2018-2019 ISO Reliability Assessment - Preliminary Study Results

Study Area: SCE North of Lugo

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Remaining two Lugo-Victor 230kV lines	Loss of two of the Lugo-Victor 230kV lines	P6	Two overlapping singles	<100	<100	104.28	<100	<100	<100	<100	<100	HDPP RAS
24701 KRAMER 230 24601 VICTOR 230 1 1	ROADWAY - KRAMER 115.0 ck 1 KRAMER - VICTOR 230.0 ck 2	P6	Two overlapping singles	<100	<100	111.31	104.07	<100	<100	105.36	<100	Congestion management. Modify exisitng Mojave RAS to monitor flow and status or Kramer-Vicor 230kV lines as well
24701 KRAMER 230 24601 VICTOR 230 2 1	ROADWAY - KRAMER 115.0 ck 1 KRAMER - VICTOR 230.0 ck 1	P6	Two overlapping singles	<100	<100	111.31	104.07	<100	<100	105.36	<100	Congestion management. Modify exisitng Mojave RAS to monitor flow and status or Kramer-Vicor 230kV lines as well
24723 CONTROL 115 24728 INYO 115 1 1	INYOKERN - KRAMER 115.0 ck 1 KRAMER-INYOKERN-RANDSB 115 ck 1	P6	Two overlapping singles	132.8	<100	143.89	184.98	117.33	<100	146.79	<100	Congestion management
24723 CONTROL 115 24731 INYOKERN 115 1 1	CONTROL - INYO 115.0 ck 1 CONTROL-COSO-INYOKERN 115 ck 2	P6	Two overlapping singles	105.75	<100	111.78	<100	<100	<100	<100	<100	Bishop RAS
24728 INYO 115 24730 INYO PS 115 1 1	INYOKERN - KRAMER 115.0 ck 1 KRAMER-INYOKERN-RANDSB 115 ck 1	P6	Two overlapping singles	174.69	<100	177.29	217.18	154.4	<100	185.6	<100	Utilize two hour emergency rating followed by system adjustment
Case Diverge	KRAMER - COLWATER 115.0 ck 1 KRAMER - TORTILLA 115.0 ck 1	P6	Two overlapping singles	<100	Nconv	<100	<100	Nconv	Nconv	<100	<100	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
Case Diverge	Control 115/55kV Nos.1&2 transformers	P6	Two overlapping singles	<100	Nconv	<100	<100	<100	<100	<100	<100	SCE Operating Procedure SOB-4, dispatching generation

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Baker 115kV	KRAMER - COLWATER 115.0 ck 1 KRAMER - TORTILLA 115.0 ck 1	P6	Two overlapping singles	0.86	0.86	>0.9	>0.9	0.82	0.85	>0.9	>0.9	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
Coolwater 115kV	KRAMER - COLWATER 115.0 ck 1 KRAMER - TORTILLA 115.0 ck 1	P6	Two overlapping singles	0.71	0.76	>0.9	>0.9	0.62	0.75	>0.9	>0.9	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
Control 115kV	INYOKERN - KRAMER 115.0 ck 1 KRAMER-INYOKERN-RANDSB 115 ck 1	P6	Two overlapping singles	>0.9	>0.9	0.88	0.84	>0.9	>0.9	>0.9	>0.9	Generation redispatch, reduce Oxbow B output

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Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None												

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Transient Stability

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Control-Casa Diablo 1150kV (1PH fault at Control)	P4.2	Stuck Breaker	WECC Criteira not Met	NA	WECC Criteira not Met	NA	WECC Criteira not Met	NA	WECC Criteira not Met	WECC Criteira not Met	
Control-Casa Diablo 1150kV (1PH fault at Casa Diablo)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Coso-Haiwee-Inyokern 115kV (1PH fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Coso-Haiwee-Inyokern 115kV (1PH fault at Control)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Haiwee-Inyokern (Fault at Control)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Haiwee-Inyokern (Fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Inyo 115kV (Fault at Control)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Inyokern-Downs 115kV (Fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Inyokern-McGen-Searles 15kV (Fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Roadway 115kV (Fault 20% from Kramer)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Roadway 115kV (Fault 20% from Roadway)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	stable	
Kramer-Victor 115kV (Fault 20% from Kramer)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Victor 115kV (Fault 20% from Victor)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control 115/55kV Transforemer Banks	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer 230/115kV Transformer Banks	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Lugo 500/230kkV Transformer Banks no RAS	P6	Normal clearing	Unstable	NA	Unstable	NA	Unstable	NA	Unstable	Unstable	
Lugo 500/230kV Transformer Banks RAS	P6	Normal clearing	WECC Criteira not Met	NA	WECC Criteira not Met	NA	WECC Criteira not Met	NA	Stable	WECC Criteira not Met	Revisitng the RAS to determine how much generation needs to be tripped baased on the flow
Kramer-Inyokern-Randsburg Nos.1 & 3 115kV	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV (Fault at Coolwater)	P6	Normal clearing	Stable	NA	Stable	NA	NA	NA	NA	Stable	
Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV_OP (Fault at Coolwater)	P6	Normal clearing	NA	NA	NA	NA	Stable	NA	Stable	NA	

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Transient Stability

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Coolwater-Kramer & Kramer-Tortilla 115kV (Fault at Kramer)	P6	Normal clearing	Stable	NA	Stable	NA	NA	NA	NA	Stable	
Coolwater-Kramer & Kramer-Tortilla 115kV_OP (Fault at Kramer)	P6	Normal clearing	NA	NA	NA	NA	Stable	NA	Stable	NA	
Kramer-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Unstable	NA	Unstable	NA	Unstable	NA	Unstable	Unstable	Mojave Desert RAS
Kramer-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Lugo-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	Victor loop-in
Lugo-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Coso-Inyokern & Control-Inyokern 115kV no RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	Bishop RAS
Control-Coso-Inyokern & Control-Inyokern 115kV RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Victor & Roadway-Victor 115kV	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Victor & Kramer-Roadway 115kV	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer 230kV Sub with RAS	Extreme	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	

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Single Contingency Load Drop

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
			Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

None

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Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)										Potential Mitigation Solutions
	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

None