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COMMENTS OF THE OFFICE OF RATEPAYER ADVOCATES OF THE CALIFORNIA PUBLIC UTILITIES COMMISSION ON THE CAISO'S STRAW PROPOSAL TO REVISE ITS TRANSMISSION PLANNING STANDARDS

I. INTRODUCTION

On April 4, 2014, the California Independent System Operator Corporation (CAISO) posted its Straw Proposal Revision to ISO Transmission Planning Standards (Straw Proposal) for public comment. On April 11, 2014, the CAISO held a stakeholder meeting to discuss the Straw Proposal.[1]

The Office of Ratepayer Advocates (ORA) is keenly interested in issues regarding CAISO Planning Standards because CAISO Planning Standards are essentially reliability standards exceeding those required by North American Energy Reliability Council (NERC). New CAISO planning standards therefore potentially trigger the need for infrastructure investment to meet those higher standards, and will potentially result in higher Transmission Access Charges (TAC) for ratepayers.

The CAISO has an obligation to consider the cost-consequences of its proposals and decisions. California Public Utilities Code § 345.5 imposes a statutory obligation on the CAISO to reduce "to the extent possible, overall economic cost to the state's consumers." This obligation is emphasized by state energy policy. Among other things, the California Public Utilities Commission (CPUC) has repeatedly rejected the concept of "reliability at any cost." See

[1] During the stakeholder meeting, the CAISO presented a powerpoint summary of the Straw Proposal and answered stakeholder questions regarding the Straw Proposal. *See* http://www.caiso.com/Documents/AgendaPresentation-TransmissionPlanningStandards-April112014Meeting.pdf

D.05-10-042, p. 7: "… the concept embodied in the phrase "reliability at any cost" is not a policy option. Ultimately, measures that are proposed to promote greater grid reliability should be evaluated by weighing their expected costs against the value of their expected contribution to reliability."[2]

Notwithstanding these clear legislative and policy mandates, the Straw Proposal does not reflect an effort to reduce "to the extent possible, overall economic cost to the state's consumers." The CAISO has not presented any analysis to demonstrate that the NERC standards are insufficient to ensure reliability.

These comments focus on:

1. The proposed standards for non-consequential load dropping during Category C contingencies; and
2. The San Francisco peninsula extreme event reliability standard.

II. DISCUSSION

A. Standards for Non-Consequential Load Dropping During Category C Contingencies

1. Background

The NERC Transmission Planning (TPL) Standards are national requirements setting minimum standards for contingency selection, transmission performance, and criteria determining whether continuity of service to customers is maintained. TPL-003,[3] the current NERC standard for Category C contingencies, addresses the loss of two or more Basic Electric System (BES) elements (such as a major transmission line or generation supply) and requires that the system be stable and within both thermal and voltage system limits during that loss. However planned/controlled loss of demand or curtailment of firm transfers is allowed.

The recently approved NERC TPL Standards (TPL-001-4) will replace Category C contingencies with contingency categories P4 to P7.[4,5] TPL-001-4 requires that there be no non-

[2] This policy is reiterated in multiple Commission decisions, including D.06-04-040, D.10-06-018, D.13-04-013, and D.14-03-004.
[3] TPL-003 contingencies are also known as Category C contingencies.
[4] Standard TPL-001-4 — Transmission System Planning Performance Requirements is available at http://www.nerc.com/files/TPL-001-4.pdf.

consequential load loss for some multiple contingencies, including (1) an extra high voltage (EHV)[6] stuck breaker (P4), or (2) an EHV relay failure (P5). However, the new NERC TPL Standards continue to allow the controlled loss of load either consequential or non-consequential for the overlapping loss of two non-generation transmission elements (P6) or the simultaneous loss of two elements sharing a common structure (P7).

NERC allows Regional Reliability Organizations (RROs) or Planning Authorities (PAs) such as the CAISO to establish more stringent standards as may be appropriate for their area. The Straw Proposal proposes a more stringent standard, which will prohibit non-consequential loss of load using a special protection scheme (SPS) following a Category C[7] event for portions of the CAISO controlled transmission system where the population density exceeds 1,000 people/square mile (the "SPS standard.")[8] SPS could still be used in non-urban areas or as an interim solution.[9] As a basis for this position, the Straw Proposal is described as codifying the "ISO's current practice in local area planning", which "is to not rely upon high density urban load shedding as a long term planning solution for Category C contingencies."[10] The CAISO states that "[t]he need for system reinforcement in a number of local areas is expected to climb due to protected resource retirements, with Category C contingencies paying a material role in driving the need for reinforcement. Relying on load on a broad basis to meet these emerging needs would run counter to historical and current practices, resulting in general deterioration of service levels."[11] The CAISO describes its current practice as not "shed[ding] large blocks of high density urban load for category C contingencies as a long term solution."[12]

Currently, 14 SPS systems "drop load for category C contingencies on the 100 kV systems and above"[13] in CAISO's controlled grid. Two of these SPS systems operate in urban

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[5] P3 is a multiple contingency which was originally considered a NERC Category C contingency and a CAISO Category B contingency. The new NERC standard considers P3 to be a category B type contingency.
[6] 345 kV, 500 kV, 765 kV transmission lines are considered EHV for purposes of NERC TPL Standards. *See*, *e.g.*, Robert Alonzo, Electrical Codes, Standards, Recommended Practices and Regulations: An Examination of Relevant Safety Considerations, p. 424.
[7] Category P4 through P7 in the new TPL-001-4.
[8] Straw Proposal, p. 3-6.
[9] Straw Proposal, p. 3.
[10] Straw Proposal, p. 3.
[11] Straw Proposal, p. 4.
[12] Straw Proposal, p. 4.
[13] ISO Non-consequential load dropping: Category C Contingencies, PowerPoint (Apr. 11, 2014), slide 13.

areas and both SPS systems have CAISO approved transmission solutions.[14] The Straw Proposal contains two illustrative maps suggesting that the Straw Proposal's SPS standard would be applied in limited areas of California, largely encompassing the greater San Francisco, Los Angeles and San Diego areas.[15]

2. ORA Recommendation

a. The Criteria For Applying the Standard Should Be Adjusted

To the extent that the CAISO moves forward regardless, it should not rely on population density as a measure of "urban" load, especially when the threshold is set so low. The Straw Proposal suggests that a threshold of 1,000 people/square mile would limit the application of the SPS standard to small portions of California with high population densities.[16] However this is not the case.

Attachment 1 shows the population densities for the largest 100 California cities. All of these cities easily meet the CAISO's population density threshold, even cities which may not be in the counties identified as having high population densities in Figure 2 of the CAISO's Straw Proposal.[17] Even communities of much more modest size easily meet this threshold.[18] It is therefore likely that many of these areas are served by transmission facilities that are currently at risk of consequential loss of load for Category C (and for more modest communities, Category B) contingencies. In other words, if the Straw Proposal were adopted, significant transmission upgrades would be needed to make the transmission systems compliant with the CAISO planning standards, planning standards which are significantly more rigorous than those required by NERC.

b. Robust And Relevant Need and Cost/Benefit Analyses Should Be Prepared To Determine Whether The Standard Is Appropriate For Solving The Identified Problem – Comparisons to Manhattan Are Inapposite

[14] ISO Non-consequential load dropping: Category C Contingencies, PowerPoint (Apr. 11, 2014), slide 13.
[15] Straw Proposal, p. 5.
[16] Straw Proposal, p. 5.
[17] Straw Proposal, p. 5.
[18] A few random examples: Auburn – 1,900 pop/mi^2, Coalinga – 2,200 pop/mi^2, Livingston – 3,200 pop/mi^2, Marysville – 3,000 pop/mi^2, Gonzales – 3,200 pop/mi^2, Fortuna – 2,400 pop/mi^2, Susanville – 2,200 pop/mi^2.

As explained above, the Straw Proposal does not specifically identify a problem that needs to be solved, and fails to provide any substantive analysis showing that the proposed standards are the most cost-effective means for solving the purported problem. With regard to the Category C standard, a showing of need would, at a minimum, include a discussion of the frequency of SPS system use for category C contingencies in several base case scenarios. It would also include a showing of duration of outages. Finally, a proper showing would give cost estimates of economic harm resulting from SPS systems used in California's urban and suburban cities.

Instead, the Straw Proposal cites very generally to the "potential (economic and safety) impact" resulting from load shedding, comparing economic consequences in California to economic costs justifying special reliability standards in New York City.[19] Such a comparison is inapposite. Among other things, given the Straw Proposal's analytical reliance on population density, it must acknowledge that economic impacts in New York City, with a population density of 20,000 people/square mile in the borough of Manhattan,[20] would be far more severe than economic impacts in California's highest density areas, where the population density peaks at around 14,000 people per square mile for the 100 largest cities in California.[21] Additionally, only 8 cities out of the top 100 most populous cities exceed population densities of 10,000 people per square mile, with six of those cities located in Los Angeles County.[22] This suggests that the CAISO cannot make a direct comparison of California economic impacts with economic impacts in New York City using population density as its only metric. Further justification of both need and cost-effectiveness, based on relevant analysis, is needed to justify a planning standard more stringent that NERC reliability criteria.[23]

c. Historical Practice at the CAISO Suggests That More Stringent Reliability Standards Could Be Selectively Implemented On The Local Level Without A Blanket Prohibition On SPS Load Dropping As A Permanent Solution For Urban Areas.

[19] Straw Proposal, p. 4.
[20] Population density is based on the 2010 U.S. Bureau Census data. Pol and Thomas, Demography of Health and Healthcare, 3rd ed. (2013), p. 49.
[21] *See* Attachment 1.
[22] *Id*.
[23] ORA notes for future discussion that it seriously questions any cost-effectiveness analysis based solely on the estimated cost of the project compared the estimated costs to consumers of an outage, especially when such analysis is offered without any reference to alternatives. Future project justifications using these metrics will need to meet more rigorous analytical standards.

ORA questions the Straw Proposal's representation of historic practices, which suggest that there is more flexibility in determining the appropriate level of reliability following a multiple contingency event. For example, prior to the formation of the CAISO, PG&E had no such blanket prohibition against load shedding for Category C events, whether consequential or non-consequential. Rather each situation was separately reviewed and a mitigation plan developed considering the consequences of the loss of load[24] and the cost of mitigation. This practice is evidenced by PG&E's 2001 Electric Transmission Grid Expansion Plan[25] where in Section 3 – Operating Arrangements, the Plan identifies where PG&E uses either manual or automatic actions to meet the planning standards for Category B and C events, as reflected in Attachment 2 hereto. These actions frequently include interruption of customer load.

Furthermore, PG&E's analysis of Category C events focused on the loss of double circuit tower lines. For other Category C events, PG&E's planning practices assumed loss of customer load was acceptable. There was no distinction around consequential versus non-consequential load loss as such a distinction has no meaning when the planner is making decisions based upon customer impacts. Similarly, as reflected in the table provided at Attachment 2, which includes excerpts describing PG&E's operation arrangements that were included in the CAISO 2001 Transmission Plan, there is no distinction or blanket prohibition on the implementation of SPS based on load density.[26] In fact, the table includes 22 examples[27] of the use of SPS in the Bay Area that are contrary to the standard in the Straw Proposal.

Attachment 3, which identifies the PG&E Planning Criteria for electric transmission capacity into San Francisco, demonstrates that PG&E was capable of developing specialized criteria for areas with special needs.[28] These criteria are reflective of several Category C

[24] PG&E conducted extensive Value of Service surveys of its customers to support its planning efforts to balance the costs and benefits of improved reliability.
[25] Dated December 14, 2001.
[26] *See* Attachment 2.
[27] Note that this list was compiled by selecting those entries where either manual or automatically dropping of Bay Area loads was identified. Other similar load dropping outside the Bay Area may also occur in areas with population densities in excess of 1000 people/square mile as many of the plans involved dropping load in developed areas. However as the Proposal only includes county level density information for northern California, load dropping in those areas outside the Bay Area were excluded from the list. The CAISO's map included Sacramento County. Furthermore since it is not possible to discern from the map whether the high population densities were in the CAISO or SMUD area, no load dropping in Sacramento County was included in the list. *Id*.
[28] *See e.g.* http://zglobal.biz/pdf/FinalSFSSGReport.pdf

overlapping transmission and/or generation contingencies as well as the loss of all overhead lines on the peninsula in the vicinity of San Francisco airport.

While these criteria were more stringent than PG&E applied to the PG&E system at large, these were specific contingencies that were applicable only to the San Francisco Peninsula and were not applicable to larger geographic areas based on a population density metric. In fact, PG&E's development of a list of overlapping contingencies for San Francisco is evidence that PG&E did not normally plan for maintaining service to load during such events elsewhere in its system.

d. The CAISO Should Classify The New SPS Standard As A Guideline Until The Cost Impacts Are Better Understood

Like the CAISO's adoption of existing CAISO standards, it is reasonable for the CAISO to classify the new SPS Standard as a guideline until the cost impacts are better understood. The existing CAISO Planning Standards include requirements in planning for new transmission versus the involuntary loss of load.[29] These requirements generally address the more common single contingency of G-1, L-1 events and include, among other things, that no single contingency result in the loss of more than 250 MW of load and that all single substations of 100 MW or more be served from two transmission circuits. Upgrades to service reliability above these levels may be appropriate when justified using a benefit to cost ratio analysis. There is no distinction with respect to urban load or non-consequential loss of load.

While the CAISO's existing criteria were developed to limit the amount of load that could be lost for common single contingency events, there was clear concern about the potential excessive cost impacts associated with such a limitation. Due to this concern, existing CAISO criteria were initially implemented as a guideline until the cost impacts could be better understood. The CAISO should follow a similarly cautious path with the implementation of SPS restrictions.

B. The San Francisco Peninsula Extreme Event Reliability Standard

1. Background

[29] CAISO, California ISO Planning Standards, p. 5-6 (Jun. 23, 2011).

The CAISO is currently conducting a San Francisco Peninsula Special Study and is "therefore proposing to add to the Planning Standards specific recognition of the unique characteristics of supply to the San Francisco Peninsula and acknowledge that planning for extreme events – including the approval solutions to improve the reliability of supply – is an appropriate action for the CAISO Board to consider and approve."[30] According to the CAISO, circumstances justifying the Bay Area's unique status include: (1) being an urban center; (2) geographic and system configuration; (3) having a risk of extended restoration times after an extreme event; and (4) potential risks with challenging restoration times restoration times after extreme events (63% high chance of an earthquake with > 6.7 magnitude or greater occurring in the next 30 years).[31]

The CAISO is already required to study the San Francisco Bay Area for Category D extreme events under existing NERC standards (TPL-004) and under the new NERC standard (TPL-001-4). However, neither NERC standard requires the CAISO to implement special mitigation measures.

2. ORA Recommendation

Given the lack of analytical showing in the Straw Proposal, ORA questions the need for a reliability standard specific to the San Francisco Bay Area and recommends, at a minimum, that the CAISO not attempt to justify the unique status of the San Francisco Bay Area with guidelines which do not clearly distinguish the San Francisco Bay area as unique.

The CAISO's guidelines creating unique consideration for the San Francisco Peninsula are not required by NERC and are vague and inadequate. During the workshop, Southern California Edison Company (SCE) reasonably asked why Los Angeles would not qualify for extreme event reliablity status given that it has similar characteristics to the San Francisco peninsula. Adopting vague guidelines to designate areas for application of specialized extreme event standards may result in the exception swallowing the whole such that new, more stringent transmission requirements, will apply to nearly every other urban area in California.

[30] Straw Proposal, p. 9.
[31] Jeff Billinton, ISO Transmission Planning Standards Discussion Paper on Revisions: San Francisco Extreme Event Reliability Standard, PowerPoint (Apr. 11, 2014), slide 22-23.

Rather than approach mitigation measures for extreme events in a piecemeal fashion with overly broad factors for designating extreme event areas, ORA recommends that the CAISO deploy its resources using a systemwide approach based on the following principles:

1. Prioritize the adoption of cost-effective mitigation measures which create flexibility in the system and reduce system recovery time, such as stockpiling replacement parts in areas where the parts may be deployed as needed.
2. Adopt mitigation measures by hardening the existing transmission infrastructure systems and reduce the damage likely to occur as a result of an extreme event.
3. Adopt mitigation measures which create new infrastructure to reduce the recovery times of service disruption due to an extreme event.

III. CONCLUSION

ORA appreciates the CAISO's attention to these comments on issues, new CAISO planning standards exceeding NERC reliability standards, which, if adopted, could have a significant effect on California ratepayers. Consistent with these comments, ORA urges the CAISO to reconsider the Straw Proposal's planning standards until it has developed analytical tools that can address the basic issues of the need for more rigorous planning standards, and the costs to TAC ratepayers of those standards.

In an era of raising energy rates, it is imperative that the CAISO take a harder look at its proposals, consistent with its statutory obligation to minimize ratepayer costs.

Attachment 1

Population Densities of the 100 Largest California Cities[32]

Rank	City	Population	County	Size (sq. mi.)	Density
1	Los Angeles	3,792,621	Los Angeles	469	8,087
2	San Diego	1,307,402	San Diego	372	3,515
3	San Jose	945,942	Santa Clara	180	5,255
4	San Francisco	805,235	San Francisco	232	3,471
5	Fresno	494,665	Fresno	112	4,417
6	Long Beach	468,257	Los Angeles	51	9,182
7	Sacramento	466,488	Sacramento	100	4,665
8	Oakland	390,724	Alameda	78	5,009
9	Bakersfield	347,483	Kern	144	2,413
10	Anaheim	336,265	Orange	51	6,593
11	Santa Ana	324,528	Orange	28	11,590
12	Riverside	303,871	Riverside	81	3,751
13	Stockton	291,707	San Joaquin	62	4,705
14	Chula Vista	243,916	San Diego	52	4,691
15	Fremont	214,089	Alameda	88	2,433
16	Irvine	212,375	Orange	66	3,218
17	San Bernardino	209,924	San Bernardino	60	3,499
18	Modesto	201,165	Stanislaus	37	5,437
19	Oxnard	197,899	Ventura	39	5,074
20	Fontana	196,069	San Bernardino	42	4,668
21	Moreno Valley	193,365	Riverside	51	3,791
22	Glendale	191,719	Los Angeles	31	6,184
23	Huntington Beach	189,992	Orange	32	5,937
24	Santa Clarita	176,320	Los Angeles	48	3,673
25	Garden Grove	170,883	Orange	18	9,494
26	Santa Rosa	167,815	Sonoma	42	3,996
27	Oceanside	167,086	San Diego	42	3,978
28	Rancho Cucamonga	165,269	San Bernardino	40	4,132
29	Ontario	163,924	San Bernardino	50	3,278
30	Lancaster	156,663	Los Angeles	95	1,649
31	Elk Grove	153,015	Sacramento	42	3,643
32	Palmdale	152,750	Los Angeles	106	1,441

[32] Based on the reported results of the 2010 United States Census.

33	Corona	152,374	Riverside	39	3,907
34	Salinas	150,441	Monterey	23	6,541
35	Pomona	149,058	Los Angeles	23	6,481
36	Torrance	145,438	Los Angeles	21	6,926
37	Hayward	144,186	Alameda	64	2,253
38	Escondido	143,911	San Diego	37	3,889
39	Sunnyvale	140,081	Santa Clara	23	6,090
40	Pasadena	137,122	Los Angeles	23	5,962
41	Orange	136,416	Orange	25	5,457
42	Fullerton	135,161	Orange	22	6,144
43	Thousand Oaks	126,683	Ventura	55	2,303
44	Visalia	124,442	Tulare	36	3,457
45	Simi Valley	124,327	Ventura	42	2,960
46	Concord	122,067	Contra Costa	31	3,938
47	Roseville	118,788	Placer	36	3,300
48	Santa Clara	116,468	Santa Clara	18	6,470
49	Vallejo	115,942	Solano	50	2,319
50	Victorville	115,903	San Bernardino	74	1,566
51	El Monte	113,475	Los Angeles	10	11,348
52	Berkeley	112,580	Alameda	18	6,254
53	Downey	111,772	Los Angeles	13	8,598
54	Costa Mesa	109,960	Orange	16	6,873
55	Inglewood	109,673	Los Angeles	9	12,186
56	San Buenaventura (Ventura)	106,433	Ventura	32	3,326
57	West Covina	106,098	Los Angeles	16	6,631
58	Norwalk	105,549	Los Angeles	10	10,555
59	Carlsbad	105,328	San Diego	39	2,701
60	Fairfield	105,321	Solano	38	2,772
61	Richmond	103,701	Contra Costa	52	1,994
62	Murrieta	103,466	Riverside	34	3,043
63	Burbank	103,340	Los Angeles	17	6,079
64	Antioch	102,372	Contra Costa	29	3,530
65	Daly City	101,123	San Mateo	8	12,640
66	Temecula	100,097	Riverside	30	3,337
67	Santa Maria	99,553	Santa Barbara	23	4,328
68	El Cajon	99,478	San Diego	14	7,106
69	Rialto	99,171	San Bernardino	22	4,508
70	San Mateo	97,207	San Mateo	16	6,075

71	Compton	96,455	Los Angeles	10	9,646
72	Clovis	95,631	Fresno	23	4,158
73	South Gate	94,396	Los Angeles	7	13,485
74	Vista	93,834	San Diego	19	4,939
75	Mission Viejo	93,305	Orange	18	5,184
76	Vacaville	92,428	Solano	29	3,187
77	Carson	91,714	Los Angeles	19	4,827
78	Hesperia	90,173	San Bernardino	73	1,235
79	Redding	89,861	Shasta	61	1,473
80	Santa Monica	89,736	Los Angeles	16	5,609
81	Westminster	89,701	Orange	10	8,970
82	Santa Barbara	88,410	Santa Barbara	42	2,105
83	Chico	86,187	Butte	33	2,612
84	Whittier	85,331	Los Angeles	14	6,095
85	Newport Beach	85,186	Orange	53	1,607
86	San Leandro	84,950	Alameda	16	5,309
87	Hawthorne	84,293	Los Angeles	6	14,049
88	San Marcos	83,781	San Diego	24	3,491
89	Citrus Heights	83,301	Sacramento	14	5,950
90	Alhambra	83,089	Los Angeles	8	10,386
91	Tracy	82,922	San Joaquin	22	3,769
92	Livermore	80,968	Alameda	24	3,374
93	Buena Park	80,530	Orange	11	7,321
94	Lakewood	80,048	Los Angeles	9	8,894
95	Merced	78,958	Merced	23	3,433
96	Hemet	78,657	Riverside	28	2,809
97	Chino	77,983	San Bernardino	30	2,599
98	Menifee	77,519	Riverside	47	1,649
99	Lake Forest	77,264	Orange	18	4,292
100	Napa	76,915	Napa	18	4,273

Attachment 2
Excerpts from the CAISO 2001 Transmission Plan – PG&E Operational Arrangements
for Category B and C Events Tables 3 & 4
(Entries where PG&E practice was to interrupt customer load
for Category C5 events greater than 100 kV in the Bay Area.)

Entry	Contingency	Mitigation
Table 3 Entry 9	Newark-Ravenswood, Tesla-Ravenswood 230 kV	Interrupt up to 620 MW of electric demand for Bay Area
Table 3 Entry 10	Ravenswood-San Mateo 230 kV Nos. 1 & 2 Lines	Interrupt approximately 700 MW of load in SF-Peninsula area
Table 3 Entry 11	Ravenswood-Palo Alto 115 kV Nos. 1 & 2 lines	Special Protection System to open Palo Alto Switching Station CB Nos. 412 and 512 following an outage of the Ravenswood-Palo Alto 115 kV double circuit tower lines.[33]
Table 3 Entry 12	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines.	Interrupt up to 40 MW of electric demand at San Leandro.[34]
Table 3 Entry 23	Newark-Los Esteros and Los Esteros-Metcalf No. 1 and 2	Interrupt up to 400 MW of customer demand in the South Bay
Table 3 Entry 24	Metcalf-Evergreen Nos. 1 & 2	Interrupt up to 180 MW in Evergreen 115 and 60 kV areas. (Drop 115/12 kV load at Evergreen and open 115/60 kV Evergreen transformer).
Table 3 Entry 25	Los Esteros-Trimble, Trimble-Montague 115 kV	Interrupt up to 500 MW in the South Bay
Table 3 Entry 26	Pittsburg-Clayton 115 kV Nos. 3 and 4	Interrupt up to 100MW in Clayton area.
Table 3 Entry 28	Newark-Northern Receiving Station Nos. 1 & 2 115 kV lines	Interrupt up to 235 MW at Silicon Valley Power
Table 4 Entry 9	East Shore-San Mateo and Pittsburg-San Mateo 230 kV	Implement Short Term Facility Ratings and interrupt load
Table 4 Entry 10	Monta Vista-Jefferson 230 kV Nos. 1 & 2 Lines	Implement Short Term Facility Ratings and interrupt load

[33] Opening these breakers following the identified contingency isolates and drops the entire City of Palo Alto electric system with a peak load modeled at 214 MW.
[34] Note that this SPS has been modified by PG&E to include the interruption of Alameda Station J load that may be triggered by either Category B or C events.

Attachment 3
PG&E San Francisco Planning Criteria Prior to the CAISO

Power is supplied to the city of San Francisco from a combination of local generation and transfers into the city through transmission. The city is located at the end of a peninsula, and all of the major overhead transmission lines are forced into a common corridor adjacent to the San Francisco Airport. This corridor extends between Martin Substation, just south of San Francisco, and San Mateo Substation, located 13 miles to the south.

Given the location of the City and the nature of its supply, special planning criteria were adopted in 1978 by the Electrical Engineering Advisory Committee that considers simultaneous outage of multiple system elements. These criteria are listed below:

San Francisco Power Supply Planning Criteria

At all times, the resources available to serve the city of San Francisco shall be sufficient to serve all loads within the city limits during any of the following contingencies:

A. Loss of all overhead transmission from San Mateo Substation to Martin Substation in addition to any generation unavailable due to regular overhaul schedules.

B. Loss of the largest available generation unit plus the loss of one overhead transmission circuit from San Mateo to Martin in addition to any generation unavailable due to regular overhaul schedules.

C. Loss of one underground transmission circuit plus the loss of one overhead transmission circuit from San Mateo to Martin in addition to any generation unavailable due to regular overhaul schedules.

D. Overlapping loss of the two largest available generation units in addition to any generation unavailable due to regular overhaul schedules.

E. Loss of one underground circuit from San Mateo to Martin plus the loss of the largest available generation unit in addition to any generation unavailable due to regular overhaul schedules.