Application No.: 12-05-020

Exhibit No.:

Witness: Robert Sparks

In the Matter of the Application of San Diego Gas & Electric Company (U902E) for a Certificate of Public Convenience and Necessity for the South Orange County Reliability Enhancement Project.	Application 12-05-020

REBUTTAL TESTIMONY OF ROBERT SPARKS
ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of the Application of San Diego Gas & Electric Company (U902E) for a Certificate of Public Convenience and Necessity for the South Orange County Reliability Enhancement Project.	Application 12-05-020

REBUTTAL TESTIMONY OF ROBERT SPARKS ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

Q. What is your name and by whom are you employed?

A. My name is Robert Sparks. I am employed by the California Independent System Operator Corporation (CAISO), 250 Outcropping Way, Folsom, California as Manager, Regional Transmission.

Q. Have you previously provided testimony in this proceeding?

A. Yes, I provided direct testimony in this proceeding served on May 26, 2015. My educational and professional background is provided in my direct testimony.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my testimony is to present the CAISO's analysis of the alternatives to the South Orange County Reliability Enhancement (SOCRE) project proposed by the Office of Ratepayer Advocates (ORA) and the City of San Juan Capistrano.[1]

[1] The CAISO has not separately addressed the new alternatives proposed by Forest Residents Opposing New Transmission Lines (Frontlines) in this rebuttal testimony. Frontlines Alternatives discussed in Sections 3.1 and 3.2 of its direct testimony are similar to the Draft Environmental Impact Report (DEIR) alternatives B1, B2, B3, B4 and E, previously evaluated in the prepared direct testimony of Robert Sparks on behalf of the CAISO served on May 26, 2015. The Frontlines alternatives presented Section 6 of its testimony introduce a new reliability concern by paralleling the South Orange County 138 kV system with the Southern California Electric Company (SCE) 230 kV system. This concern is similar to that discussed in the prepared direct testimony of Robert Sparks addressing DEIR Alternatives C1, C2 and D.

Q. Please provide an overview of ORA's proposed alternatives to the SOCRE project.

A. ORA offers two alternatives to the SOCRE project. The first proposes to interconnect SDG&E's Trabuco Substation to Southern California Edison Company's (SCE's) San Onofre–Santiago transmission line (Trabuco Alternative). This alternative would separate the South Orange County load into two parts by opening some of the 138 kilovolt (kV) circuit breakers. In the Trabuco Alternative, the existing Talega Substation would partially supply South Orange County load and an upgraded Trabuco Substation would supply the remainder under normal operating conditions.

ORA's second alternative proposes to interconnect SDG&E's Pico substation to one of SCE's 230 kV transmission lines (Pico Alternative). Similar to the Trabuco Alternative the Pico Alternative would separate South Orange County load into two parts by opening some 138 kV circuit breakers.

Q. Does the CAISO have any concerns with ORA's Trabuco and Pico Alternatives?

Yes. Although the alternatives address some of CAISO-identified reliability concerns, they create new reliability concerns. Both alternatives would result in substantial single contingency load dropping in the South Orange County area. Modifying the South Orange County system in a way that causes single contingency load shedding that does not exist today would be a degradation of customer service and is not acceptable. ORA does not provide detail on how the South Orange County system would be split, however, for the Trabuco Alternative the CAISO estimates that 245-396 MW of South Orange County load, or about 50%-81% of total area load, would be served by the new Trabuco 230 kV source would be interrupted for an N-1 outage of the Trabuco 230/138 kV transformer (T-1). Similarly, for the Pico Alternative the CAISO estimates that 205-402 MW South Orange County load, or about 42%-82% of total area load that would be served by

the new Pico 230 kV source would be interrupted for an N-1 outage of Pico 230/138 kV transformer (T-1).

In addition, both the Trabuco and Pico Alternatives would result in the Margarita, Rancho Mission Viejo, and Laguna Niguel substations being served from a single radial 138 kV transmission line and would be subject to single contingency load dropping.[2]

ORA's proposed separation of the South Orange County transmission system would sacrifice operational reliability and flexibility in the area because the four 138 kV lines between the northern and southern South Orange County area would normally be operated as radial lines. Although the two 230 kV power supplies could back up each other to serve the South Orange County South Orange County load under contingencies, customers would likely experience much more frequent widespread service interruptions.

Q. If the Commission approves ORA's Trabuco or Pico Alternative, what additional improvements would be necessary to avoid N-1 load shedding?

The existing South Orange County 230/138 kV system is a 138 kV transmission network with four 138 kV lines connecting from the southern to the northern South Orange County area and is not designed to operate in radial configuration. In order to avoid the N-1 single contingency load shedding described above the following additional system improvements would be required:

- Addition of a second 230/138 kV transformer at Trabuco Substation for the Trabuco Alternative or at Pico Substation for the Pico Alternative;
- Building a second 138 kV line from Trabuco to Margarita;
- Building a second 138 kV line from Margarita to Rancho Mission Viejo;

[2] The substation peak load at Margarita and Laguna Niguel substations are 105.5 megawatts (MW) and 99.5 MW by the year of 2024.

- Building a second 138 kV line from Rancho Mission Viejo to Talega;
- Re-configuring the Trabuco-Capistrano-Laguna Niguel 138 kV system; and
- Designing a robust control system to back up the two transmission sources.

These additional necessary improvements make the Trabuco or Pico Alternative an unattractive and potentially costly alternative to the SOCRE project.

Q. Please provide an overview of the 230-kV Rancho Mission Viejo Substation Alternative (Alternative F) to the SOCRE project found in DEIR and endorsed by the City of San Juan Capistrano.

A. According to the DEIR, Alternative F was identified based on comments received during the EIR scoping meeting held in the city of San Juan Capistrano.[3] Alternative F proposes to bring in a new 230-kV source into the South Orange County service area by building a new double-circuit 230-kV line from Talega to Rancho Mission Viejo line. Although two new 230-kV circuits would be installed, one of the circuits would be operated at 138 kV.

Q. Has the CAISO analyzed Alternative F?

A. Yes. This analysis was provided in my direct testimony starting at page 19, which identified reliability concerns associated with this alternative.

Q. The City of San Juan Capistrano suggests that the Talega-Rancho Mission Viejo 138 kV circuit could be reconfigured to bypass Talega Substation and directly tie with the Talega to Pico 138 kV line and operated as a three terminal line. Would this modification address the reliability concerns identified by the CAISO?

A. No. Although the modified Alternative F addresses some of the reliability concerns associated to load serving capability with facility out of service for maintenance in

[3] DEIR, p. 3-17, lines 17-18.

Talega 138 kV Substation and part of the Category D concern, it creates new reliability concerns.

Table A-1 provides the results of the CAISO analysis of the City of San Juan Capistrano's modified Alternative F. This analysis demonstrates numerous Category C contingency reliability concerns. One Category D concern is still identified and may not be fully eliminated, depending on the nature of the Category D event at the Talega 138 kV substation. If a fault occurs on the 138 kV section between Talega to the new tap of the three-terminal line or circuit breaker #8E or 8W at the Talega 138 kV substation experiences failure or internal fault during the event, the three-terminal 138 kV line will also be tripped out, which will result in cascading outages on the Rancho Mission Viejo Substation.

Table A-1 Thermal Overloads in the SDG&E South Orange County area with Alternative F 230-kV Rancho Mission Viejo Substation and with Rancho Mission Viejo-Talega 138 kV line tapped to Talega-Pico 138 kV line 2024 Summer Peak (CAISO 2014~2015 TPP) and 2030 Summer Peak (Sensitivity Case)

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (% over applicable rating)
					2024SP
24SP-F-c1	22840 TALEGA 138 22842 TA TAP33 138 1	TAP_2000_Line TALEGA-R.MSNVJO-PICO 138 kV Tap Circuit 1 -- RMV-L_011_Line S.ONOFRE	C	L-1-1	113.48

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (% over applicable rating)
					2024SP
		230.0 to RMVIEJO 230.0 Circuit 1			
24SP-F-c2	22842 TA TAP33 138 22656 PICO 138 1	TAP_2000_Line TALEGA-R.MSNVJO-PICO 138 kV Tap Circuit 1 -- RMV-L_011_Line S.ONOFRE 230.0 to RMVIEJO 230.0 Circuit 1	C	L-1-1	109.67
24SP-F-c3	22841 TA TAP 138 22396 LAGNA NL 138 1	line_7002_Line CAPSTRNO 138.0 to PICO 138.0 Circuit 1 -- line_7007_Line R.MSNVJO 138.0 to MARGARTA 138.0 Circuit 1	C	L-1-1	108.01
24SP-F-c4	22841 TA TAP 138 22396 LAGNA NL 138 1	002_Line CAPSTRNO 138.0 to PICO 138.0 Circuit 1 -- line_7004_Line CAPSTRNO 138.0 to TRABUCO 138.0 Circuit 1	C	L-1-1	101.84
24SP-F-c5	22840 TALEGA 138 22842 TA TAP33 138 1	007_Line R.MSNVJO 138.0 to MARGARTA 138.0 Circuit 1 -- TAP_2000_Line TALEGA-R.MSNVJO-	C	L-1-1	100.35

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (% over applicable rating)
					2024SP
		PICO 138 kV Tap Circuit 1			
24SP-F-c6	SDG&E's South Orange County Service Area	f Talega 138 kV Substation	D	Loss of substation (D8)	Load drop for the area

Q. Does the CAISO have any additional concerns regarding the City of San Juan Capistrano's modified Alternative F?

A. Yes. The CAISO conducted long-term sensitivity studies for both the SOCRE project and the City of San Jun Capistrano's modified Alternative F based on a 2030 summer peak scenario assuming 8.6% total load growth compared to the 2024 Summer Peak case.[4] The long-term sensitivity study results show a growing number of reliability concerns for the modified Alternative F compared with the SOCRE project. Table A-2 provides an overview of the identified reliability concerns.

Table A-2 Thermal Overloads in the SDG&E South Orange County area SOCREP vs. Alt. F: (Rancho Mission Viejo 230 kV source) on 2030 Summer Peak (Sensitivity Study Case). With Rancho Mission Viejo-Talega 138 kV line

[4] For the modified Alternative F and the SOCRE project, the 230/138 kV Talega substation was modified to meet the SDG&E current substation design standard, by eliminating the Talega Bank #60 and #62.

tapped to Talega-Pico 138 kV line, and Elimination of the Talega 230/138 kV Bank #60 and #62

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (%) of 2030 Summer Peak Case (Sensitivity study)	
					SOCRE P	DEIR's Alternative F Modified
24SP	22678 R.MSNVJO 138 22432 MARGARTA 138 1	tran_7019_Tran TALEGA 230.00 to TALEGA 138.00 Circuit 2 -- tran_7020_Tran TALEGA 230.00 to TALEGA 138.00 Circuit 4	C	L-1-1	-	90.22
24SP	22840 TALEGA 138 22842 TA TAP33 138 1	line_7007_Line R.MSNVJO 138.0 to MARGARTA 138.0 Circuit 1 -- TAP_2000_Line TALEGA-R.MSNVJO-PICO 138 kV Tap Circuit 1	C	L-1-1	-	110.6
24SP	22840 TALEGA 138 22842 TA TAP33 138 1	TAP_2000_Line TALEGA-R.MSNVJO-PICO 138 kV Tap Circuit 1 -- RMV-L_011_Line S.ONOFRE 230.0	C	common structure (C5)	-	125.08

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (%) of 2030 Summer Peak Case (Sensitivity study)	
					SOCRE P	DEIR's Alternati ve F Modified
		to RMVIEJO 230.0 Circuit 1				
24SP	22841 TA TAP 138 22396 LAGNA NL 138 1	line_7002_Line CAPSTRNO 138.0 to PICO 138.0 Circuit 1 -- line_7004_Line CAPSTRNO 138.0 to TRABUCO 138.0 Circuit 1	C	L-1-1	-	112.54
24SP	22841 TA TAP 138 22396 LAGNA NL 138 1	line_7002_Line CAPSTRNO 138.0 to PICO 138.0 Circuit 1 -- line_7007_Line R.MSNVJO 138.0 to MARGARTA 138.0 Circuit 1	C	L-1-1	-	119.3
24SP	22842 TA TAP33 138 22656 PICO 138 1	line_7007_Line R.MSNVJO 138.0 to MARGARTA 138.0 Circuit 1 -- TAP_2000_Line	C	L-1-1	-	106

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (%) of 2030 Summer Peak Case (Sensitivity study)	
					SOCRE P	DEIR's Alternati ve F Modified
		TALEGA-R.MSNVJO-PICO 138 kV Tap Circuit 1				
24SP	22842 TA TAP33 138 22656 PICO 138 1	TAP_2000_Line TALEGA-R.MSNVJO-PICO 138 kV Tap Circuit 1 -- RMV-L_011_Line S.ONOFRE 230.0 to RMVIEJO 230.0 Circuit 1	C	common structure (C5)	-	120.91
24SP	22844 TALEGA 230 22840 TALEGA 138 2	tran_7020_Tran TALEGA 230.00 to TALEGA 138.00 Circuit 4 -- RMV-L_011_Line S.ONOFRE 230.0 to RMVIEJO 230.0 Circuit 1	C	T-1/L-1	-	108.58
24SP	22844 TALEGA 230 22840 TALEGA 138 4	tran_7019_Tran TALEGA 230.00 to TALEGA 138.00 Circuit 2 -- RMV-L_011_Line	C	T-1/L-1	-	106.32

ID	Overloaded Facility	Contingency	Category	Category Description	Thermal Loading (%) of 2030 Summer Peak Case (Sensitivity study)	
					SOCRE P	DEIR's Alternative F Modified
		S.ONOFRE 230.0 to RMVIEJO 230.0 Circuit 1				
24SP	SDG&E's South Orange County Service Area	Loss of Talega 138 kV substation	D	Loss of substation (D8)	0 MW load drop	532 MW Load drop
Summary of Reliability Concerns		Total number of thermal overload concerns			0	9
		Total number of Elements Monitored by SPS			0	5
		Total number of Contingencies Monitored by SPS			0	6

Furthermore, the ISO explored the possibility of mitigating these reliability concerns by a special protection system (SPS). However, the sensitivity studies identified five transmission elements that would need to be monitored by an SPS. This is in excess of the four allowable transmission elements that may be addressed by an SPS pursuant to CAISO Planning Standards. In addition, there were at least 6 unique local contingencies identified that would need to be monitored by the SPS. This is equal to the six allowable local contingences pursuant to CAISO Planning

Standards. The long-term sensitivity studies also indicate that the 138 kV line from Rancho Mission Viejo to Margarita (TL13838) would experience thermal overload for the overlapping contingency of Talega Bank #61 and #63 (T-1-1) if the area load increases more in the future.

Q. Please summarize your testimony.

A. The alternatives to the SOCRE project put forth by ORA are impractical because they create new reliability concerns including several contingencies that result in N-1 single contingency load shedding. These alternatives would necessitate substantial additional improvements to the South Orange County transmission system to mitigate.

The alternative proposed by the City of San Juan Capistrano fails to address all reliability concerns that increase in number over the long-term horizon.

The SOCRE project remains the most effective project at mitigating all reliability concerns without compromising the current level of service in the South Orange County system.

Q. Does this conclude your testimony?

A. Yes.