

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-1	Biola-Glass-Madera 70kV (Trigo Jct-El Peco Tap Section)	Base Case	A	N-0	<90%	<90%	108.2%	Reconductor line
FR-SP-T-2	Kearney-Caruthers 70kV	Base Case	A	N-0	114.0%	<90%	<90%	Accelerate approved project
FR-SP-T-3	Borden #1 230/70kV	Borden #2 230/70kV	B	T-1	96.0%	97.0%	108.9%	Upgrade Borden #1 230/70kV to at least 200/220 MVA
FR-SP-T-4	Oro Loma #2 115/70kV	Los Banos-Livingston Jct-Canal 70kV	B	T-1	118.7%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-5	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Oro Loma #2 115/70kV	B	T-1	122.0%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-6	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Oro Loma #2 115/70kV	B	T-1	104.0%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-7	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Gates-Coalinga 1 70kV	B	L-1	101.9%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-8	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche-Mendota 115kV	B	L-1	94.1%	104.4%	113.2%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-9	Reedley-Orosi 70kV (Orosi Jct-Orosi Section)	Reedley-Dinuba 70kV	B	L-1	104.7%	<90%	<90%	Action Plan. Reedley-Orosi 70kV reconductor mitigates later years
FR-SP-T-10	Reedley-Orosi 70kV (Reedley-Orosi Jct Section)	Reedley-Dinuba 70kV	B	L-1	100.7%	<90%	<90%	Action Plan. Reedley-Orosi 70kV reconductor mitigates later years
FR-SP-T-11	Reedley-Dinuba 70kV (Dinuba Jct-Dinuba Section)	Reedley-Orosi 70kV	B	L-1	102.1%	<90%	<90%	Action Plan. Reedley-Dinuba 70kV reconductor mitigates later years

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FR-SP-T-12	Reedley-Dinuba 70kV (Reedley-Dinuba Jct Section)	Reedley-Orosi 70kV & Dinuba Energy Unit 1	B	G-1/L-1	104.1%	<90%	<90%	Action Plan. Reedley-Dinuba 70kV reconductor mitigates later years
FR-SP-T-13	Borden #1 230/70kV	Borden E 70kV Bus	C1	Bus	90.7%	97.6%	110.6%	Upgrade Borden #1 230/70kV to at least 200/220 MVA
FR-SP-T-14	Borden-Madera #2 70kV	Borden D 70kV Bus	C1	Bus	126.3%	133.8%	147.6%	Reconductor Borden-Madera #1 & #2 70kV
FR-SP-T-15	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Gates 70kV Bus	C1	Bus	<90%	102.4%	98.9%	Reconductor Coalinga 1-Coalinga 2 70kV line
FR-SP-T-16	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche #1 115kV Bus	C1	Bus	<90%	100.0%	107.4%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-17	Herndon-Bullard #1 115kV (Pinedale Jct-Bullard Section)	Herndon #1 115kV Bus	C1	Bus	99.8%	99.2%	100.3%	Radial line from Herndon 115kV. Consider SPS.
FR-SP-T-18	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Panoche #2 115kV Bus	C1	Bus	118.5%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-19	Oro Loma #2 115/70kV	Los Banos 70kV Bus	C1	Bus	522.0%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-20	Los Banos-Canal-Oro Loma #1 70kV (Oro Loma-Mercy Springs Section)	Los Banos 70kV Bus	C1	Bus	231.0%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-21	Los Banos-Canal-Oro Loma #1 70kV (Ortiga-Mercy Springs Section)	Los Banos 70kV Bus	C1	Bus	213.0%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.

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FR-SP-T-22	Los Banos-Canal-Oro Loma 70kV (Canal-Ortiga Section) (2016 Case) Mercy Springs-Canal 70kV (Canal-Ortiga Section) (2019 & Later)	Los Banos 70kV Bus	C1	Bus	151.3%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-23	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Panoche #2 115kV Bus	C1	Bus	100.4%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-24	Oro Loma-Canal #1 70kV (Dos Palos-Santa Rita Section)	Los Banos 70kV Bus	C1	Bus	215.3%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-25	Oro Loma-Canal #1 70kV (Oro Loma-Dos Palos Section)	Los Banos 70kV Bus	C1	Bus	285.6%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-26	Oro Loma-Canal #1 70kV (Santa Rita-Canal Section)	Los Banos 70kV Bus	C1	Bus	160.6%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-27	Oro Loma-Mendota 70kV (Oro Loma-Poso Jct Section)	Los Banos 70kV Bus	C1	Bus	103.8%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-28	Panoche-Oro Loma 115kV (DFS Tap-Oro Loma Section)	Los Banos 70kV Bus	C1	Bus	227.6%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-29	Panoche-Oro Loma 115kV (Hammonds-DFS Tap Section)	Los Banos 70kV Bus	C1	Bus	231.7%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.

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FR-SP-T-30	Panoche-Oro Loma 115kV (Panoche-Panoche Jct Section)	Los Banos 70kV Bus	C1	Bus	113.2%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-31	Wilson-Merced #1 115kV	Wilson B 115kV Bus	C1	Bus	118.6%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-32	Wilson-Merced #2 115kV	Wilson A 115kV Bus	C1	Bus	115.7%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-33	Not Solved	Herndon #2 115kV Bus	C1	Bus	Not Solved	Not Solved	Not Solved	Mitigation alternatives under review
FR-SP-T-34	Barton-Airways-Sanger 115kV (Airways-Sanger Section)	Herndon CB202 230kV Failure	C2	Breaker	102.7%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-35	GWF-Kingsburg 115kV (Contadina-Kingsburg Section)	McCall CB202 230kV Failure	C2	Breaker	110.5%	94.3%	98.0%	Consider SPS.
FR-SP-T-36	GWF-Kingsburg 115kV (GWF-Contadina Section)	McCall CB202 230kV Failure	C2	Breaker	114.9%	98.5%	102.3%	Consider SPS.
FR-SP-T-37	Herndon-Barton 115kV	McCall CB202 230kV Failure	C2	Breaker	118.5%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-38	Oro Loma-Mercy Springs 70kV	Panoche CB102 115kV Failure	C2	Breaker	N/A	111.1%	122.7%	Add second Oro Loma-Mercy Springs 70kV line or consider SPS.
FR-SP-T-39	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Panoche CB202 230kV Failure	C2	Breaker	104.1%	<90%	<90%	Not Solved. Oro Loma 70 kV Area Reinforcement mitigates later years.

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FR-SP-T-40	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Panoche CB102 115kV Failure	C2	Breaker	105.5%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-41	Oro Loma #2 115/70kV	Panoche CB102 115kV Failure	C2	Breaker	<90%	100.9%	104.6%	Upgrade Oro Loma #2 115/70kV transformer
FR-SP-T-42	Manchester-Herndon 115kV	McCall CB202 230kV Failure	C2	Breaker	120.2%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-43	McCall-Sanger #3 115kV	Herndon CB202 230kV Failure	C2	Breaker	100.8%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-44	Schindler-Huron-Gates 70kV (Huron Jct-Calflax Section)	Panoche CB102 115kV Failure	C2	Breaker	108.2%	108.5%	117.4%	Reconductor limiting section.
FR-SP-T-45	Biola-Glass-Madera 70kV (Canandaigua-Glass Section)	Borden-Madera #1 & #2 70kV	C3	L-1-1	111.9%	120.3%	134.1%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-46	Biola-Glass-Madera 70kV (Trigo Jct-Canandaigua)	Borden-Madera #1 & #2 70kV	C3	L-1-1	101.7%	110.0%	123.7%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-47	Biola-Glass-Madera 70kV (Trigo Jct-Trigo Section)	Borden-Madera #1 & #2 70kV	C3	L-1-1	<90%	91.8%	103.0%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-48	Borden-Glass 70kV	Borden-Madera #1 & #2 70kV	C3	L-1-1	127.9%	136.4%	150.2%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-49	Borden-Madera #1 70kV	Borden-Glass 70kV & Borden-Madera #2 70kV	C3	L-1-1	127.0%	135.4%	149.0%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load

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FR-SP-T-50	Borden-Madera #2 70kV	Borden-Glass 70kV & Borden-Madera #1 70kV	C3	L-1-1	125.5%	133.6%	146.8%	Reconductor Borden-Madera #1 & #2 70kV or consider SPS to drop load
FR-SP-T-51	Atwater-Livingston-Merced 115kV (Atwater Jct-Merced)	Atwater-El Capitan 115kV & Wilson-Atwater #2 115kV	C3	L-1-1	142.8%	<90%	<90%	Existing Atwater SPS mitigates
FR-SP-T-52	Atwater-Livingston-Merced 115kV (Atwater-Atwater Jct)	Atwater-El Capitan 115kV & Wilson-Atwater #2 115kV	C3	L-1-1	162.3%	<90%	<90%	Existing Atwater SPS mitigates
FR-SP-T-53	Chowchilla-Kerckhoff 2 115kV (Certainteed Jct-Sharon Tap Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	186.2%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-54	Chowchilla-Kerckhoff 2 115kV (Chowchilla-Certainteed Jct Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	187.2%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-55	Chowchilla-Kerckhoff 2 115kV (Kerckhoff 1 Jct-Kerckhoff 2 Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	154.8%	<90%	91.8%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-56	Chowchilla-Kerckhoff 2 115kV (Oakhurst Jct-Kerckhoff 1 Jct Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	155.1%	<90%	91.9%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-57	Chowchilla-Kerckhoff 2 115kV (Sharon Tap-Oakhurst Jct Section)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	209.1%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-58	Dairyland-Le Grand 115kV	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	146.7%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-59	Exchequer-Le Grand 115kV	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	175.3%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.

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FR-SP-T-60	Le Grand-Chowchilla 115kV (Certainteed Tap)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	141.4%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-61	Le Grand-Chowchilla 115kV (Chowchilla Tap)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	141.4%	<90%	<90%	Not Solved. Oro Loma-Mendota 115kV Conversion Project mitigates later years.
FR-SP-T-62	Coalinga #1-San Miguel 70kV	Gates #5 230/70kV & Schindler #1 115/70kV	C3	T-1-1	117.8%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-63	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Templeton-Gates 230kV & Gates-Coalinga 1 70kV	C3	L-1-1	114.6%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-64	Coalinga 1-Coalinga 2 70kV (Tornado Tap-Pennzier Tap Section)	Gates #5 230/70kV & Schindler #1 115/70kV	C3	T-1-1	101.8%	<90%	<90%	Action Plan. Open Coalinga-San Miguel 70kV (Summer Setup).
FR-SP-T-65	Gregg-Ashlan 230kV (Gregg-Figarden 2 Tap)	Gregg-Herndon #1 & #2 230kV	C3	L-1-1	121.2%	<90%	<90%	Action Plan. New Northern Fresno 115kV Reinforcement Project mitigates later years.
FR-SP-T-66	Kings River-Sanger-Reedley 115kV (Piedra 1 SW-Reedley Section)	Sanger-Reedley 115kV & McCall-Reedley (McCall-Wahtoke Section)	C3	L-1-1	149.4%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-67	Kings River-Sanger-Reedley 115kV (Rainbow Tap-Piedra 1 SW Section)	Sanger-Reedley 115kV & McCall-Reedley (McCall-Wahtoke Section)	C3	L-1-1	149.4%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-68	Kings River-Sanger-Reedley 115kV (Sanger-Rainbow Tap Section)	Sanger-Reedley 115kV & McCall-Reedley (McCall-Wahtoke Section)	C3	L-1-1	118.2%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.



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FR-SP-T-69	Los Banos 230/70kV #3	Los Banos #4 230/70kV & Oro Loma #2 115/70kV	C3	T-1-1	123.2%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-70	Los Banos-Canal-Oro Loma #1 70kV (Oro Loma-Mercy Springs Section) (2016 Case) Los Banos-Mercy Springs 70kV (2018 and later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	136.1%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-71	Los Banos-Canal-Oro Loma #1 70kV (Oro Loma-Mercy Springs Section) (2016 Case) Oro Loma-Mercy Springs 70kV (2018 and later)	Panoche-Mendota 115kV & Panoche-Oro Loma 115kV	C3	L-1-1	<90%	<90%	106.1%	Add second Oro Loma-Mercy Springs 70kV line or consider SPS.
FR-SP-T-72	Los Banos-Canal-Oro Loma #1 70kV (Ortiga-Mercy Springs Section)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	159.2%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-73	Los Banos-Canal-Oro Loma 70kV (Mercy Springs-Q648 Section)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	205.1%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-74	Los Banos-Canal-Oro Loma 70kV (Q648-Arburua Section)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	193.9%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-75	Los Banos-Livingston Jct-Canal 70kV (Canal-Livingston Jct Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	171.0%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-76	Los Banos-Livingston Jct-Canal 70kV (Chevron Pipeline-Santa Nella Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	207.1%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate



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FR-SP-T-77	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	257.8%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-78	Los Banos-Livingston Jct-Canal 70kV (Santa Nella-Livingston Jct Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	241.2%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-79	Los Banos-Canal-Oro Loma 70kV (Los Banos-Pacheco Wind Section) (2016 Case) Los Banos-Mercy Spring 70kV (Los Banos-Pacheco Wind Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	207.1%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-80	Los Banos-Canal-Oro Loma 70kV (Canal-Ortiga Section) (2016 Case) Mercy Springs-Canal 70kV (Canal-Ortiga Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	129.4%	<90%	<90%	Action Plan. New Mercy Spring 230/70kV mitigates later years.
FR-SP-T-81	Los Banos-Canal-Oro Loma 70kV (Pacheco Wind-Wright Tap Section) (2016 Case) Los Banos-Mercy Spring 70kV (Pacheco Wind-Wright Tap Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	180.8%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate

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FR-SP-T-82	Los Banos-Canal-Oro Loma 70kV (Aruburaa Tap-Wright Tap Section) (2016 Case) Los Banos-Mercy Spring 70kV (Aruburaa Tap-Wright Tap Section) (2018 & Later)	Los Banos-Livingston Jct-Canal 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	174.2%	<90%	<90%	Action Plan. New Mercy Spring 230/70kV mitigates later years.
FR-SP-T-83	Oro Loma-Canal #1 70kV (Dos Palos-Santa Rita Section)	Los Banos-Canal-Oro Loma 70kV & Los Banos-Livingston Jct-Canal 70kV	C3	L-1-1	299.0%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-84	Oro Loma-Canal #1 70kV (Dos Palos-Santa Rita Section)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	117.4%	164.5%	Upgrade limiting 1/0 Cu line
FR-SP-T-85	Oro Loma-Canal #1 70kV (Oro Loma-Dos Palos Section)	Los Banos-Canal-Oro Loma 70kV & Los Banos-Livingston Jct-Canal 70kV	C3	L-1-1	353.9%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-86	Oro Loma-Canal #1 70kV (Oro Loma-Dos Palos Section)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	<90%	109.0%	Upgrade limiting 1/0 Cu line
FR-SP-T-87	Oro Loma-Canal #1 70kV (Santa Rita-Canal Section)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	297.1%	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-88	Oro Loma-Canal #1 70kV (Santa Rita-Canal Section)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	165.6%	233.4%	Upgrade limiting 1/0 Cu line
FR-SP-T-89	Oro Loma #2 115/70kV	Los Banos #3 & #4 230/70kV	C3	T-1-1	350.7%	<90%	<90%	Not Solved. Use Summer Setup in Los Banos 70kV Area to mitigate
FR-SP-T-90	Sanger-Reedley 115kV (Pom Jct-Parlier Section)	Kings River-Sanger-Reedley 115kV & McCall-Reedley 115kV (McCall-Wahtoke Section)	C3	L-1-1	101.1%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-91	Sanger-Reedley 115kV (Sanger CoGen Jct-Pom Jct Section)	Kings River-Sanger-Reedley 115kV & McCall-Reedley 115kV (McCall-Wahtoke Section)	C3	L-1-1	114.8%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-92	McCall-Reedley 115kV (Wahtoke-Reedley Section)	Kings River-Sanger-Reedley 115kV & Sanger-Reedley 115kV	C3	L-1-1	102.8%	<90%	<90%	Action Plan. New McCall-Reedley #2 115kV line mitigates later years.
FR-SP-T-93	McCall-Kingsburg #2 115kV (Guardian Jct-Kingsburg Section)	McCall-Kingsburg #1 115kV & GWF-Kingsburg 115kV	C3	L-1-1	92.4%	101.6%	113.0%	Consider SPS.
FR-SP-T-94	McCall-Kingsburg #1 115kV (Kingsburg Jct 1-Kingsburg Jct 2 Section)	McCall-Kingsburg #2 115kV & GWF-Kingsburg 115kV	C3	L-1-1	92.5%	101.7%	113.0%	Consider SPS.
FR-SP-T-95	McCall-Cal Ave 115kV (McCall-Danish Creamery Section)	Cal Ave-Sanger 115kV & McCall-West Fresno 115kV	C3	L-1-1	<90%	<90%	102.3%	Consider SPS.
FR-SP-T-96	Merced #2 115/70kV	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	92.4%	93.8%	128.9%	Existing Exchequer SPS mitigates.
FR-SP-T-97	Merced Falls-Exchequer 70kV (McSwain-Exchequer Section)	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	123.4%	125.1%	191.3%	Existing Exchequer SPS mitigates.
FR-SP-T-98	Merced Falls-Exchequer 70kV (Merced Falls-McSwain Jct Section)	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	111.6%	112.9%	162.9%	Existing Exchequer SPS mitigates.
FR-SP-T-99	Merced Falls-Exchequer 70kV (Merced Falls-McSwain Jct Section)	Wilson #2 230/115 & Exchequer-Le Grand 115kV	C3	L-1/T-1	121.2%	<90%	<90%	Existing Exchequer SPS mitigates. North Merced 230/70kV mitigates later years.
FR-SP-T-100	Merced-Merced Falls 70kV	Wilson #2 230/115 & Exchequer-Le Grand 115kV	C3	L-1/T-1	109.5%	<90%	<90%	Existing Exchequer SPS mitigates. North Merced 230/70kV mitigates later years.
FR-SP-T-101	Merced-Merced Falls 70kV	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	99.9%	99.9%	147.0%	Existing Exchequer SPS mitigates.

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-102	Panoche-Oro Loma 115kV (DFS Tap-Oro Loma Section)	Los Banos #3 & #4 230/70kV	C3	T-1-1	142.5%	<90%	<90%	Action Plan. New Mercy Spring 230/70kV mitigates later years.
FR-SP-T-103	Panoche-Oro Loma 115kV (DFS Tap-Oro Loma Section)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	<90%	106.9%	124.7%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-104	Panoche-Oro Loma 115kV (Hammonds-DFS Tap Section)	Los Banos #3 & #4 230/70kV	C3	T-1-1	145.3%	<90%	<90%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-105	Panoche-Oro Loma 115kV (Hammonds-DFS Tap Section)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	<90%	109.9%	127.8%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-106	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Los Banos #3 & #4 230/70kV	C3	T-1-1	157.2%	<90%	<90%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-107	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	<90%	122.4%	141.2%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)
FR-SP-T-108	Wilson #1 230/115kV	Wilson #2 230/115 & Wilson-North Merced 230kV	C3	L-1/T-1	N/A	94.3%	109.2%	Consider SPS.
FR-SP-T-109	Wilson-Atwater #2 115kV	Atwater-Merced 115kV & El Capitan-Wilson 115kV	C3	L-1-1	138.1%	<90%	<90%	Existing Atwater SPS mitigates
FR-SP-T-110	Wilson-El Capitan 115kV	Atwater-Merced 115kV & Wilson-Atwater #2 115kV	C3	L-1-1	113.1%	<90%	<90%	Existing Atwater SPS mitigates

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-111	Wilson-Le Grand 115kV	Wilson #1 & #2 230/115kV	C3	T-1-1	146.3%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-112	Wilson-Merced #1 115kV	Wilson-Atwater #2 115kV & El Capitan-Wilson 115kV	C3	L-1-1	136.3%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-113	Wilson-Merced #2 115kV	Wilson-Atwater #2 115kV & El Capitan-Wilson 115kV	C3	L-1-1	129.3%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-114	Wilson-Oro Loma 115kV (Le Grand Jct-El Nido Section)	Wilson #1 & #2 230/115kV	C3	T-1-1	111.4%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-115	Wilson-Oro Loma 115kV (Oro Loma-El Nido Section)	Wilson #1 & #2 230/115kV	C3	T-1-1	139.0%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-116	Wilson-Oro Loma 115kV (Wilson-Le Grand Jct Section)	Wilson #1 & #2 230/115kV	C3	T-1-1	111.4%	<90%	<90%	Action Plan. Wilson 115 kV Area Reinforcement Project mitigates later years.
FR-SP-T-117	Chowchilla-Kerckhoff 2 115kV (Sharon Tap-Oakhurst Jct Section)	Gregg-E1 #1 & #2 230kV	C5	L-2	N/A	99.9%	101.5%	Update Helms RAS & Kerckhoff 2 PH RAS
FR-SP-T-118	Los Banos-Livingston Jct-Canal 70kV (Los Banos-Chevron Pipeline Section)	Melones-Wilson 230kV & Warnerville-Wilson 230kV	C5	L-2	100.7%	<90%	<90%	Action Plan. Oro Loma 70 kV Area Reinforcement mitigates later years.
FR-SP-T-119	Panoche-Oro Loma 115kV (Panoche-Hammonds Section)	Panoche-Kearney 230kV & Gates-Gregg 230kV	C5	L-2	110.4%	<90%	<90%	Reconductor limiting section with 477 SSAC (224 MVA rating). Line is limited by 397.5 AAC (87/102MVA rating)

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-T-120	Warnerville-Wilson 230kV	Panoche-Kearney 230kV & Gates-Gregg 230kV	C5	L-2	100.2%	<90%	<90%	Action Plan.

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
FR-NP-T-1	Coalinga 1-Coalinga 2 70kV (Coalinga 1-Tornado Tap Section)	Coalinga 2 70kV Bus	C1	Bus	109.6%	107.5%		Redispatch
FR-NP-T-2	Panoche-Gates #1 230kV	Gates CB312 230kV	C2	Breaker	105.6%	<90%		Redispatch



# 2014-2015 ISO Reliability Assessment - Study Results

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

## Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-VD-1	Borden 230kV	Borden-Gregg 230kV	B	L-1	8.94%	<5%	<5%	Action Plan. Borden 230kV voltage mitigates later years.
FR-SP-VD-2	Chowchilla 115kV (Chowchilla 115kV Area)	Le Grand-Chowchilla 115kV	B	L-1	10.95%	12.65%	13.94%	Add dynamic voltage support at Chowchilla 115kV
FR-SP-VD-3	Dairyland 115kV	Le Grand-Dairyland 115kV	B	L-1	5.70%	5.57%	6.27%	Add dynamic voltage support at Chowchilla 115kV
FR-SP-VD-4	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV	B	L-1	13.85%	<5%	<5%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-5	Angiola 70kV (Kingsburg Area)	Kingsburg-Corcoran #2 115kV	B	L-1	6.32%	6.65%	7.24%	Add dynamic voltage support at Kingsburg 115kV
FR-SP-VD-6	Dinuba 70kV (Reedley 70kV Area)	Reedley-Dinuba 70kV	B	L-1	7.87%	<5%	<5%	Action Plan. Reedley-Dinuba 70kV mitigates later years.
FR-SP-VD-7	Caruthers 70kV (Kearney 70kV Area)	Kearney #4 230/70kV	B	T-1	<5%	5.32%	<5%	Verify transformer settings at Kearney
FR-SP-VD-8	Firebaugh 70kV	Oro Loma #2 115/70kV	B	T-1	9.76%	<5%	<5%	Action Plan. Oro Loma 70kV Area Reinforcement mitigates later years.
FR-SP-VD-9	Oakhurst 115kV (Chowchilla 115kV Area)	Kerckhoff 2 115kV Bus	C1	Bus	11.49%	13.48%	14.67%	Add dynamic voltage support at Chowchilla 115kV
FR-SP-VD-10	Mendota 115kV (Mendota 115kV Area)	Panoche 1 115kV Bus	C1	Bus	13.55%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-11	Santa Nella 70kV (Los Banos 70kV Area)	Los Banos 70kV Bus	C1	Bus	83.60%	<10%	<10%	Not Solved. Oro Loma 70kV Area Reinforcement mitigates later years.
FR-SP-VD-12	Mendota 115kV (Mendota 115kV Area)	Panoche CB102 115kV Failure	C2	Breaker	17.19%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-13	Dairyland 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	100.00%	13.50%	18.17%	Add dynamic reactive support at Mendota 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.
FR-SP-VD-14	Oakhurst 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	20.75%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-15	Chowchilla 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	100.00%	15.52%	16.95%	Add dynamic reactive support at Chowchilla 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.

## 2014-2015 ISO Reliability Assessment - Study Results

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

### Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-VD-16	Oro Loma 70kV (Los Banos 70kV Area)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	100.00%	N/A	N/A	Not Solved.
FR-SP-VD-17	Oro Loma 70kV (Los Banos 70kV Area)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	27.67%	41.58%	Add second Mercy Spring-Oro Loma 70kV line
FR-SP-VD-18	Bear Valley 70kV (Mariposa 70kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	43.55%	<10%	<10%	Mariposa UVLS mitigates 2016. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-19	Merced 70kV (Mariposa 70kV Area)	Panoche-Mendota 115kV & Exchequer-Le Grand 115kV	C3	L-1-1	<10%	<10%	11.64%	Mariposa UVLS mitigates.
FR-SP-VD-20	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	81.55%	<10%	<10%	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-VD-21	Newhall 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	100.00%	10.98%	15.24%	Add dynamic reactive support at Mendota 115kV
FR-SP-VD-22	Wahtoke 115kV (Reedley 70kV Area)	McCall-Reedley 115kV (McCall-Wahtoke) & Sanger-Reedley 115kV	C3	L-1-1	12.74%	<10%	<10%	Action Plan. McCall-Reedley #2 115kV mitigates later years.
FR-SP-VD-23	West Fresno 115kV (Sanger 115kV Area)	California Ave-Sanger 115kV & McCall-West Fresno 115kV	C3	L-1-1	<10%	<10%	14.98%	Add dynamic reactive support at West Fresno 115kV
FR-SP-VD-24	Not Solved	Wilson #1 & #2 230/115kV	C3	T-1-1	Not Solved	<10%	<10%	Action Plan. Wilson 115kV Area Reinforcement mitigates later years.
FR-SP-VD-25	Not Solved	Los Banos #3 & #4 230/70kV	C3	T-1-1	Not Solved	<10%	<10%	Action Plan. Oro Loma 70kV Area Reinforcement mitigates later years.
FR-SP-VD-26	Not Solved	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	Not Solved	<10%	<10%	Mitigation alternatives under review
FR-SP-VD-27	Borden 230kV (Borden 230kV Area)	Borden-Gregg 230kV & Wilson-Gregg 230kV	C5	N-2	11.19%	<10%	<10%	Action Plan. Borden 230kV Voltage mitigates later years.



Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No voltage deviation concerns identified.

# 2014-2015 ISO Reliability Assessment - Study Results

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

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-V-1	Kearney 70kV	Base Case	A	N-0	1.07	1.09	1.08	Check xfmr taps
FR-SP-V-2	Chowchilla 115kV	Le Grand-Chowchilla 115kV	B	L-1	0.9133	0.8918	0.8733	Add dynamic voltage support at Chowchilla 115kV
FR-SP-V-3	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV	B	L-1	0.8758	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-4	Kearney 70kV	Kearney #2 230/70kV	B	T-1	<1.10	1.1157	1.1079	Check xfmr taps
FR-SP-V-5	Oakhurst 115kV (Chowchilla 115kV Area)	Kerckhoff 2 115kV Bus	C1	Bus	0.8792	0.8759	0.8626	Add dynamic voltage support at Chowchilla 115kV
FR-SP-V-6	Santa Nella 70kV (Los Banos 70kV Area)	Los Banos 70kV Bus	C1	Bus	0.1905	>0.90	>0.90	Not Solved
FR-SP-V-7	Dunlap 70kV (Reedley 70kV Area)	McCall CB202 230kV Failure	C2	Breaker	0.8858	>0.90	>0.90	Action Plan. Reedly-Orosi 70kV mitigates later years.
FR-SP-V-8	Mendota 115kV (Mendota 115kV Area)	Panoche CB102 115kV Failure	C2	Breaker	0.8722	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-9	Borden 230kV (Borden 230kV Area)	Warnerville-Wilson 230kV & Borden-Gregg 230kV	C3	L-1-1	0.8739	>0.90	>0.90	Action Plan. Borden 230kV Voltage mitigates later years.
FR-SP-V-10	Dairyland 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	0	0.8615	0.8069	Add dynamic reactive support at Mendota 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.
FR-SP-V-11	Oakhurst 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0.8183	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-12	Chowchilla 115kV (Chowchilla 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0	0.8567	0.8378	Add dynamic reactive support at Chowchilla 115kV. Case not solved for 2016, but Oro Loma-Mendota 115kV conversion mitigates later years.
FR-SP-V-13	Oro Loma 70kV (Los Banos 70kV Area)	Los Banos-Canal-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	0	N/A	N/A	Not Solved. Use Summer Setup in Los Banos 70kV Area.
FR-SP-V-14	Oro Loma 70kV (Los Banos 70kV Area)	Mercy Spring-Oro Loma 70kV & Oro Loma #2 115/70kV	C3	L-1/T-1	N/A	0.738	0.5896	Add second Mercy Spring-Oro Loma 70kV line or consider SPS.
FR-SP-V-15	Bear Valley 70kV (Mariposa 70kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0.5919	>0.90	>0.90	Mariposa UVLS mitigates

# 2014-2015 ISO Reliability Assessment - Study Results

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

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	
FR-SP-V-16	Mendota 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Wilson-Le Grand 115kV	C3	L-1-1	0	>0.90	>0.90	Action Plan. Oro Loma-Mendota 115kV project mitigates later years.
FR-SP-V-17	Newhall 115kV (Mendota 115kV Area)	Panoche-Mendota 115kV & Dairyland-Le Grand 115kV	C3	L-1-1	0	0.8769	0.8261	Add dynamic reactive support at Mendota 115kV.
FR-SP-V-18	Wahtoke 115kV (Reedley 70kV Area)	McCall-Reedley 115kV (McCall-Wahtoke) & Sanger-Reedley 115kV	C3	L-1-1	0.8928	>0.90	>0.90	Action Plan. McCall-Reedley #2 115kV mitigates later years.
FR-SP-V-19	West Fresno 115kV (Sanger 115kV Area)	California Ave-Sanger 115kV & McCall-West Fresno 115kV	C3	L-1-1	>0.90	>0.90	0.8361	Add dynamic reactive support at West Fresno 115kV
FR-SP-V-20	Borden 230kV (Borden 230kV Area)	Borden-Gregg 230kV & Wilson-Gregg 230kV	C5	N-2	0.8864	>0.90	>0.90	Action Plan. Borden 230kV Voltage mitigates later years.

# 2014-2015 ISO Reliability Assessment - Study Results

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

**High/Low Voltage**



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2016 Summer Off-Peak	2019 Summer Light Load	N/A	
FR-NP-V-1	Fresno Wastewater 70kV	None	A	N-0	1.0855	1.0919		Kearney #4 230/70kV is locked.
FR-NP-V-2	Corcoran 70kV	None	A	N-0	<1.05	1.0628		Under review with PTO
FR-NP-V-3	Los Banos 70kV	None	A	N-0	<1.05	1.0631		Under review with PTO
FR-NP-V-4	Exchequer 70kV	None	A	N-0	<1.05	1.0596		Under review with PTO
FR-NP-V-5	Orosi 70kV	None	A	N-0	<1.05	1.0734		Under review with PTO
FR-NP-V-6	North Merced 115kV	None	A	N-0	<1.05	1.0577		Under review with PTO
FR-NP-V-7	Fresno Wastewater 70kV	Herndon-Kearney 230kV	B	L-1	<1.05	1.1077		Under review with PTO
FR-NP-V-8	Fresno Wastewater 70kV	Kearney #2 230/70kV	B	T-1	1.119	<1.05		Under review with PTO
FR-NP-V-9	Fresno Wastewater 70kV	Kearney #4 230/70kV	B	T-1	<1.05	1.1267		Under review with PTO

**Single Contingency Load Drop**

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

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



**Single Contingency Load Drop**

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)			Potential Mitigation Solutions
				2016 Summer Off-Peak	2019 Summer Light Load	N/A	

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

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

*Single Source Substation with more than 100 MW Load*



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Peak	2019 Summer Peak	2024 Summer Peak	

No single source substation with more than 100 MW Load

## 2014-2015 ISO Reliability Assessment - Study Results

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

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



ID	Substation	Load Served (MW)			Potential Mitigation Solutions
		2016 Summer Off-Peak	2019 Summer Light Load	N/A	

No single source substation with more than 100 MW Load