberville reactive support project

# 2012/2013 ISO Reliability Assessment - Final Study Results

Study Area: **PG&E Humboldt - Winter Peak**

## Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
HUMB-W-DV-1	Orick 60kV	Humboldt - Arcata 60 kV Line (ARC_JT2X-ARCATA)	B	L-1	-4.00%	-4.47%	-5.30%	Adjust generation at Blue Lake / Humboldt bay.
		Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	5.80%	9.40%	10.90%	
HUMB-W-DV-2	Big Lagoon 60kV	Humboldt - Arcata 60 kV Line (ARC_JT2X-ARCATA)	B	L-1	4.00%	4.50%	5.30%	
		Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.50%	9.40%	10.90%	
HUMB-W-DV-3	Trinidad 60kV	Humboldt - Arcata 60 kV Line (ARC_JT2X-ARCATA)	B	L-1	4.00%	4.50%	5.30%	
		Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.50%	9.40%	10.90%	
HUMV-W-DV-4	ESSX Jct 60kV	Humboldt - Arcata 60 kV Line (ARC_JT2X-ARCATA)	B	L-1	3.90%	4.40%	5.20%	
		Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.30%	9.20%	10.70%	
HUMV-W-DV-5	Blue Lake PP 60kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.10%	9.00%	10.60%	
HUMV-W-DV-6	BCHIPMIL 60kV	Humboldt - Arcata 60 kV Line (ARC_JT2X-ARCATA)	B	L-1	3.90%	4.40%	5.20%	
		Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.30%	9.20%	10.70%	
HUMV-W-DV-7	Blue Lake 60kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.10%	9.00%	10.60%	
HUMV-W-DV-8	SIMPSON 60kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.10%	9.00%	10.60%	
HUMV-W-DV-9	ARCATA 60kV	Humboldt - Arcata 60 kV Line (ARC_JT2X-ARCATA)	B	L-1	4.50%	4.90%	5.70%	
		Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	8.10%	8.90%	10.40%	

**Voltage Deviations**

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
HUM-W-DV-10	RDGE CBN 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	-9.74%	1.09%	-0.35%	Maple Creek reactive support project
HUM-W-DV-11	MPLE CRK 60kV		B	L-1	-12.29%	1.98%	0.18%	
HUM-W-DV-12	RUSS RCH 60kV		B	L-1	-12.42%	2.00%	0.17%	
HUM-W-DV-13	WILLWCRK 60kV		B	L-1	-12.82%	2.06%	0.19%	
HUM-W-DV-14	Hoopa 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	13.00%	2.10%	0.00%	
HUMB-W-DV-15	JANS CRK 60kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	C	L-2	9.40%	10.40%	12.06%	Adjust generation at Blue Lake / Humboldt bay.



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	

No voltage deviation issues identified.



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2014 Summer Peak	2017 Summer Peak	2022 Summer Peak	
HUMB-S-V-1	Orick 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)	C	L-1-1	0.94	0.93	0.88	Disable load transfer from Janes Creek
HUMB-S-V-2	Big Lagoon 60kV		C	L-1-1	0.94	0.93	0.88	
HUMB-S-V-3	Trinidad 60kV		C	L-1-1	0.94	0.93	0.89	
HUMB-S-V-4	Maple Creek 60kV	Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.88	1.04	1.03	Maple Creek reactive support project?
HUMB-S-V-5	Russ Ranch 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.89	1.05	1.04	
		Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.88	1.04	1.04	
HUMB-S-V-6	Willow Creek 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.87	1.03	1.02	
		Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.85	1.01	1	
HUMB-S-V-7	Hoopa 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.86	1.02	1.01	
		Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.84	1	0.99	

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
HUMB-S-V-1	Orick 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)	C	L-1-1	0.90	0.88	0.86	Disable load transfer from Janes Creek
HUMB-S-V-2	Big Lagoon 60kV		C	L-1-1	0.90	0.88	0.86	
HUMB-S-V-3	Trinidad 60kV		C	L-1-1	0.90	0.88	0.86	
HUMB-S-V-4	Maple Creek 60kV	Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.89	1.04	1.03	Maple Creek reactive support project?
HUMB-S-V-5	Russ Ranch 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.89	1.04	1.02	
		Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.88	1.03	1.02	
HUMB-S-V-6	Willow Creek 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.86	1.02	1	
		Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.85	1.01	1	
HUMB-S-V-7	Hoopa 60kV	Humboldt - Maple Creek 60 kV Line	B	L-1	0.85	1.01	0.98	
		Humboldt - Bridgeville 115 kV Line & Humboldt - Maple Creek 60 kV Line	C	L-1-1	0.84	1	0.99	
HUMB-W-V-8	Bridgeville 60kV	Rio Dell Jct - Bridgeville 60 kV Line & Bridgeville 115/60/12 KV transformer	C	L-1/T-1	0.83	Diverged	1.02	New Bridgeville - Garberville 115kV line project. In the interim open line between Lyntonville - Kekawaka 60kV. Drop load at Fort seward, Fruitland & Garberville.
HUMB-W-V-9	Fruitland 60kV		C	L-1/T-1	0.82	Diverged	1.01	
HUMB-W-V-10	Fort Seward 60kV		C	L-1/T-1	0.83	Diverged	1.02	
HUMB-W-V-11	Garberville 60kV		C	L-1/T-1	0.84	Diverged	1.03	
HUMB-W-V-12	Kekawaka 60kV		C	L-1/T-1	0.85	Diverged	1.03	
HUMB-W-V-13	Laytonville 60kV		C	L-1/T-1	0.89	Diverged	0.99	
HUMB-W-V-14	COVELO6 60kV		C	L-1/T-1	0.88	Diverged	0.98	

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2014 Winter Peak	2017 Winter Peak	2022 Winter Peak	
HUMB-W-V-15	JANS CRK 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FLKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)	C	L-1-1	0.912	0.8999	0.8773	Adjust generation at humboldt bay / Blue Lake
HUMB-W-V-16	BLUE LK PP 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FLKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)	C	L-1-1	0.9164	0.9044	0.8822	
		Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA) & BLUELKPP 12.47 Unit ID 1	C	L-1 / G-1	0.9121	0.93	0.8927	
HUMB-W-V-17	BCHIPMIL 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FLKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)	C	L-1-1	0.9156	0.9037	0.8815	
HUMB-W-V-18	ARCATA 60kV	Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)			0.9283	0.9173	0.897	
HUMB-W-V-19	BLUE LAKE 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FLKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)	C	L-1-1	0.9151	0.903	0.8808	
		Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA) & BLUELKPP 12.47 Unit ID 1			0.9127	0.93	0.8933	
HUMB-W-V-20	SIMPSON 60kV	Essex Jct - Arcata - Fairhaven 60 kV Line (LP_FLKBD-JANS CRK) & Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA)			0.9147	0.9027	0.8805	
		Essex Jct - Arcata - Fairhaven 60 kV Line (ARC_JT2X-ARCATA) & BLUELKPP 12.47 Unit ID 1			0.9115	0.93	0.8921	

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	

No high/low violations identified.

Study Area: **PG&E Humboldt**



**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.

Study Area: **PG&E Humboldt**



*Single Source Substation with more than 100 MW Load*

ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2014	2017	2022	

No single source substation with more than 100 MW Load