

Attn: ~~XXXXXXXXXX~~

Request 14. Provide detailed explanations of events that led to dropping load in the San Francisco Bay Area on June 14.

Response:

EVENTS AND ACTIONS BY THE ISO ON JUNE 14:

On June 14, 2000, a Stage 1 emergency was brought about due to extreme high temperatures, high loads, and outages or derates of key generating resources in and/or affecting the Greater Bay Area. Because of limited Bay Area generation availability, local area voltages approached unacceptable operating levels. Specifically, the voltage at Newark had dropped to 227.3kV at 13:10. It was determined that the Greater Bay Area was vulnerable to voltage collapse in the event of an additional generator contingencies (a G-1 involving Pittsburg #7, Moss Landing #6 or #7, or Potrero #3) or and additional line contingencies (a N-1 involving Tesla-Metcalf) under this operating condition. These events led to curtailment of firm load in the Bay Area where the system is known to be vulnerable due in part to aggressive load growth.

The following is a summary of the sequence of events leading up to and including the Stage 1 emergency of June 14, 2000.

Table 1: Events

Date	Time	Description of Event
Monday, May 22	10:55	Hunters Point 2 & 3 Limited to 45 MW.
Wednesday, June 7	06:35	Hunters Point Unit 4 Out of Service.
Thursday, June 8		Cal-ISO system peak load was projected to be 46,825 MW on June 14, 2000.
Sunday, June 11		Cal-ISO Operations meets to develop a plan to ensure that enough internal resources and imports would be available to reliably meet the expected system peak demand.
Monday, June 12		PowerWatch 2000 issued for June 13, 2000. Cancelled Cottonwood – Roseville clearance. Requested BPA to cancel work on BC Hydro Tie. (BPA would not cancel).
Tuesday, June 13		PowerWatch 2000 issued for June 14, 2000 COI limited day-ahead to 3,950 MW. Moss Landing #6 off-line. Cal-ISO & PG&E meet. Agreed to the following: <ul style="list-style-type: none">• Set Bay Area import limit of 8,750 MW• Voltage trigger at Newark 228 kV• Under Voltage Load Shedding B-setting cut-in at 14:12 Based on expected generation, and scenarios of

		loss of major units and/or lines.
Wednesday, June 14	07:30	Potrero Unit 3 experiencing problems.
	08:00	PowerWatch 2000 issued for June 15, 2000
	09:37	RAS for San Mateo-Martin Cable Implemented. Scheme is armed for possibility of loss of Potrero Unit #3
	10:32	Requested PG&E to curtail 200 MW of interruptible load in the Bay Area beginning at 12:00.
	11:34	Requested PG&E to man all stations for firm load shedding, and fax the ISO a copy of plans for same.
	11:35	Requested PG&E to curtail all interruptible service in its control area.
	11:50	Requested generation dispatchers to load all Municipal generation in the Bay area, Silicon Valley Power and City and County of San Francisco.
	13:00	CAISO declared a Stage 1 Emergency from 13:00 to 18:00.
	13:13	Requested PG&E to shed 100 MW of firm load, at San Jose or on the Peninsula. Initial load drop was Block 1A, by contract NCPA dropped 3 MW at Palo Alto and 1 MW at Alameda, Silicon Valley Power Dropped 5 MW at 14:00.
	16:03	Requested PG&E restore its 100 MW of firm load at 16:30. Asked PG&E to have the next block ready to drop if problems resulted from this restoration.
	17:55	Confirmed with PG&E that as of 18:00 interruptible load would be allowed to be restored per contract.
	20:30	Emergency Stage 1 Notification Terminated – Market Messages sent and PTOs notified by telephone.

The ISO issued the following market notices for the June 14 operating day:

- No Touch
- Alerts
- Warnings
- Stage 1
- PowerWatch 2000

The ISO coordinated with municipal utilities and the City and County of San Francisco on June 14:

- Throughout the day, the CAISO was in communication over the telephone with municipal utilities in the Peninsula and the City and County of San Francisco (CCSF). The response of these entities was generally extremely cooperative. CCSF in particular undertook a series of activities to reduce

load, including for example adjustment of government building loads and sewer loads.

The ISO coordinated with regulators on June 14:

- Throughout the day, the CAISO was in communication over the telephone with the Electricity Oversight Board providing information about the actions being taken.

The ISO coordinated with generators on June 14:

- Throughout the day, the CAISO was in communication with generators having a key impact on the Bay Area. For example, Moss Landing Unit #6 was out of service on June 13. The ISO facilitated a timely restoration of service by the unit. In addition, the ISO remained in ongoing communication relating to problems experienced by Potrero to ensure continued operation notwithstanding the problems.

Load curtailment:

- As of 10:30 AM, the ISO commenced requesting PG&E to call on interruptible load for implementation at noon. Interruptible loads were restored by 6:00 PM.
- At 1:13 PM, the ISO requested PG&E to shed firm load. Load was restored at 4:30PM. T-147i, the Emergency Supplemental San Francisco Bay Area Operation Action Plan, was implemented. These operating instructions are needed for current Bay Area emergency operating conditions. Blocks of approximately 130 MW of firm load were dropped and restored in a rotating fashion to maintain minimum Bay Area voltages and minimize the exposure to voltage collapse resulting from several G-1 or N-1 contingencies.
- Approximately 500 MW of non-firm and 130 MW of firm load was shed.

Table 2 provides an overview of the blocks of load that were dropped in the Greater Bay Area.

Table 2. Bay Area Rotating Outage Block Summary

Block Name	Block Number	Number of Customers	Summer Maximum MW ¹
<i>Block 1A Dropped at 13:13; Restored at Approximately 14:35.</i>			
Total De Anza Block 1A	1A	13,654	50.8
Total Diablo Block 1A	1A	7,854	43.4
Total East Bay Block 1A	1A	7,303	6.3
Total Mission Block 1A	1A	4,952	43.4
Total Bay Area Block 1a		33,763	143.9
<i>Block 1B Dropped at 14:30; Restored at Approximately 15:35.</i>			
Total Peninsula Block 1B	1B	1,596	27.6
Total San Francisco Block 1B	1B	4,712	24.6
Total San Jose Block 1B	1B	11,308	79.9
Total Bay Area Block 1B		17,616	132.1
<i>Blocks 1D & 2A Dropped at 15:30; Restored at 16:35.</i>			
Total Diablo Block 1D	1D	1,862	5.0
Total East Bay Block 1D	1D	2,680	1.5
Total Mission Block 1D	1D	510	11.7
Total Peninsula Block 1D	1D	4,534	11.1
Total Bay Area Block 1D		9,586	29.4
Total De Anza Block 2A	2A	21,655	51.2
Total San Jose Block 2A	2A	14,409	64.3
Total Bay Area Block 2A		36,064	115.5
<i>Blocks 2B & 2C on Standby But Not Dropped.</i>			
Total Diablo Block 2B	2B	10,301	50.8
Total East Bay Block 2B	2B	18,763	18.5
Total Mission Block 2B	2B	9,627	57.8
Total Peninsula Block 2B	2B	13,367	29.5
Total Bay Area Block 2B		52,058	156.6
Total East Bay Block 2C	2C	6,846	11.8
Total Mission Block 2C	2C	6,781	23.8
Total San Jose Block 2C	2C	35	11.5
Total Bay Area Block 2C		13,662	47.1

LOAD and TEMPERATURE CONDITIONS ON JULY 14:

PG&E plans the system for 1-in-10 loads. Temperatures on June 14 were unseasonably hot. Table 3 shows the temperature assumptions for a 1-in-10 year

¹ Actual load shed amounts are not known at this time.

and 1-in-20 year peak temperature forecasts, and the actual temperatures on 6/14/00.

Table 3. Temperature Comparison

Area	1-in-10 Temp.	1-in-20 Temp.	6/14/00 Actual Temp.
East Bay	80.0	96.4	-
Diablo	102.5	106.5	106.0
S.F. City	81.1	97.3	103.0
Peninsula	93.7	104.8	-
Mission	97.0	106.3	-
San Jose	96.6	102.3	104.0

On average, the Bay Area has been growing 200-300 MW (~ 6%) per year. San Francisco and the SF Peninsula have exhibited growth rates of roughly 18 MW/year and 10 MW/year respectively. Past recorded (SCADA) peak loads² are provided below:

Table 4. Historical Bay Area Peak Load & Temperature Information

	8/7/97	8/3/98	7/12/99	6/14/00
Bay Area Load	7,637	8,262	8,478	~9,150 ³
SF City Load ⁴	823	-	867	~945
SF yearly peak	910	895	927	945?
SF Temp.	74	86	87	103
Concord Temp.	102	104	103	106
San Jose Temp.	91	103	101	104
Bay Avg. Temp.	89	97.7	97	104.3

GENERATOR UNAVAILABILITY ON JUNE 14.

On June 14 three important units were out of service for scheduled maintenance, one unit was subject to a forced outage, and four units were derated. To some extent these outages and derates reflect the age and condition of some key Bay Area units resulting in limited availability.

Table 5. Greater Bay Area Generation Limitations for June 14, 2000

Resource	Total MW	Status	Avail. MW
Pittsburg #6	325	Out of Service: scheduled maintenance	0
Geysers #16	66	Out of Service: scheduled maintenance	0

² For the Bay Area, past comparisons indicate that the SCADA-calculated load runs 200-300MW less than the actual "explicit" Bay Area Load.

³ This number was estimated based on the interruptible and firm load shed in the Bay Area.

⁴ The value listed is the maximum SF load reached on the day of the Bay Area peak.

Geysers #17	48	Out of Service: scheduled maintenance	0
Hunters Point #4	163	Out of Service: forced outage	0
Hunters Point #2	104	De-Rate	45
Hunters Point #3	104	De-Rate	45
Potrero #3	206	Operated notwithstanding problems	
Oakland #1	52	De-Rate	25
Oakland #3	52	De-Rate	26

ACTIONS TAKEN BY THE ISO IN LIGHT OF THE VULNERABLE NATURE OF THE SYSTEM IN THE BAY AREA:

- To address the vulnerability of facilities in the area, during January of this year, the ISO promoted timely reconductoring of a line in the area and the addition of shunt capacitors in San Mateo.
- To further address the vulnerability of facilities in the area, the ISO has underway a planning process to address the needs of the area: the San Francisco-Peninsula Study.
- In addition, to ensure reliability in the area during the summer, the Governing Board approved issuance of a request for proposals for additional generation in the Bay Area during the summer. Further in March, the Governing Board directed management to proceed with development of an RFP and Contract to encourage location in of generation in the San Francisco Bay Area. Unfortunately the RFP did not result in successful bids. However, in June the Governing Board directed ISO management to pursue a further possible alternative for emergency generation during the summer.
- On June 13, the ISO worked with PG&E to implement a Remedial Action Scheme in anticipation of the possibility that Potrero #3 might be forced out-of-service. The scheme would have been armed in the event Potrero #3 tripped to protect for the subsequent loss of the next worst contingency, loss of the San Mateo-Martin 230-kV cable. In addition, with the units out-of-service in the Bay Area and the corresponding loss of dynamic reactive support, PG&E and the CAISO agreed to increase the voltage trip settings on the under voltage load shedding (UVLS) scheme in the bay area.

THERMAL LOADINGS:

To reduce curtailments, the ISO promoted aggressive use of facilities in the Peninsula and Greater San Francisco Bay Area on June 14.

The table below illustrates the Bay Area 500/230 kV transformers that were near their ratings or exceeded their ratings.

Table 6. Bay Area 500/230 kV Transformer Loading

Bay Area 500/230 kV Transformer:	Maximum Loading on 6/14/00 ⁵	Old Normal (Nameplate)	Normal	MVA Rating	
				Emergency (4 Hours)	Emergency (1 Hour)
Vaca Dixon #11	1,203 MVA	1,122 MVA	1,230 MVA	1,501 MVA	1,568 MVA
Tesla #2	1,101 MVA	1,122 MVA	1,122 MVA	1,335 MVA	1,571 MVA
Tesla #4	727 MVA	840 MVA	940 MVA	1,073 MVA	1,159 MVA
Tracy KT1A (WAPA)	847 MVA	850 MVA	850 MVA	1,041 MVA	-
Metcalf #11	1,091 MVA	1,122 MVA	1,280 MVA	1,455 MVA	1,603 MVA
Metcalf #12	1,013 MVA	1,122 MVA	1,196 MVA	1,360 MVA	1,539 MVA

The table below illustrates other key facilities that were near their ratings or exceeded the ratings.

Table 7. Other Bay Area Equipment Loading

Equipment	Loading	Simultaneous Limit
Metcalf #11 and #12 Transformer Banks	2,104 MVA	1,925 MVA
Tesla #2 and Vaca-Dixon #11	2,288 MVA	2,050 MVA
Tesla – Newark 230 kV line	706 MW	697 MW
Tesla – Ravenswood 230 kV line	621 MW	550 MW
Metcalf – El Patio #1 115 kV line	157 MVA	140 MVA
Metcalf – El Patio #2 115 kV line	158 MVA	140 MVA
Metcalf – Evergreen #1 and #2 115 kV lines	331 MVA	270 MVA

OPERATING PROCEDURES:

- The design of Operating Procedure T-133, entitled **Bay Area Dispatch Instructions**, is to indicate the required generation commitment levels for the Bay Area to maintain reliability and prevent/mitigate thermal overloads on various power system equipment. The generation commitment levels are based on power system studies which take into account critical contingencies on the power system. These contingencies include G-1, N-1, N-2, common corridor, and overlapping G-1, N-1 outages. The commitment levels detailed

⁵ Approximately 500 MW of interruptible and 130 MW of firm load was shed in the Bay Area, for a total of 630 MW.

in the operating procedure ensure that the reliability of the Bay Area and CAISO-controlled is preserved for the outages described above.

- The level of contingencies experienced on June 1 is considered extreme and T-133 was not designed to handle such adverse system operating conditions as seen on June 14, 2000. Four Bay Area generating units were unavailable (totaling 602 MW), four units were derated due to mechanical problems (totaling 312 MW), and 1 generator was questionable (206 MW). Refer to Table 5 for a summary of the Bay Area generation limitations seen on June 14, 2000. This type of operating condition could not be anticipated by operating procedure T-133.

See also the attached draft Preliminary Report on the events June 13-15. Please note that the attached document is a draft. The report has not been finalized. The ISO will forward the final document to the EOB as soon as it is complete.