



Exceptional Dispatch Report

Table 2: April 2017

Market Quality and Renewable Integration

July 28, 2017

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Introduction

This report is filed pursuant to FERC's September 2, 2009, and May 4, 2010, orders in ER08-1178. These orders require two monthly Exceptional Dispatch reports—one issued on the 15th of each month and one issued on the 30th of each month. This report provides data on the frequency, reasons and costs for Exceptional Dispatches issued in April 2017.

This report contains a price impact analysis as prescribed by FERC in its September 2 order. The price impact analysis for the month of April is presented in Appendix B. This report also includes mitigation analysis for April 2017 required by section 34.9.4 of the CAISO tariff. This analysis compares those Exceptional Dispatches subject to bid mitigation (i.e. Exceptional Dispatches to address noncompetitive constraints and Delta Dispatch), and determines the cost difference between the Exceptional Dispatch bid mitigation settlement rules and what the settlement amount would have been had the Exceptional Dispatches not been subject to bid mitigation. The Exceptional Dispatch bid mitigation analysis for April is presented in Appendix C.

The Nature of Exceptional Dispatch

The CAISO can issue exceptional dispatch instructions for a resource as a pre-day-ahead unit commitment, a post day-ahead unit commitment or a real-time exceptional dispatch. A pre-day-ahead unit commitment is an exceptional dispatch instruction committing a resource at or above its physical minimum (Pmin) operating level in the day-ahead market. A post-day-ahead unit commitment is an exceptional dispatch instruction committing a resource at or above its (Pmin) operating level in the real-time market. A real-time exceptional dispatch instructs a resource to operate at or above its physical minimum operating point. A real-time exceptional dispatch above the resource's day-ahead award is an incremental exceptional dispatch instruction and a real-time exceptional dispatch below the day-ahead award is considered a decremental dispatch instruction. The CAISO issues exceptional dispatch instructions to maintain the reliability of the grid when the market software cannot do so. Whenever the CAISO issues an exceptional dispatch instruction, the operator logs the dispatch and the associated reason. Reliability requirements are calculated for both local area and the system wide needs, and are classified into various requirements including local generation, transmission management, non-modeled transmission outages, ramping and inertia emergency assistance. Whenever the CAISO issues an exceptional dispatch instruction, the operators log these instructions and the associated reason for each instruction.

Most of the generation procedures are internal to the CAISO and not available publicly on the CAISO website; however, all of the transmission procedures are available on the CAISO website.¹

The following additional reason for exceptional dispatch instructions in 2017 includes Software Limitation. When an exceptional dispatch instruction was used to bridge schedules across days for resources with a minimum down time of 24 hours, as the CAISO software does not handle multi day commitment. For instance, a resource has a day-ahead schedule from 0600 till 2300, and then is shut down in 2400. If this resource had a minimum down time of 24 hours and it is required the following day, then the CAISO issues an exceptional dispatch to commit this resource in 2400 so it can be dispatched economically in the following day. Software limitation reason was also used for exceptional dispatches to manually issue shut down instructions to a resource because of a temporary Automatic Dispatch System (“ADS”) failure, or similar issues. There were a few other reasons used to explain exceptional dispatch instructions in April, which are self explanatory.

The data in Table 1 is based on a template specified in the September 2009 order.² This table contains all the information published in Table 1 of the first report for April 2017. In addition, it contains volume (MWh) and cost information. Each entry in Table 1 is a summary of exceptional dispatches classified by (1) the reason for the exceptional dispatch; (2) the location of the resource by Participating Transmission Owner (PTO) service area; (3) the Local Reliability Area (LRA) where applicable; (4) the market in which the exceptional dispatch occurred (day-ahead vs. real-time); and (5) the date of the exceptional dispatch. For each classification the following information is provided: (1) Megawatts (MW); (2) Commitment; (3) Inc or Dec; (4) Hours; (5) Begin Time; (6) End Time; (7) Total Volume (MWh); (8) Min Load Cost; (9) Start Up Cost; (10) CC6470; (11) ED Volume (MWh INC/DEC); (12) CC6470 INC; (13) CC6470 DEC; (14) CC6482; (15) CC6488; and (16) CC6620. Each column is defined :

- The MW column shows the range of exceptional dispatch instruction in MW for the classification.
- The Commitment column specifies if there was a unit commitment for the classification.
- The INC/DEC/NA column specifies if there was an incremental dispatch (INC), a decremental dispatch (DEC), or only a unit commitment (NA). The Begin Time and End Time columns show the start and end time of exceptional dispatch for the classification respectively.

¹ A list of all of the CAISO’s Operating Procedures and all the publicly available Operating Procedures are available at the following link:

<http://www.caiso.com/thegrid/operations/opsdoc/index.html>

² The data in Table 1 is principally SLIC information supplemented with data from the Market Quality System (MQS) and Settlements database. The volume and cost information is based on t+51B Recalculation Statements.

- The Hours column is the time difference between begin time and end time rounded up to the next hour.
- The total volume column shows the total MWh dispatch quantity dispatched for that classification. This quantity includes the minimum load quantity, the imbalance energy quantity, and the exceptional dispatch quantity.
- The Min-Load Cost column shows eligible minimum load cost for the classification.
- The Start-Up Cost column shows the eligible start up cost for the classification. The CAISO does not explicitly pay resources for its start up and minimum load costs; however, it ensures that resources are compensated adequately through its bid cost recovery.³
- The CC6470 column shows the total imbalance energy costs for the classification. This cost contains the portion of exceptional dispatch instruction settled as optimal energy due to its bid price being less than the LMP in the relevant settlement interval.
- The ED Volume MWh (MWh INC/DEC) column shows the incremental or the decremental portion of the real-time exceptional dispatch MWh for the classification. The CC6470-INC shows that portion of incremental exceptional dispatch instruction settled at the resource LMP.
- The CC6470-DEC column shows that portion of decremental exceptional dispatch instruction settled at the resource specific LMP. Both these charge codes are portions of the real-time instructed imbalance energy charge code (6470).⁴
- The CC6482 column shows the real-time excess cost for the classification.⁵
- The CC6488 column shows the real-time exceptional dispatch uplift settlement for the classification.⁶ The CC6620 shows the bid cost recovery payment for the classification. This cost is shown for all pre-day-ahead unit commitments only.

Charge codes 6470, 6470 INC, 6470 DEC, 6482 and 6488 are shown in Table 1 because all these charge codes pertain to real-time exceptional dispatch MWH quantities. The classification of data is further explained for example in Attachment A. Many of the exceptional dispatches with the reason “Other Reliability Requirement” were due to Real Time Contingency Analysis.

³ For further details regarding the Bid Cost Recovery process please refer to section 11.8 of the CAISO tariff.

⁴ For further details please refer to the BPM configuration Guide: Real-Time Instructed Imbalance Energy Settlement published on the CAISO’s website.

⁵ For further details please refer to the BPM configuration Guide: Real Time Excess Cost for Instructed Energy Settlement published on the CAISO’s website.

⁶ For further details please refer to the BPM configuration Guide: Real Time Exceptional Dispatch Uplift Settlement published on the CAISO’s website.

Table 1: Exceptional Dispatches in April 2017

California Independent System Operator Corporation Exceptional Dispatch Report July 28, 2017																					
Chart 2: Table of Exceptional Dispatches for Period 01/April/2017 - 30/April/2017																					
Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
1	RT	Conditions beyond the control of the CAISO	PG&E	Fresno	4/3/2017	160	No	INC	5	19:20	23:59	63.37	863.57	0.00	-1362.78	0.00	0.00	0.00	0.00	0.00	0.00
2	RT	Conditions beyond the control of the CAISO	PG&E	Fresno	4/3/2017	160-190	No	DEC	5	19:10	23:59	-186.68	0.00	0.00	4899.19	-182.50	0.00	4796.54	0.00	0.00	0.00
3	RT	Conditions beyond the control of the CAISO	PG&E	Fresno	4/4/2017	170-510	No	DEC	16	6:30	21:59	-59.18	0.00	0.00	1676.94	-63.27	0.00	537.18	0.00	0.00	0.00
4	RT	Conditions beyond the control of the CAISO	PG&E	Fresno	4/4/2017	339-589	No	INC	16	6:30	21:59	-53.98	4660.54	0.00	1368.48	0.00	0.00	0.00	0.00	0.00	0.00
5	RT	Conditions beyond the control of the CAISO	PG&E	N/A	4/1/2017	278	No	DEC	3	20:29	22:59	-116.35	0.00	0.00	2643.38	-55.97	0.00	1115.50	0.00	0.00	0.00
6	RT	Conditions beyond the control of the CAISO	PG&E	N/A	4/6/2017	207	No	DEC	2	6:57	8:25	-40.33	0.00	0.00	1547.20	-2.07	0.00	67.61	0.00	0.00	0.00
7	RT	Conditions beyond the control of the CAISO	PG&E	N/A	4/9/2017	222	No	INC	2	6:40	8:17	-7.48	0.00	0.00	801.05	0.00	0.00	0.00	0.00	0.00	0.00
8	RT	Conditions beyond the control of the CAISO	PG&E	N/A	4/9/2017	150-222	No	DEC	16	6:35	22:02	-339.22	0.00	0.00	11637.75	-57.68	0.00	1657.31	0.00	0.00	0.00
9	RT	Conditions beyond the control of the CAISO	PG&E	N/A	4/10/2017	205	No	DEC	4	18:45	21:59	-100.03	0.00	0.00	4050.07	-8.23	0.00	319.08	0.00	0.00	0.00
10	RT	Conditions beyond the control of the CAISO	PG&E	Sierra	4/14/2017	22	No	DEC	5	17:25	21:29	-27.50	0.00	0.00	-401.87	-41.72	0.00	-68.99	0.00	0.00	0.00
11	RT	Conditions beyond the control of the CAISO	PG&E	N/A	4/8/2017	160-196	No	DEC	17	6:37	22:59	-212.01	0.00	0.00	5316.66	-26.45	0.00	425.48	0.00	-5.91	0.00
12	RT	Contingency Dispatch	PG&E	Bay Area	4/24/2017	360	No	INC	1	8:45	9:44	180.00	14504.77	21830.54	109.54	0.00	0.00	0.00	0.00	0.00	0.00
13	RT	Contingency Dispatch	PG&E	Fresno	4/7/2017	1218	No	INC	1	8:10	8:59	429.68	0.00	0.00	-69610.32	13.00	-3335.95	0.00	0.00	0.00	0.00
14	RT	Contingency Dispatch	SCE	LA Basin	4/24/2017	45	No	INC	1	8:45	9:44	22.44	1283.97	141.71	10.30	0.00	0.00	0.00	0.00	0.00	0.00
15	RT	Fast Start Unit Management	PG&E	Bay Area	4/14/2017	0	No	INC	2	11:15	12:49	-60.00	1617.96	0.00	-638.19	-60.00	0.00	-638.19	0.00	0.00	0.00
16	RT	Fast Start Unit Management	PG&E	Bay Area	4/24/2017	0	No	INC	2	10:45	11:49	-120.00	6446.55	9314.36	0.00	-120.00	0.00	0.00	0.00	0.00	0.00
17	RT	Fast Start Unit Management	PG&E	N/A	4/30/2017	0	No	INC	1	2:30	3:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
18	RT	Fast Start Unit Management	SCE	LA Basin	4/7/2017	0	No	INC	1	7:45	8:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	RT	Fast Start Unit Management	SCE	LA Basin	4/18/2017	0	No	INC	1	11:45	12:44	2.50	0.00	0.00	-44.51	0.00	0.00	0.00	0.00	0.00	0.00
20	RT	Fast Start Unit Management	SCE	LA Basin	4/24/2017	0	No	INC	1	9:55	10:54	-26.19	570.65	62.98	0.00	-26.19	0.00	0.00	0.00	0.00	0.00
21	RT	Incomplete or Inaccurate Transmission	PG&E	N/A	4/6/2017	85	No	DEC	2	7:15	8:44	-2.50	0.00	0.00	69.54	-5.00	0.00	143.54	0.00	-384.15	0.00
22	RT	Incomplete or Inaccurate Transmission	PG&E	Sierra	4/6/2017	140-155	No	DEC	6	18:25	23:59	-16.75	0.00	0.00	243.30	-16.44	0.00	238.37	0.00	-1831.47	0.00
23	RT	Incomplete or Inaccurate Transmission	PG&E	Sierra	4/6/2017	160	No	INC	1	17:45	18:44	-3.33	0.00	0.00	102.46	-2.92	0.00	91.08	0.00	-77.50	0.00
24	RT	Incomplete or Inaccurate Transmission	PG&E	Sierra	4/7/2017	100-125	No	DEC	18	1:19	18:29	-14.02	0.00	0.00	-6742.79	-35.07	0.00	649.37	0.00	33484.55	0.00
25	RT	Incomplete or Inaccurate Transmission	PG&E	Sierra	4/7/2017	140-150	No	INC	11	1:19	11:59	9.70	0.00	0.00	-7735.13	0.00	0.00	0.00	0.00	0.00	0.00
26	RT	Incomplete or Inaccurate Transmission	PG&E	Sierra	4/22/2017	140-150	No	DEC	5	12:45	16:59	-17.20	0.00	0.00	240.61	-17.45	0.00	246.88	0.00	-797.35	0.00
27	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/18/2017	48-50	No	INC	5	1:08	5:44	-8.77	0.00	0.00	482.22	-18.08	0.00	-588.83	0.00	0.00	0.00
28	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/18/2017	50	No	DEC	4	1:55	5:44	23.61	0.00	0.00	518.00	0.00	0.00	0.00	0.00	-40.70	0.00
29	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/19/2017	0	No	INC	1	23:15	23:59	-111.02	1921.86	0.00	1260.95	0.00	0.00	0.00	0.00	0.00	0.00
30	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/20/2017	0	No	INC	1	0:00	0:19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/29/2017	30	No	DEC	1	23:55	23:59	1.88	0.00	0.00	-46.83	1.88	-46.83	0.00	0.00	-2.00	0.00
32	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/30/2017	27-62	No	DEC	5	0:00	4:59	-2.25	0.00	0.00	50.86	2.50	-57.51	0.00	0.00	-104.42	0.00
33	RT	Incomplete or Inaccurate Transmission	PG&E	Stockton	4/30/2017	62	No	INC	2	3:18	4:59	-22.96	0.00	0.00	-2059.31	-15.23	0.00	1322.27	0.00	-107.42	0.00
34	RT	Incomplete or Inaccurate Transmission	SCE	LA Basin	4/7/2017	300-303	No	INC	3	1:41	4:29	55.43	30845.83	0.00	-2346.96	0.69	-17.25	0.00	0.00	-1.66	0.00
35	RT	Incomplete or Inaccurate Transmission	SDG&E	San Diego-IV	4/6/2017	495	No	INC	5	11:00	15:59	-65.80	35925.88	0.00	-3428.93	-0.01	0.00	0.21	0.00	-0.01	0.00

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36	RT	Load Forecast Uncertainty	PG&E	Bay Area	4/14/2017	360	No	INC	1	10:05	10:29	90.00	4853.90	0.00	-1625.52	0.00	0.00	0.00	0.00	0.00	0.00
37	RT	Load Forecast Uncertainty	SCE	Big Creek-Ventura	4/7/2017	16-140	No	INC	6	8:35	13:59	177.97	16415.62	0.00	-4807.00	0.00	0.00	0.00	0.00	0.00	0.00
38	RT	Load Forecast Uncertainty	SCE	LA Basin	4/7/2017	0	No	INC	1	8:35	9:00	18.17	568.36	28.45	-764.49	0.00	0.00	0.00	0.00	0.00	0.00
39	RT	Load Forecast Uncertainty	SCE	LA Basin	4/14/2017	92	No	INC	1	10:05	10:29	33.29	1839.83	0.00	-557.91	0.00	0.00	0.00	0.00	0.00	0.00
40	RT	Load Forecast Uncertainty	SDG&E	San Diego-IV	4/5/2017	63	No	INC	6	16:00	21:59	-335.41	41182.85	0.00	17182.47	0.01	-0.30	0.00	-0.15	0.00	0.00
41	RT	Load Pull	PG&E	Fresno	4/7/2017	83	Yes	INC	3	8:00	10:59	40.60	11514.26	0.00	-2936.50	13.00	-3335.95	0.00	0.00	0.00	0.00
42	RT	Load Pull	PG&E	Fresno	4/17/2017	300-400	No	INC	1	17:05	17:59	276.38	6990.80	0.00	-54150.05	55.71	-2473.68	0.00	0.00	0.00	0.00
43	RT	Load Pull	PG&E	Fresno	4/30/2017	3	No	DEC	8	9:50	16:59	0.65	0.00	0.00	140.25	-0.32	0.00	-24.24	0.00	0.00	0.00
44	RT	Operating Procedure Number and Constraint (6410)	PG&E	Fresno	4/23/2017	-323	No	DEC	1	5:00	5:29	-161.50	0.00	0.00	23280.80	0.00	0.00	0.00	0.00	0.00	0.00
45	RT	Operating Procedure Number and Constraint (6410)	SDG&E	San Diego-IV	4/23/2017	440	No	INC	1	5:10	5:14	10.40	0.00	0.00	-288.72	0.00	0.00	0.00	0.00	0.00	0.00
46	RT	Operating Procedure Number and Constraint (6410)	SDG&E	San Diego-IV	4/24/2017	400	No	INC	1	1:50	2:29	29.56	0.00	0.00	-679.86	16.24	-393.46	0.00	0.00	0.00	0.00
47	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/1/2017	12	No	DEC	18	6:33	23:59	-16.14	-239.46	0.00	384.89	0.00	0.00	0.00	0.00	0.00	0.00
48	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/1/2017	12-30	No	INC	24	0:00	23:59	-24.05	518.18	0.00	-391.24	4.91	-201.28	0.00	0.00	0.00	0.00
49	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/2/2017	16	No	INC	6	18:05	23:59	0.32	517.90	0.00	-28.58	3.69	-160.63	0.00	0.00	0.00	0.00
50	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/3/2017	12-24	No	DEC	17	7:45	23:59	-18.46	0.00	0.00	476.81	0.00	0.00	0.00	0.00	0.00	0.00
51	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/3/2017	12-36	No	INC	24	0:00	23:59	20.21	-1294.75	0.00	-192.19	7.30	-294.98	0.00	0.00	0.00	0.00
52	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/4/2017	15-30	No	INC	13	7:50	19:59	4.41	0.00	0.00	-94.94	2.51	-63.40	0.00	0.00	0.00	0.00
53	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/4/2017	15-45	No	DEC	13	7:50	19:59	0.26	0.00	0.00	-4.38	0.45	-15.87	0.00	0.00	0.00	0.00

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54	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/5/2017	12	No	DEC	15	8:00	22:59	-9.97	0.00	0.00	286.67	0.00	0.00	0.00	0.00	0.00	0.00
55	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/5/2017	12	No	INC	15	8:00	22:59	20.48	0.00	0.00	-747.38	0.50	-22.08	0.00	0.00	0.00	0.00
56	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/6/2017	24	No	DEC	4	20:45	23:59	-1.43	0.00	0.00	26.75	0.00	0.00	0.00	0.00	0.00	0.00
57	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/6/2017	24-28	No	INC	7	17:00	23:59	7.60	-934.66	0.00	-294.52	4.29	-185.69	0.00	0.00	0.00	0.00
58	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/7/2017	12-30	No	DEC	10	12:45	21:59	-9.60	0.00	0.00	298.08	0.00	0.00	0.00	0.00	0.00	0.00
59	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/7/2017	26-117	No	INC	11	8:00	18:59	102.00	-2394.00	0.00	-7078.78	43.56	-2991.42	0.00	0.00	0.00	0.00
60	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/8/2017	15-30	No	INC	17	7:35	23:59	10.55	-710.32	0.00	-1589.77	8.59	-318.14	0.00	0.00	0.00	0.00
61	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/8/2017	16	No	DEC	12	7:35	18:59	-1.16	0.00	0.00	72.61	0.00	0.00	0.00	0.00	0.00	0.00
62	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/9/2017	15	No	DEC	14	9:33	23:29	-9.47	0.00	0.00	269.23	0.00	0.00	0.00	0.00	0.00	0.00
63	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/9/2017	15-31	No	INC	24	0:00	23:59	8.70	0.00	0.00	-175.61	7.15	-260.17	0.00	0.00	0.00	0.00
64	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/10/2017	10	No	DEC	2	17:40	19:39	-7.84	0.00	0.00	260.12	0.00	0.00	0.00	0.00	0.00	0.00
65	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/10/2017	10-30	No	INC	13	7:05	19:39	27.18	-2408.72	0.00	-788.58	15.04	-658.52	0.00	0.00	0.00	0.00
66	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/11/2017	15-30	No	DEC	14	6:16	19:59	8.96	-2029.61	0.00	-567.44	5.51	-244.49	0.00	0.00	0.00	0.00
67	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/11/2017	15-120	No	INC	18	6:16	23:58	27.87	10007.76	0.00	-1109.54	19.96	-876.67	0.00	0.00	0.00	0.00
68	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/12/2017	30-51	No	INC	8	16:15	23:59	87.70	-5168.24	0.00	-1436.94	11.90	-475.68	0.00	0.00	0.00	0.00
69	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/12/2017	45-51	No	DEC	7	16:15	22:59	-0.03	-1040.13	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00
70	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/13/2017	12-60	No	DEC	12	12:40	23:59	-0.71	0.00	0.00	-194.72	0.80	-30.09	0.00	0.00	0.00	0.00
71	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/13/2017	12-60	No	INC	24	0:00	23:59	51.56	-2654.50	0.00	-1358.05	11.70	-446.21	0.00	0.00	0.00	0.00

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Chart 2: Table of Exceptional Dispatches for Period 01/April/2017 - 30/April/2017

Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
72	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/14/2017	24-132	No	INC	24	0:00	23:59	75.93	-4919.24	0.00	-219.67	39.53	-1348.33	0.00	0.00	0.00	0.00
73	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/15/2017	15-105	No	INC	24	0:00	23:59	74.58	-3501.08	0.00	-705.19	16.83	-598.68	0.00	0.00	0.00	0.00
74	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/16/2017	22-28	No	DEC	16	8:25	23:59	-3.55	0.00	0.00	2.04	2.36	-85.06	0.00	0.00	0.00	0.00
75	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/16/2017	22-44	No	INC	24	0:00	23:59	64.48	-4787.19	0.00	-3477.60	13.40	-1034.65	0.00	0.00	0.00	0.00
76	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/17/2017	16-31	No	DEC	12	12:05	23:59	-14.86	0.00	0.00	362.27	1.50	-27.56	0.00	0.00	0.00	0.00
77	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/17/2017	16-85	No	INC	24	0:00	23:59	100.14	-6205.62	0.00	-4604.01	39.62	-2272.23	0.00	0.00	0.00	0.00
78	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/18/2017	16-55	No	DEC	24	0:00	23:14	-2.55	0.00	0.00	13.01	1.24	-44.85	0.00	0.00	0.00	0.00
79	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/18/2017	16-55	No	INC	24	0:00	23:59	14.08	-399.50	32.68	135.34	7.07	-208.72	0.00	0.00	0.00	0.00
80	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/19/2017	10-30	No	INC	24	0:00	23:59	30.73	-712.16	0.00	-694.07	9.79	-410.80	0.00	0.00	0.00	0.00
81	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/19/2017	14	No	DEC	6	5:45	11:24	0.14	0.00	0.00	-2.50	0.00	0.00	0.00	0.00	0.00	0.00
82	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/20/2017	12-30	No	DEC	24	0:35	23:59	-17.80	0.00	0.00	-3.72	2.50	-90.58	0.00	0.00	0.00	0.00
83	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/20/2017	12-30	No	INC	24	0:00	23:59	38.63	1955.56	0.00	392.07	5.71	-146.11	0.00	0.00	0.00	0.00
84	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/21/2017	10-60	No	INC	24	0:00	23:59	55.22	-797.96	0.00	-662.94	17.12	-622.49	0.00	0.00	0.00	0.00
85	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/21/2017	12-15	No	DEC	16	0:00	15:49	0.07	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
86	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/22/2017	10-43	No	DEC	23	0:45	23:29	3.48	-1232.23	0.00	-88.59	2.40	-86.23	0.00	0.00	0.00	0.00
87	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/22/2017	10-43	No	INC	24	0:45	23:59	70.53	0.00	0.00	-969.26	7.81	-222.04	0.00	0.00	0.00	0.00
88	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/23/2017	12-30	No	INC	24	0:00	23:59	33.14	-795.39	0.00	-987.38	6.07	-267.86	0.00	0.00	0.00	0.00
89	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/23/2017	22	No	DEC	2	17:30	19:29	0.00	0.00	0.00	-0.05	0.00	0.00	0.00	0.00	0.00	0.00

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Chart 2: Table of Exceptional Dispatches for Period 01/April/2017 - 30/April/2017

Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
90	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/24/2017	20-44	No	INC	19	5:30	23:59	84.39	-12284.36	0.00	-2797.23	39.58	-1679.91	0.00	0.00	0.00	0.00
91	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/24/2017	32-74	No	DEC	17	7:05	23:59	-20.77	0.00	0.00	511.37	0.00	0.00	0.00	0.00	0.00	0.00
92	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/25/2017	15-48	No	DEC	18	6:35	23:59	-52.23	0.00	0.00	1329.31	1.57	-55.76	0.00	0.00	0.00	0.00
93	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/25/2017	20-48	No	INC	24	0:00	23:59	59.65	-6017.38	0.00	-1193.81	30.12	-1257.55	0.00	0.00	0.00	0.00
94	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/26/2017	15	No	DEC	20	0:00	19:59	-3.14	0.00	0.00	90.21	0.00	0.00	0.00	0.00	0.00	0.00
95	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/26/2017	15-47	No	INC	24	0:00	23:59	49.86	130.05	0.00	-1993.60	5.99	-204.24	0.00	0.00	0.00	0.00
96	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/27/2017	12-40	No	INC	24	0:00	23:59	8.93	262.77	0.00	-912.82	8.46	-614.75	0.00	0.00	0.00	0.00
97	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/27/2017	15-16	No	DEC	24	0:00	23:29	-1.04	0.00	0.00	34.52	0.00	0.00	0.00	0.00	0.00	0.00
98	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/28/2017	10-49	No	INC	24	0:00	23:59	-65.39	0.00	0.00	-992.47	11.05	-393.91	0.00	0.00	0.00	0.00
99	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/28/2017	21-24	No	DEC	6	18:35	23:59	-8.61	-2188.63	0.00	192.22	0.00	0.00	0.00	0.00	0.00	0.00
100	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/29/2017	10-31	No	INC	24	0:00	23:59	-57.72	-801.90	0.00	-1323.17	4.75	-200.47	0.00	0.00	0.00	0.00
101	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/29/2017	15-16	No	DEC	24	0:40	23:59	1.71	0.00	0.00	-103.15	0.93	-33.87	0.00	0.00	0.00	0.00
102	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/30/2017	15-28	No	DEC	24	0:00	23:59	-5.66	0.00	0.00	-58.65	3.00	-108.99	0.00	0.00	0.00	0.00
103	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	4/30/2017	15-32	No	INC	24	0:00	23:59	0.04	0.00	50.25	-292.07	2.40	-107.62	0.00	0.00	0.00	0.00
104	RT	Operating Procedure Number and Constraint (7110)	PG&E	Humboldt	5/1/2017	32	No	INC	8	0:00	7:29	-11.43	0.00	0.00	200.25	3.00	-109.20	0.00	0.00	0.00	0.00
105	RT	Operating Procedure Number and Constraint (7410)	PG&E	Stockton	4/23/2017	240	No	INC	1	22:10	22:59	9.63	3809.37	0.00	-181.31	0.00	0.00	0.00	0.00	0.00	0.00
106	RT	Operating Procedure Number and Constraint (7430)	PG&E	Fresno	4/1/2017	70-74	No	DEC	24	0:25	23:59	-19.69	0.00	0.00	361.26	-23.23	0.00	455.92	0.00	0.00	0.00
107	RT	Operating Procedure Number and Constraint (7430)	PG&E	Fresno	4/2/2017	72	No	INC	1	0:00	0:59	3.64	0.00	0.00	-56.66	0.00	0.00	0.00	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
108	RT	Operating Procedure Number and Constraint (7500)	SCE	Big Creek-Ventura	4/30/2017	600	No	DEC	4	20:01	23:59	-98.82	0.00	0.00	449.06	-79.48	0.00	0.79	0.00	0.00	0.00
109	RT	Operating Procedure Number and Constraint (7510)	SCE	Big Creek-Ventura	4/17/2017	650	No	DEC	4	20:35	23:59	-10.79	0.00	0.00	-947.24	-50.67	0.00	0.51	0.00	0.00	0.00
110	RT	Operating Procedure Number and Constraint (7820)	SDG&E	San Diego-IV	4/11/2017	155	No	INC	7	10:00	16:59	-244.28	71085.28	0.00	3713.52	0.00	0.00	0.00	0.00	0.00	0.00
111	RT	Operating Procedure Number and Constraint (7820)	SDG&E	San Diego-IV	4/12/2017	155-290	No	INC	9	8:00	16:59	224.42	93080.26	0.00	1390.27	0.00	0.00	0.00	0.00	0.00	0.00
112	RT	Operating Procedure Number and Constraint (7820)	SDG&E	San Diego-IV	4/13/2017	290	No	INC	10	10:00	19:59	-4.73	93024.27	0.00	9368.14	0.00	0.00	0.00	0.00	0.00	0.00
113	RT	Operating Procedure Number and Constraint (7820)	SDG&E	San Diego-IV	4/22/2017	155-290	No	INC	3	8:00	10:44	107.83	22559.17	0.00	-50.45	52.00	0.00	0.00	0.00	0.00	0.00
114	RT	Other Reliability Requirement	N/A	N/A	4/10/2017	16	No	DEC	6	11:05	16:59	-2.55	0.00	0.00	-0.03	-2.59	0.00	0.98	0.00	0.00	0.00
115	RT	Other Reliability Requirement	N/A	N/A	4/28/2017	0	No	DEC	6	11:15	17:14	2.76	0.00	0.00	-1121.09	-7.26	0.00	-1088.33	0.00	0.00	0.00
116	RT	Other Reliability Requirement	N/A	N/A	4/29/2017	8-10	No	DEC	9	9:37	17:44	1.90	0.00	0.00	-744.74	-3.89	0.00	-212.46	0.00	0.00	0.00
117	RT	Other Reliability Requirement	N/A	N/A	4/30/2017	7-14	No	DEC	8	9:50	16:59	-4.71	0.00	0.00	-699.45	-0.40	0.00	-59.49	0.00	0.00	0.00
118	RT	Other Reliability Requirement	N/A	N/A	4/30/2017	7-14	No	INC	8	9:50	16:59	0.90	0.00	0.00	134.51	0.00	0.00	0.00	0.00	0.00	0.00
119	RT	Other Reliability Requirement	PG&E	Bay Area	4/8/2017	24	No	INC	1	12:12	12:26	5.29	0.00	0.00	215.24	0.00	0.00	0.00	0.00	0.00	0.00
120	RT	Other Reliability Requirement	PG&E	Fresno	4/4/2017	200	No	DEC	1	6:30	6:59	-6.67	0.00	0.00	54.07	-6.67	0.00	56.60	0.00	0.00	0.00
121	RT	Other Reliability Requirement	PG&E	Fresno	4/9/2017	-314	No	DEC	1	8:55	8:59	-16.35	0.00	0.00	395.63	0.00	0.00	0.00	0.00	0.00	0.00
122	RT	Other Reliability Requirement	PG&E	Fresno	4/10/2017	4	No	INC	7	10:30	16:59	-0.07	0.00	0.00	-1.19	0.00	0.00	0.00	0.00	0.00	0.00
123	RT	Other Reliability Requirement	PG&E	Fresno	4/10/2017	26-49	No	DEC	7	10:30	16:59	-11.84	0.00	0.00	7.90	-9.01	0.00	-0.60	0.00	0.00	0.00
124	RT	Other Reliability Requirement	PG&E	Fresno	4/12/2017	0	No	INC	1	16:00	16:59	82.25	0.00	0.00	-0.97	0.00	0.00	0.00	0.00	0.00	0.00
125	RT	Other Reliability Requirement	PG&E	Fresno	4/20/2017	47	No	DEC	1	13:35	13:39	-0.92	0.00	0.00	-109.13	-0.88	0.00	-104.21	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
126	RT	Other Reliability Requirement	PG&E	Fresno	4/23/2017	-320	No	DEC	3	5:45	7:59	-80.75	0.00	0.00	5655.86	0.00	0.00	0.00	0.00	0.00	0.00
127	RT	Other Reliability Requirement	PG&E	Fresno	4/27/2017	28	No	DEC	7	10:14	16:44	-20.07	0.00	0.00	-787.97	-16.57	0.00	-737.02	0.00	0.00	0.00
128	RT	Other Reliability Requirement	PG&E	Fresno	4/27/2017	28-36	No	INC	8	10:14	17:59	0.23	0.00	0.00	7.35	0.00	0.00	0.00	0.00	0.00	0.00
129	RT	Other Reliability Requirement	PG&E	Fresno	4/28/2017	4	No	DEC	5	12:30	17:14	-0.48	0.00	0.00	-72.43	-0.27	0.00	-40.50	0.00	0.00	0.00
130	RT	Other Reliability Requirement	PG&E	Fresno	4/28/2017	36-86	No	INC	6	11:15	17:14	12.46	0.00	0.00	1663.57	-0.27	0.00	-40.50	0.00	0.00	0.00
131	RT	Other Reliability Requirement	PG&E	Fresno	4/29/2017	25-30	No	DEC	9	9:37	17:44	-4.60	0.00	0.00	-83.36	-4.59	0.00	-118.16	0.00	0.00	0.00
132	RT	Other Reliability Requirement	PG&E	Fresno	4/29/2017	30	No	INC	8	10:10	17:44	-0.74	0.00	0.00	187.14	0.00	0.00	0.00	0.00	0.00	0.00
133	RT	Other Reliability Requirement	PG&E	Fresno	4/30/2017	12-25	No	DEC	8	9:50	16:59	5.87	0.00	0.00	908.69	-1.75	0.00	-262.88	0.00	0.00	0.00
134	RT	Other Reliability Requirement	PG&E	Fresno	4/30/2017	13-24	No	INC	8	9:50	16:59	-1.41	0.00	0.00	172.35	0.00	0.00	0.00	0.00	0.00	0.00
135	RT	Other Reliability Requirement	PG&E	N/A	4/30/2017	10	No	DEC	6	11:50	16:59	1.47	0.00	0.00	265.85	-0.20	0.00	-2.03	0.00	0.00	0.00
136	RT	Other Reliability Requirement	PG&E	Sierra	4/2/2017	140	No	DEC	2	20:20	21:29	-4.29	0.00	0.00	-61.11	-9.66	0.00	30.72	0.00	0.00	0.00
137	RT	Other Reliability Requirement	PG&E	Sierra	4/2/2017	140	No	INC	2	20:20	21:29	-2.21	0.00	0.00	65.85	0.00	0.00	0.00	0.00	0.00	0.00
138	RT	Other Reliability Requirement	PG&E	Sierra	4/13/2017	30-35	No	INC	6	13:35	18:59	25.53	0.00	0.00	1475.86	0.00	0.00	0.00	0.00	0.00	0.00
139	RT	Other Reliability Requirement	PG&E	Sierra	4/13/2017	35	No	DEC	5	14:55	18:59	-13.68	0.00	0.00	-139.03	0.00	0.00	0.00	0.00	0.00	0.00
140	RT	Other Reliability Requirement	PG&E	Sierra	4/14/2017	20	No	INC	8	11:00	18:59	9.69	0.00	0.00	133.05	0.00	0.00	0.00	0.00	0.00	0.00
141	RT	Other Reliability Requirement	PG&E	Sierra	4/14/2017	25-150	No	DEC	17	2:20	18:59	-59.98	0.00	0.00	-865.00	-59.33	0.00	-842.30	0.00	0.00	0.00
142	RT	Other Reliability Requirement	PG&E	Sierra	4/18/2017	30	No	DEC	7	13:35	19:59	-8.82	0.00	0.00	-335.49	-9.17	0.00	-343.34	0.00	0.00	0.00
143	RT	Other Reliability Requirement	PG&E	Sierra	4/19/2017	15-50	No	DEC	14	10:05	23:59	-14.88	0.00	0.00	35.09	-30.34	0.00	106.44	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
144	RT	Other Reliability Requirement	PG&E	Sierra	4/20/2017	30	No	DEC	17	0:00	16:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	RT	Other Reliability Requirement	PG&E	Sierra	4/28/2017	153	No	DEC	4	12:22	15:59	-4.63	0.00	0.00	-66.41	-8.79	0.00	-119.10	0.00	0.00	0.00
146	RT	Other Reliability Requirement	PG&E	Sierra	4/29/2017	130-148	No	DEC	12	10:47	21:59	-90.47	0.00	0.00	167.94	-89.66	0.00	167.93	0.00	0.00	0.00
147	RT	Other Reliability Requirement	PG&E	Stockton	4/3/2017	201-205	No	INC	16	8:20	23:59	27.14	119144.03	0.00	804.21	-1.92	-0.06	53.82	0.00	0.00	0.00
148	RT	Other Reliability Requirement	PG&E	Stockton	4/4/2017	201	No	DEC	4	6:55	10:44	-43.21	1328.51	0.00	-144.11	0.00	0.00	0.00	0.00	0.00	0.00
149	RT	Other Reliability Requirement	PG&E	Stockton	4/4/2017	201	No	INC	4	6:55	10:44	-2.29	0.00	0.00	-471.73	0.00	0.00	0.00	0.00	0.00	0.00
150	RT	Other Reliability Requirement	PG&E	Stockton	4/18/2017	30	No	INC	1	14:26	14:59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
151	RT	Other Reliability Requirement	PG&E	Stockton	4/19/2017	20	No	DEC	2	10:52	11:59	15.48	0.00	0.00	-438.31	15.48	-438.31	0.00	0.00	0.00	0.00
152	RT	Other Reliability Requirement	PG&E	Stockton	4/20/2017	60	No	DEC	1	15:20	15:59	-2.18	0.00	0.00	-327.08	0.00	0.00	0.00	0.00	0.00	0.00
153	RT	Other Reliability Requirement	PG&E	Stockton	4/21/2017	201	No	INC	10	7:00	16:59	148.53	61167.50	0.00	-531.52	0.74	-22.32	0.00	0.00	0.00	0.00
154	RT	Other Reliability Requirement	PG&E	Stockton	4/29/2017	70	No	DEC	3	5:45	8:44	-7.51	0.00	0.00	271.64	-11.11	0.00	282.33	0.00	0.00	0.00
155	RT	Planned Transmission Outage and Constraint	PG&E	Bay Area	4/8/2017	25-50	No	INC	7	10:05	16:29	151.73	0.00	0.00	2609.66	64.46	1047.99	0.00	0.00	-7480.92	0.00
156	RT	Planned Transmission Outage and Constraint	PG&E	Bay Area	4/15/2017	23	No	DEC	7	7:55	14:32	0.06	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00
157	RT	Planned Transmission Outage and Constraint	PG&E	Bay Area	4/15/2017	48-635	No	INC	8	7:55	14:59	50.65	33353.05	0.00	430.53	63.77	637.21	0.00	0.00	-8732.67	0.00
158	RT	Planned Transmission Outage and Constraint	PG&E	Bay Area	4/21/2017	141	No	INC	1	23:00	23:59	-2.41	5201.00	0.00	27.43	0.00	0.00	0.00	0.00	-0.08	0.00
159	RT	Planned Transmission Outage and Constraint	PG&E	Bay Area	4/22/2017	141	No	INC	19	0:00	18:14	-69.25	95940.25	0.00	-281.71	0.00	0.00	0.00	0.00	-1.09	0.00
160	RT	Planned Transmission Outage and Constraint	PG&E	Fresno	4/19/2017	30-80	No	DEC	9	8:40	16:59	-23.35	0.00	0.00	-917.27	-22.19	0.00	-793.58	0.00	-487.61	0.00
161	RT	Planned Transmission Outage and Constraint	PG&E	Fresno	4/20/2017	10-50	No	DEC	7	13:40	19:59	-13.65	0.00	0.00	-4049.84	-51.41	0.00	-5030.63	0.00	-501.65	0.00

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Chart 2: Table of Exceptional Dispatches for Period 01/April/2017 - 30/April/2017

Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
162	RT	Planned Transmission Outage and Constraint	PG&E	Humboldt	4/12/2017	29-50	No	DEC	4	5:45	9:44	14.52	-1058.58	0.00	-296.72	13.20	-217.24	0.00	0.00	-594.47	0.00
163	RT	Planned Transmission Outage and Constraint	PG&E	Humboldt	4/12/2017	48-93	No	INC	12	5:45	16:59	34.71	-2851.67	0.00	-1324.26	49.77	-978.18	0.00	0.00	-4965.45	0.00
164	RT	Planned Transmission Outage and Constraint	PG&E	Humboldt	4/19/2017	14	No	DEC	6	6:15	11:44	0.14	0.00	0.00	-2.50	0.00	0.00	0.00	0.00	0.00	0.00
165	RT	Planned Transmission Outage and Constraint	PG&E	Humboldt	4/19/2017	14-45	No	INC	12	6:15	17:59	60.74	0.00	0.00	-6.90	52.98	-229.17	0.00	0.00	-4738.98	0.00
166	RT	Planned Transmission Outage and Constraint	PG&E	N/A	4/11/2017	518	No	DEC	2	20:45	21:59	-12.93	-5798.41	0.00	-608.77	0.00	0.00	0.00	0.00	0.00	0.00
167	RT	Planned Transmission Outage and Constraint	PG&E	Sierra	4/4/2017	46-206	No	INC	3	19:50	21:59	39.78	1120.50	601.16	-2155.19	13.00	-33.27	0.00	0.00	-	14722.32
168	RT	Planned Transmission Outage and Constraint	PG&E	Sierra	4/4/2017	140	No	DEC	20	4:15	23:59	-2.29	0.00	0.00	-25145.87	-179.18	0.00	1450.59	0.00	-	102748.68
169	RT	Planned Transmission Outage and Constraint	PG&E	Sierra	4/5/2017	50-100	No	DEC	14	10:00	23:59	-126.72	0.00	0.00	-139.89	-122.12	0.00	1526.05	0.00	-	78770.68
170	RT	Planned Transmission Outage and Constraint	PG&E	Sierra	4/6/2017	70-150	No	DEC	16	0:00	15:59	-75.27	0.00	0.00	9383.72	-283.52	0.00	24528.38	0.00	-	98867.69
171	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/7/2017	125	No	DEC	4	19:25	22:29	-8.62	-10460.96	0.00	324.65	-12.93	0.00	458.81	0.00	-539.54	0.00
172	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/8/2017	128-201	No	DEC	5	19:20	23:59	-54.05	0.00	0.00	2214.03	-62.09	0.00	2500.76	0.00	-2418.59	0.00
173	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/8/2017	128-201	No	INC	5	19:20	23:59	-171.73	0.00	0.00	-13074.50	-170.98	0.00	-	13099.66	0.00	-5157.77
174	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/9/2017	128	No	INC	3	0:00	2:29	-0.97	4303.81	0.00	181.01	0.00	0.00	0.00	0.00	0.00	0.00
175	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/10/2017	128	No	DEC	7	5:45	11:59	14.02	-1024.88	0.00	-354.27	0.00	0.00	0.00	0.00	0.00	0.00
176	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/10/2017	128	No	INC	7	5:45	11:59	-90.31	8376.13	0.00	2727.52	-82.32	0.00	2419.89	0.00	-2284.11	0.00
177	RT	Planned Transmission Outage and Constraint	PG&E	Stockton	4/11/2017	160	No	INC	3	1:55	3:59	-45.15	4054.58	0.00	750.91	-42.49	0.00	687.12	0.00	-571.37	0.00
178	RT	Planned Transmission Outage and Constraint	SCE	LA Basin	4/13/2017	46	No	DEC	12	5:45	16:59	-17.76	0.00	0.00	372.07	0.00	0.00	0.00	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620	
179	RT	Planned Transmission Outage and Constraint	SCE	LA Basin	4/13/2017	46-91	No	INC	12	5:45	16:59	-62.93	48792.50	0.00	1102.68	0.00	0.00	0.00	0.00	0.00	0.00	
180	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/5/2017	20-63	No	INC	10	6:00	15:59	-226.87	136823.78	0.00	6280.92	0.01	-0.20	0.00	0.00	0.00	-2.08	0.00
181	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/19/2017	10-15	No	INC	9	10:08	18:59	13.38	0.00	0.00	-123.01	0.00	0.00	0.00	0.00	0.00	-5.30	0.00
182	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/19/2017	12	No	DEC	6	11:25	17:14	-11.57	0.00	0.00	178.16	0.00	0.00	0.00	0.00	0.00	-288.78	0.00
183	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/27/2017	12-20	No	DEC	8	9:20	17:14	-25.43	0.00	0.00	185.07	0.00	0.00	0.00	0.00	0.00	-14.35	0.00
184	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/27/2017	12-60	No	INC	15	9:13	23:59	-169.82	33382.98	26249.64	9103.83	-3.91	0.00	8.95	0.00	0.00	-6.70	0.00
185	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/28/2017	12-20	No	DEC	3	14:18	17:14	5.48	0.00	0.00	70.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
186	RT	Planned Transmission Outage and Constraint	SDG&E	San Diego-IV	4/28/2017	12-40	No	INC	18	0:00	17:14	-82.75	18534.90	0.00	2285.95	0.00	0.00	0.00	0.00	0.00	-1.26	0.00
187	RT	Pump Management	PG&E	Fresno	4/23/2017	-320	No	DEC	3	4:00	6:59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
188	RT	Software Limitation	PG&E	Bay Area	4/10/2017	0	No	INC	2	21:30	22:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
189	RT	Software Limitation	PG&E	Bay Area	4/17/2017	0	No	INC	1	8:45	8:59	-17.16	0.00	0.00	0.00	-17.16	0.00	0.00	0.00	0.00	0.00	0.00
190	RT	Software Limitation	PG&E	Bay Area	4/21/2017	75	No	DEC	4	17:40	20:59	7.64	0.00	665.49	-185.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
191	RT	Software Limitation	PG&E	Bay Area	4/21/2017	75	No	INC	4	17:40	20:59	50.60	5271.91	332.75	-128.46	6.23	-23.26	0.00	0.00	0.00	0.00	0.00
192	RT	Software Limitation	PG&E	Fresno	4/20/2017	-320	No	INC	1	10:30	11:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
193	RT	Software Limitation	PG&E	N/A	4/7/2017	0	No	INC	2	12:00	13:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
194	RT	Software Limitation	PG&E	N/A	4/24/2017	196	No	INC	1	9:20	9:39	32.63	1597.44	0.00	-675.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
195	RT	Software Limitation	PG&E	Stockton	4/20/2017	96	No	DEC	1	18:00	18:59	-1.47	-3619.57	3727.80	747.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
196	RT	Software Limitation	SCE	Big Creek-Ventura	4/6/2017	16	No	INC	1	23:40	23:54	1.33	0.00	0.00	-34.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
197	RT	Software Limitation	SCE	Big Creek-Ventura	4/7/2017	0	No	INC	1	5:40	6:39	-4.00	0.00	351.75	0.00	-4.00	0.00	0.00	0.00	0.00	0.00
198	RT	Software Limitation	SCE	LA Basin	4/1/2017	0	No	INC	5	19:00	23:04	-69.00	922.72	0.00	1245.73	-15.00	0.00	0.00	0.00	0.00	0.00
199	RT	Software Limitation	SCE	LA Basin	4/2/2017	250	No	INC	1	22:10	22:59	-4.37	0.00	0.00	110.02	-9.56	0.00	264.62	0.00	0.00	0.00
200	RT	Software Limitation	SCE	LA Basin	4/6/2017	140	No	INC	1	23:40	23:54	17.37	1381.27	703.65	-482.38	0.00	0.00	0.00	0.00	0.00	0.00
201	RT	Software Limitation	SCE	LA Basin	4/7/2017	0	No	INC	1	5:35	6:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202	RT	Software Limitation	SCE	LA Basin	4/11/2017	150	No	INC	4	20:10	23:59	-34.60	7705.56	0.00	797.61	0.00	-0.15	0.00	0.00	0.00	0.00
203	RT	Software Limitation	SCE	LA Basin	4/12/2017	0	No	INC	1	0:00	0:44	-37.50	0.00	0.00	1117.49	0.00	0.00	0.00	0.00	0.00	0.00
204	RT	Software Limitation	SCE	LA Basin	4/13/2017	0	No	INC	1	0:00	0:59	-24.11	0.00	0.00	328.79	-24.11	0.00	328.79	0.00	0.00	0.00
205	RT	Software Limitation	SCE	LA Basin	4/18/2017	0	No	INC	1	11:45	12:44	2.50	0.00	0.00	-44.51	0.00	0.00	0.00	0.00	0.00	0.00
206	RT	Software Limitation	SCE	LA Basin	4/22/2017	0	No	INC	1	0:15	0:44	-28.54	0.00	0.00	107.29	-28.54	0.00	107.29	0.00	0.00	0.00
207	RT	Software Limitation	SCE	LA Basin	4/23/2017	0	No	INC	1	20:05	20:59	-103.71	315.84	0.00	2624.38	-103.97	0.00	2633.98	0.00	0.00	0.00
208	RT	Unit Testing	PG&E	Fresno	4/1/2017	47	No	INC	1	20:30	20:49	12.21	0.00	0.00	-694.39	12.24	-695.31	0.00	0.00	0.00	0.00
209	RT	Unit Testing	PG&E	N/A	4/8/2017	158	No	DEC	1	7:28	7:37	-8.85	0.00	0.00	180.72	0.00	0.00	0.00	0.00	0.00	0.00
210	RT	Unit Testing	PG&E	N/A	4/27/2017	100	No	INC	2	9:30	10:59	-122.37	9470.28	0.00	630.28	-11.71	0.00	0.00	0.00	0.00	0.00
211	RT	Unit Testing	PG&E	Sierra	4/28/2017	50	No	INC	1	2:01	2:44	7.38	0.00	0.00	-139.59	7.31	-138.18	0.00	0.00	0.00	0.00
212	RT	Unit Testing	SCE	LA Basin	4/1/2017	150	No	INC	1	21:15	22:14	18.75	5559.18	0.00	-587.35	0.00	0.00	0.00	0.00	0.00	0.00
213	RT	Unit Testing	SCE	LA Basin	4/5/2017	40	No	INC	3	9:00	11:44	85.91	0.00	0.00	-1719.04	0.00	0.00	0.00	0.00	0.00	0.00
214	RT	Unit Testing	SCE	LA Basin	4/11/2017	150	No	INC	1	19:15	19:54	40.93	5297.57	0.00	-1237.40	3.11	-146.23	0.00	0.00	0.00	0.00

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Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
215	RT	Unit Testing	SCE	LA Basin	4/22/2017	150	No	INC	1	12:00	12:39	106.27	6016.95	0.00	-1.63	0.01	-0.54	0.00	0.00	0.00	0.00
216	RT	Unit Testing	SCE	LA Basin	4/25/2017	300	No	INC	4	0:01	3:04	-43.80	9745.02	0.00	-751.55	-75.01	0.00	0.00	0.00	0.00	0.00
217	RT	Unit Testing	SCE	N/A	4/26/2017	380	No	INC	1	3:15	3:59	66.79	0.00	0.00	-1747.27	66.79	-1747.27	0.00	0.00	0.00	0.00
218	RT	Unit Testing	SDG&E	San Diego-IV	4/11/2017	345	No	INC	1	16:35	16:44	4.86	669.17	0.00	-199.20	5.61	-206.85	0.00	0.00	0.00	0.00
219	RT	Unplanned Outage	PG&E	Fresno	4/14/2017	0	No	INC	8	9:45	17:14	82.25	0.00	0.00	1272.22	0.00	0.00	0.00	0.00	0.00	0.00
220	RT	Unplanned Outage	SCE	N/A	4/24/2017	172	No	INC	8	14:00	21:14	-2.64	42349.68	16326.13	153.55	0.00	0.00	0.00	0.00	0.00	0.00
221	RT	Voltage Support	PG&E	Fresno	4/2/2017	-310	No	DEC	1	8:30	8:59	0.50	0.00	0.00	14.83	0.00	0.00	0.00	0.00	0.00	0.00
222	RT	Voltage Support	PG&E	Fresno	4/8/2017	83	Yes	INC	7	17:38	23:59	9.65	5428.15	0.00	-534.06	0.00	0.00	0.00	0.00	-0.07	0.00
223	RT	Voltage Support	PG&E	Fresno	4/9/2017	83-166	Yes	INC	24	0:00	23:59	251.85	63492.90	0.00	-9880.78	0.01	-0.18	0.00	0.00	-0.22	0.00
224	RT	Voltage Support	PG&E	Fresno	4/10/2017	83	Yes	INC	5	0:00	4:59	6.89	25495.85	0.00	-44.65	0.00	0.00	0.00	0.00	-0.16	0.00
225	RT	Voltage Support	PG&E	Fresno	4/16/2017	-328	No	INC	12	5:50	17:24	-27.33	0.00	0.00	501.51	0.00	0.00	0.00	0.00	0.00	0.00
226	RT	Voltage Support	PG&E	Fresno	4/16/2017	-656--328	No	DEC	12	5:30	17:24	-147.33	0.00	0.00	3860.06	0.00	0.00	0.00	0.00	0.00	0.00
227	RT	Voltage Support	PG&E	Fresno	4/17/2017	-328-83	No	DEC	24	0:30	23:59	-6.17	0.00	0.00	108.57	0.00	0.00	0.00	0.00	0.00	0.00
228	RT	Voltage Support	PG&E	Fresno	4/17/2017	-328-83	No	INC	7	0:30	7:04	-27.33	1398.16	0.00	258.66	0.00	0.00	0.00	0.00	0.00	0.00
229	RT	Voltage Support	PG&E	Fresno	4/18/2017	-328--308	No	DEC	24	0:00	23:59	-44.58	0.00	0.00	937.62	0.00	0.00	0.00	0.00	0.00	0.00
230	RT	Voltage Support	PG&E	Fresno	4/19/2017	-308	No	DEC	5	0:00	4:44	19.25	0.00	0.00	-806.88	0.00	0.00	0.00	0.00	0.00	0.00
231	RT	Voltage Support	PG&E	Fresno	4/19/2017	-308	No	INC	5	0:00	4:44	6.42	0.00	0.00	512.32	0.00	0.00	0.00	0.00	0.00	0.00
232	RT	Voltage Support	PG&E	Fresno	4/20/2017	-320	No	INC	3	11:00	13:44	-80.00	0.00	0.00	-456.46	0.00	0.00	0.00	0.00	0.00	0.00

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Chart 2: Table of Exceptional Dispatches for Period 01/April/2017 - 30/April/2017

Number	Market Type	Reason	Location	Local Reliability Area	Trade Date	MW	Commitment	INC_DEC	Hours	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488	CC6620
233	RT	Voltage Support	PG&E	Fresno	4/24/2017	-320	No	DEC	1	3:45	4:44	-226.67	0.00	0.00	4401.49	0.00	0.00	0.00	0.00	0.00	0.00
234	RT	Voltage Support	PG&E	Fresno	4/24/2017	-320	No	INC	1	3:45	4:44	-13.33	0.00	0.00	70.25	0.00	0.00	0.00	0.00	0.00	0.00
235	RT	Voltage Support	PG&E	Sierra	4/1/2017	45	No	INC	6	12:40	17:44	-11.25	5258.43	2383.12	-160.19	0.00	0.00	0.00	0.00	0.00	0.00
236	RT	Voltage Support	PG&E	Sierra	4/2/2017	45	No	INC	9	8:05	16:59	-3.75	0.00	0.00	-55.88	0.00	0.00	0.00	0.00	0.00	0.00
237	RT	Voltage Support	SCE	N/A	4/12/2017	172	No	INC	21	3:00	23:59	-17.66	135144.73	0.00	2505.64	0.00	0.00	0.00	0.00	0.00	0.00
238	RT	Voltage Support	SCE	N/A	4/13/2017	172	No	INC	3	0:00	2:44	5.89	19489.23	0.00	-150.52	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A: Explanation by Example

All examples listed below are based on fictitious data. Many simplified assumptions are made to explain settlement charge codes, and not all assumptions are explicitly stated in these examples.

For instance settlement charge codes are calculated based on metered quantities, whereas, in these examples the dispatch quantities are assumed to be equal to metered quantities. These assumptions have been made to simplify the understanding of settlements calculations.

Example 1: Exceptional Dispatch Instructions Prior to DAM

In this fictitious example, the CAISO issued an exceptional dispatch instruction for resource A to be committed at its Pmin of 50 MW from hours ending 5 through 10 for a generation procedure 7630. Similarly, the CAISO issued additional instructions to resources B and C for the same reason in Table 2. Exceptional dispatches prior to the day-ahead market are commitments to minimum load. Here the dispatch levels are all at minimum load. Table 2 below also shows the commitment costs and the total volume (MWh) of exceptional dispatch instruction for each resource. The minimum load costs and start up costs, shown in Table 2 are the eligible minimum load and start up costs different from the bid-in minimum load and start up costs⁷. Only those quantities which relate to pre-day-ahead unit commitments are shown in this table.

Table 2: Instructions Prior to Day-Ahead Market

Date	Market	Resource	Location	Local Reliability Area (LRA)	Begin Time	End Time	Dispatch level (MW)	Reason	Total Volume (MWh)	Min-Load Cost	Start- Up Cost	CC6620 (BCR)
01-Jul-09	DA	A	SCE	LA BASIN	05:00	10:00	50	7630	300	\$5000	\$0	0
01-Jul-09	DA	B	SCE	LA BASIN	08:00	20:00	30	7630	390	\$6000	\$500	\$4000
01-Jul-09	DA	C	SCE	LA BASIN	09:00	23:00	20	7630	300	\$400	\$1000	\$1000

This data is summarized as shown in Table 3, which is the prescribed format specified in the FERC order on September 02, 2009. This summary classifies the data by reason, resource location, local reliability area, and trade date. The MW column in Table 3 is the range of MW; in this case the minimum instruction MW is 20 MW for resource C which occurs from hours ending 21 through 23. The maximum instruction occurs in hour ending 10. In this hour resource A is committed at 50 MW, resource B is committed at 30 MW and resource C is committed at 20 MW. This adds up to 100 MW. The MW column shows the minimum and maximum of the overlaps of all the exceptional dispatch instructions. The Commitment column shows whether a resource was committed between the begin time and end time. Commitments are broken out separately from energy dispatches. In the day-ahead however, the exceptional dispatches are nearly always just commitments, as in this example. The Begin Time column shows hour ending 5 as this was the hour ending for first dispatch of the day, and the End Time column shows hour ending 23, as this was the hour with last dispatch. It is also possible there might be hours between the begin time and the end time where there might not be exceptional dispatch instructions for the reason, meaning that the range between the begin time and end time can include null hours with no dispatch. The total volume (MWh) is the MWh quantity for each resource, which adds up to 990 MWh. Similarly, all cost information is sum of individual resource costs. Some resources bid-in zero start-up cost; as seen in this example, resource A bid in zero for its start up cost. Since the CAISO does not explicitly pay a resource for bid-in minimum load costs and start-up costs; these costs are recovered through the charge code CC6620 (Bid Cost Recovery), this table shows the summary of CC6620 for the classification. Here, it is the CC6620 for all three resources which adds up to \$5000. This column shows the impact of exceptional dispatch on bid cost recovery for all pre-day-ahead exceptional dispatch commitments.

Table 3: FERC Summary of Instructions Prior to DAM

Number	Market Type	Reason	Location	Local Reliability Area (LRA)	Trade Date	MW	Commitment	INC/DEC	Hour	Begin Time	End Time	Total Volume (MWh)	Min-Load Cost	Start-Up Cost	CC6620
1	DA	7630	SCE	LA Basin	1-Jul-09	20-100	Yes	N/A	19	05:00	23:00	990	\$11,400	\$1,500	\$5000

Example 2: Incremental Exceptional Dispatch Instructions in RTM

In this fictitious example the CAISO issued an exceptional dispatch instruction to resource A to be committed at its Pmin of 30 MW from hours 6:00 through 11:00 after completion of the day-ahead market for the transmission procedure 7110. This resource had no day-ahead award in those hours. The CAISO issued another exceptional dispatch instruction to resource B, to be dispatched at 40 MW from hours 7:00 through

⁷ Please refer to the BPM configuration Guide: Bid Cost Recovery Settlements published on the CAISO's website for details about eligible minimum load and start up costs.

9:00 in real-time for the transmission procedure 7110. This resource had a day-ahead schedule of 20 MW from the day-ahead market, which implies this exceptional dispatch instruction was an incremental instruction and the exceptional dispatch MW was 20 MW. Similarly, the details of exceptional dispatch (ED) instruction for resource C are shown in Table 4. This table also shows volume (MWh) and various real-time charge codes associated with the exceptional dispatch instructions. The total MWh column for each resource shows all types of imbalance energy quantities for this resource between the begin time and end time which includes both the exceptional dispatch energy quantities and optimal energy quantities.

Resource A was committed at its Pmin so its total volume (MWh) is equal to its Pmin times the number of hours, which is calculated as 30 MW times 6 hours and is equal to 180 MWh. The resource Minimum load costs and the start up costs are its eligible commitment costs for that period. LMP at this resource is \$10/MWh, so the charge code CC6470 is calculated at (180 MWh * \$10/MWh) and is equal to \$1,800. Since this resource is not dispatched above its Pmin, it has a zero volume (MWh) of exceptional dispatch. All charge codes associated with the exceptional dispatch increment or decrement quantities are zero.

Resource B is dispatched 20 MW above its day-ahead schedule, so its total volume (MWh) is calculated as 20 MW times 3 hours which is equal to 60 MWh. Since the resource was committed in the Day-Ahead Market there are no minimum load quantity and start up costs associated with this resource. The resource had a bid price of \$100/MWh and the LMP at that resource was \$10/MWh. All of 60 MWh is considered as exceptional dispatch incremental quantity shown in ED Volume (MWH INC/DEC) column. The charge code CC6470 INC is calculated as 60 MWh * resource LMP (\$10/MWh) which is equal to \$600. Since the only imbalance energy in this timeframe was the exceptional dispatch volume, the charge code CC6470 is equal to CC6470 INC. The charge code CC6488 is calculated as MWH quantity *(bid price – LMP), which is equal to \$5400 (60 MWh *(\$10/MWh-\$100/MWh)). Similarly, volumes and real-time charge codes are calculated for resource C.

Table 4: Incremental Exceptional Dispatch Instructions in RTM

Date	Market	Resource	Location	Local Reliability Area (LRA)	Begin Time	End Time	Dispatch level (MW)	Day-Ahead Award (MW)	Commitment	INC/DEC	ED (MW)	Reason	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488
1-Jul-09	RT	A	PG&E	Humboldt	6:00	11:00	30	0	Yes	INC	30	7110	180	1000	50	1800	0	0	0	0	0
1-Jul-09	RT	B	PG&E	Humboldt	7:00	9:00	40	20	No	INC	20	7110	60	0	0	600	60	600	0	0	5400
1-Jul-09	RT	C	PG&E	Humboldt	12:00	15:00	50	50	No	INC	0	7110	0	0	0	0	0	0	0	0	0
1-Jul-09	RT	C	PG&E	Humboldt	16:00	20:00	50	40	No	INC	10	7110	50	0	0	300	20	300	0	0	200

This data is summarized as shown in Table 5 and is classified by reason, resource location, local reliability area, and trade date. The MW column in Table 5 is the range of MW; in this case the minimum instruction MW is 0 MW for resource C which occurs from hours ending 13 through 15. The maximum instruction occurs in hours ending 8 & 9, as during these two hours both resources A and B have an ED MW of 30MW and 20MW, respectively. This adds up to 50 MW. The MW column shows the minimum and maximum of the overlaps of all the exceptional dispatch instructions. The Commitment column shows whether a resource was committed between the begin time and end time. This column shows a commitment if there was a single commitment in the entire interval of exceptional dispatch. The Begin Time column shows the time of the first dispatch of the day. This is a time not a range. Similarly, the End Time column shows a time and not a range. Exceptional dispatches occurred between these two times. Since there was a commitment between the begin time and end time then the Commitment column displays yes for the summary. Similarly, the INC/DEC column shows an INC as there was an incremental dispatch between the begin time and end time. As mentioned in the previous example it is possible there might be hours between the begin time and end time where there were no exceptional dispatch instructions for the reason. Both volume and cost information columns are the summation for all the respective columns for resource A, B and C. For instance the Total volume (MWh) column is calculated as summation of 180,60,0 and 50 which are the individual volumes (MWh) for resources A, B and C for time periods shown in Table 4.

Table 5: FERC Summary of ED Instructions in RTM

Number	Market Type	Reason	Location	Local Reliability Area (LRA)	Trade Date	MW	Commitment	INC/DEC	Hour	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488
1	RT	7110	PG&E	Humboldt	1-Jul-09	0-50	Yes	INC	15	6:00	20:00	290	1000	50	1700	140	1500	0	0	11000

It is possible that the CAISO would dispatch a particular resource for instance at 10 MW from hours ending 1 through 4, and all or part of its energy might settle as optimal energy. This situation occurs when the LMP at the resource pricing node is above the resource bid price. This cost will only be captured in charge code 6470. It is also possible that CAISO issues an exceptional dispatch for the resource to operate at a minimum of 10 MW which is its Pmin; however the market application might dispatch this resource above Pmin because the resource is economical. When this occurs, the charge code CC6470 and the total MWh quantity might overstate the actual exceptional dispatch MWh quantities. So, to best estimate the cost and volume (MWh) of exceptional dispatch it is appropriate to consider only the following columns: ED MWh (INC/DEC), CC6470 INC, CC6470 DEC, CC6482, CC6488.

Example 3: Decremental Exceptional Dispatch Instructions in RTM

This example highlights decremental exceptional dispatch instructions in the real-time market. In this fictitious example the CAISO issued an exceptional dispatch instruction to resource A to be committed at its Pmin of 20 MW from hours ending 15 through 20 after completion of the day-ahead market for the transmission procedure 7430. The CAISO issued additional exceptional dispatch instructions for resources B and C; details of those instructions are shown in Table 6. This table also includes volume (MWh) and cost information.

Resource A is committed in real-time at its Pmin, its total volume (MWh) is 20MW *6 hours which is equal to 120 MWh. This resource has a zero MW of incremental dispatch in all hours, so all other relevant cost and volume columns result in zeros. Resource B has a decremental MW of 20 MW in 3 hours, which results in 60 MWh of decremental volume. Since this resource is not committed in real-time, both the minimum load cost and start up costs are zero. This resource had a bid price of \$50/MWh and LMP at the resource pricing node is \$10/ MWh. Based on this information CC6470-Dec is calculated as 60 MWh *\$10/MWh which is equal to \$600. Since this resource has its ED volume (MWh) equal to its Total volume, CC6470 is equal to CC6470- DEC. The CC6488 is calculated as (60 MWh * (\$50/MWh - \$10/MWh)) which is equal to \$2400. Resource C had a bid price of \$10/MWh and the LMP at its pricing node is \$50/MWh. Based on this information, volume and cost information is calculated for resource C.

Table 6: Decremental Exceptional Dispatch Instructions in RTM

Date	Market Type	Resource	Location	Local Reliability Area (LRA)	Begin Time	End Time	Dispatch level (MW)	Day-Ahead Award (MW)	Commitment	INC/DEC	ED (MW)	Reason	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488
1-Jul-09	RT	A	PG&E	Fresno	15:00	20:00	20	0	Yes	INC	20	7430	120	\$ 120	\$ 100	\$ -	0	\$ -	\$ -	\$ -	\$ -
1-Jul-09	RT	B	PG&E	Fresno	7:00	9:00	40	60	No	DEC	20	7430	(60)	\$ -	\$ -	\$ 600	-60	\$ -	\$ 600	\$ -	\$2,400
1-Jul-09	RT	C	PG&E	Fresno	10:00	14:00	40	50	No	DEC	10	7430	(50)	\$ -	\$ -	\$ 500	-50	\$ -	\$ 500	\$ -	\$2,000

This data is summarized according to FERC convention in Table 7. This summary classifies the data by reason, resource location, local reliability area, and trade date. Incs and decs are broken out separately. The inc entry is self-explanatory and similar to the previous example. Regarding the dec entry the MW column is the range of MW; in this case the minimum dec instruction is 10 MW (actually -10MW as it is a dec) for resource C which occurs from hours ending 10 through 14. The maximum instruction occurs from hours ending 7 through 9, when resource B was issued a dec instruction of 20 MW. The MW column shows the minimum and maximum of the overlaps of all the exceptional dispatch instructions. The Commitment column shows whether a resource was committed between the begin time and end time. The volume and cost information are summarized by INC and DEC classification.

Table 7: FERC Summary of Decremental ED Instructions in RTM

Number	Market Type	Reason	Location	Local Reliability Area (LRA)	Trade Date	MW	Commitment	INC/DEC	Hour	Begin Time	End Time	Total MWH	Min Load Cost	Start Up Cost	CC6470	ED MWH (INC/DEC)	CC6470 INC	CC6470 DEC	CC6482	CC6488
1	RT	7430	PG&E	Fresno	1-Jul-09	20	Yes	INC	6	15:00	20:00	120	\$ 120	\$ 100	\$ -	0	\$ -	\$ -	\$ -	\$ -
2	RT	7430	PG&E	Fresno	1-Jul-09	10-20	Yes	DEC	8	7:00	14:00	(110)	\$ -	\$ -	\$ (1,100)	\$ (110)	\$ -	\$ (1,100)	\$ -	\$ (4,400)

Appendix B: Price Impact Analysis

In the September 2 FERC order, FERC requested the CAISO to perform price impact analysis on two distinct pricing nodes for the entire reporting period. The order also mentioned that the CAISO must pick two pricing nodes for the entire reporting period that are most affected by the exceptional dispatch instructions, and the two pricing nodes must belong to two load aggregation points (LAPs).

Based on this requirement the CAISO implemented a methodology to perform price impact analysis. First, the CAISO identified a heavily affected pricing node from each of the Pacific Gas & Electric (PGAE) LAP and Southern California Edison (SCE) LAP. These two pricing nodes had the maximum amount of exceptional dispatch volume (MWh) in their respective LAP. Point A is in PGAE LAP and point B is in SCE LAP. Please note these two points correspond to an actual pricing node in the CAISO system. Only one resource was connected to each of these pricing nodes. For each resource the following input parameters were obtained to perform the analysis:

Exceptional dispatch information: constrained level, constraint type, start of exceptional dispatch instruction and end of exceptional dispatch instruction.
 Real-Time LMPs for each of the five minute intervals for the month.
 Real-Time hourly bid set for each trade hour.
 Day-Ahead award for the resources.

The exceptional dispatch intervals have a begin time and an end time which can span as small as one minute to as large as 24 hours. Since the market application dispatches resources on five-minute basis, the exceptional dispatch instructions for each of these resources were broken down into five-minute intervals. If the begin time or end time for an instruction was in the middle of the five-minute interval, that instruction was rounded up to the next five-minute interval. These five-minute intervals were then coupled with resource five-minute LMPs calculated by the real-time market application. Also, the hourly bid information and the hourly day-ahead schedule were put together to create a dataset that had all the information to perform price impact analysis.

An exceptional dispatch instruction can be classified as a start up instruction, an instruction to be dispatched at or above the constrained level, an instruction to be dispatched at or below a constrained level, an instruction to be dispatched at a fixed constrained level, or a shut down instruction. The Locational Marginal Price (LMP) is set by a resource which can provide the next incremental MW of energy. Based on this definition of LMP and the classification of exceptional dispatches based on constraint type, a resource may set the LMP in only those intervals in which the resource is eligible to move either up or down from its constrained level. Hence, in those intervals in which the resource was constrained up at its Pmax or the resource was exceptionally dispatched to its Pmax and forced to generate at that level, the resource was ineligible to set the price as it had no room to move up. Similarly, if the resource was constrained down at its Pmin, then the resource was not eligible to set the price. All those intervals in which the resource was ineligible to set the price were dropped from the dataset under consideration. From this dataset of only eligible intervals, for both pricing nodes A and B, LMPs were calculated for all intervals based on the resource dispatch level and the its bid set. The calculated LMP is equal to that bid price corresponding to the constrained MW segment.

Table 8 shows the price impact analysis information for node A, which is in the PGAE area. This table shows all the five minute intervals in which the resource at PNode A was issued an exceptional dispatch instruction. Out of the 8,064 five-minute intervals in April, this resource was issued exceptional dispatch instructions in 590 five-minute intervals. This resource was eligible to set the LMP in 384 intervals. Out of the 384 intervals, resource calculated LMP was larger than the market LMP in 368 intervals. In the 368 intervals, the average increase in five minute LMP was \$422.09/MWh. Out of the 384 intervals, resource calculated LMP was less than the market LMP in 16 intervals. In the 16 intervals, the average decrease in five minute LMP was \$95.51/MWh. This implies that if the CAISO could model the constraint for this exceptional dispatch, then this resource and all other pricing nodes associated with that constraint would observe an average increase of \$400.52/MWh

Table 9 shows the price impact analysis information for node B, which is in the SCE area. This table shows all the five minute intervals in which the resource at PNode B was issued an exceptional dispatch instruction. Out of the 8,064 five-minute intervals in April, this resource was issued exceptional dispatch instructions in 36 five-minute intervals. This resource was eligible to set the LMP in 36 intervals. Out of the 36 intervals, resource calculated LMP was larger than the market LMP in 0 intervals. Out of the 36 intervals, resource calculated LMP was less than the market LMP in 36 intervals. In the 36 intervals, the average decrease in five minute LMP was \$99.69/MWh. This implies that if the CAISO could model the constraint for this exceptional dispatch, then this resource and all other pricing nodes associated with that constraint would observe an average decrease of \$99.69/MWh

Table 8: Price Impact Analysis Information for Pricing Node A in PG&E LAP

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Number	Trade Date	Trade Hour	Interval	Market LMP	Eligible Flag	Calculated LMP	Change in LMP
1	4/2/2017	21	1	12.60	No	499	486.40
2	4/2/2017	21	2	12.44	No	499	486.56
3	4/2/2017	21	3	12.66	No	499	486.34
4	4/2/2017	21	4	20.90	No	499	478.10
5	4/2/2017	21	5	22.00	No	499	477.00
6	4/2/2017	21	6	20.57	No	499	478.43
7	4/2/2017	21	7	14.44	No	499	484.56
8	4/2/2017	21	8	14.46	No	499	484.54
9	4/2/2017	21	9	14.39	No	499	484.61
10	4/2/2017	21	10	14.56	No	499	484.44
11	4/2/2017	21	11	17.19	No	499	481.81
12	4/2/2017	21	12	17.04	No	499	481.96
13	4/4/2017	5	1	-18.08	No	-10	8.08
14	4/4/2017	5	2	-18.08	No	-10	8.08
15	4/4/2017	5	3	-17.25	No	-10	7.25
16	4/4/2017	5	4	0.01	No	-10	-10.01
17	4/4/2017	5	5	0.01	No	-10	-10.01
18	4/4/2017	5	6	0.07	No	-10	-10.07
19	4/4/2017	5	7	14.33	No	-10	-24.33
20	4/4/2017	5	8	14.88	No	-10	-24.88
21	4/4/2017	5	9	15.78	No	-10	-25.78
22	4/4/2017	5	10	14.09	No	-10	-24.09
23	4/4/2017	5	11	14.34	No	-10	-24.34
24	4/4/2017	5	12	14.80	No	-10	-24.80
25	4/4/2017	6	1	13.87	Yes	499	485.13
26	4/4/2017	6	2	13.99	Yes	499	485.01
27	4/4/2017	6	3	15.78	Yes	499	483.22
28	4/4/2017	6	4	19.77	Yes	499	479.23
29	4/4/2017	6	5	19.95	Yes	499	479.05
30	4/4/2017	6	6	19.76	Yes	499	479.24
31	4/4/2017	6	7	20.05	Yes	499	478.95
32	4/4/2017	6	8	60.01	Yes	499	438.99
33	4/4/2017	6	9	60.01	Yes	499	438.99
34	4/4/2017	6	10	59.41	Yes	499	439.59
35	4/4/2017	6	11	59.41	Yes	499	439.59
36	4/4/2017	6	12	59.41	Yes	499	439.59
37	4/4/2017	7	1	32.27	No	15	-17.27
38	4/4/2017	7	2	31.19	No	15	-16.19
39	4/4/2017	7	3	22.97	No	15	-7.97
40	4/4/2017	7	4	24.53	No	15	-9.53
41	4/4/2017	7	5	26.56	No	15	-11.56
42	4/4/2017	7	8	20.18	No	15	-5.18
43	4/4/2017	7	9	20.17	No	15	-5.17
44	4/4/2017	7	10	20.16	No	15	-5.16
45	4/4/2017	7	11	20.17	No	15	-5.17

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46	4/4/2017	7	12	20.19	No	15	-5.19
47	4/4/2017	8	1	15.17	Yes	499	483.83
48	4/4/2017	8	2	19.95	Yes	499	479.05
49	4/4/2017	8	3	18.83	Yes	499	480.17
50	4/4/2017	8	4	15.10	Yes	499	483.90
51	4/4/2017	8	5	12.94	Yes	499	486.06
52	4/4/2017	8	6	14.93	Yes	499	484.07
53	4/4/2017	8	7	13.30	Yes	499	485.70
54	4/4/2017	8	8	-10.06	Yes	499	509.06
55	4/4/2017	8	9	-10.06	Yes	499	509.06
56	4/4/2017	10	1	-17.23	No	15	32.23
57	4/4/2017	10	2	-15.06	No	15	30.06
58	4/4/2017	10	3	-15.06	No	15	30.06
59	4/4/2017	10	4	14.84	No	15	0.16
60	4/4/2017	10	5	16.92	No	15	-1.92
61	4/4/2017	10	6	19.70	No	15	-4.70
62	4/4/2017	10	7	18.84	No	15	-3.84
63	4/4/2017	10	8	17.95	No	15	-2.95
64	4/4/2017	10	9	16.98	No	15	-1.98
65	4/4/2017	10	10	15.14	No	15	-0.14
66	4/4/2017	10	11	15.14	No	15	-0.14
67	4/4/2017	10	12	15.58	No	15	-0.58
68	4/4/2017	19	1	20.13	Yes	499	478.87
69	4/4/2017	19	2	20.10	Yes	499	478.90
70	4/4/2017	19	3	20.12	Yes	499	478.88
71	4/4/2017	19	4	20.14	Yes	499	478.86
72	4/4/2017	19	5	20.16	Yes	499	478.84
73	4/4/2017	19	6	25.04	Yes	499	473.96
74	4/4/2017	19	7	76.03	Yes	499	422.97
75	4/4/2017	19	8	46.99	Yes	499	452.01
76	4/4/2017	19	9	35.43	Yes	499	463.57
77	4/4/2017	19	10	41.46	Yes	499	457.54
78	4/4/2017	19	11	41.66	Yes	499	457.34
79	4/4/2017	19	12	19.81	Yes	499	479.19
80	4/4/2017	20	1	-3.15	Yes	499	502.15
81	4/4/2017	20	2	-10.12	Yes	499	509.12
82	4/4/2017	20	4	36.37	Yes	499	462.63
83	4/4/2017	20	5	47.43	Yes	499	451.57
84	4/4/2017	20	6	81.91	Yes	499	417.09
85	4/4/2017	20	7	999.00	Yes	499	-500.00
86	4/4/2017	20	8	999.00	Yes	499	-500.00
87	4/4/2017	20	9	186.43	Yes	499	312.57
88	4/4/2017	20	10	999.00	Yes	499	-500.00
89	4/4/2017	20	11	190.87	Yes	499	308.13
90	4/4/2017	20	12	64.65	Yes	499	434.35
91	4/4/2017	21	1	27.12	Yes	499	471.88

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92	4/4/2017	21	2	43.89	Yes	499	455.11
93	4/4/2017	21	3	43.61	Yes	499	455.39
94	4/4/2017	21	4	-9.81	Yes	499	508.81
95	4/4/2017	21	5	-9.81	Yes	499	508.81
96	4/4/2017	21	6	-9.80	Yes	499	508.80
97	4/4/2017	21	7	-9.84	Yes	499	508.84
98	4/4/2017	21	8	-14.30	Yes	499	513.30
99	4/4/2017	21	9	-14.30	Yes	499	513.30
100	4/4/2017	21	10	-14.31	Yes	499	513.31
101	4/4/2017	21	11	-14.31	Yes	499	513.31
102	4/4/2017	21	12	-14.31	Yes	499	513.31
103	4/4/2017	22	10	-15.09	No	15	30.09
104	4/4/2017	22	11	-15.10	No	15	30.10
105	4/4/2017	22	12	-15.76	No	15	30.76
106	4/4/2017	23	1	-14.93	Yes	105.08	120.01
107	4/4/2017	23	2	19.85	Yes	105.08	85.23
108	4/4/2017	23	3	19.87	Yes	105.08	85.21
109	4/4/2017	23	4	19.86	Yes	105.08	85.22
110	4/4/2017	23	5	19.84	Yes	105.08	85.24
111	4/4/2017	23	6	19.86	Yes	105.08	85.22
112	4/4/2017	23	7	-15.01	Yes	105.08	120.09
113	4/4/2017	23	8	-15.01	Yes	105.08	120.09
114	4/4/2017	23	9	-15.01	Yes	105.08	120.09
115	4/4/2017	23	10	-15.01	Yes	105.08	120.09
116	4/4/2017	23	11	-15.01	Yes	105.08	120.09
117	4/4/2017	23	12	-15.01	Yes	105.08	120.09
118	4/5/2017	11	1	8.77	Yes	105.08	96.31
119	4/5/2017	11	2	11.52	Yes	105.08	93.56
120	4/5/2017	11	3	13.92	Yes	105.08	91.16
121	4/5/2017	11	4	10.74	Yes	105.08	94.34
122	4/5/2017	11	5	9.01	Yes	105.08	96.07
123	4/5/2017	11	6	9.80	Yes	105.08	95.28
124	4/5/2017	11	7	8.27	Yes	105.08	96.81
125	4/5/2017	11	8	8.09	Yes	105.08	96.99
126	4/5/2017	11	9	8.92	Yes	105.08	96.16
127	4/5/2017	11	10	9.19	Yes	105.08	95.89
128	4/5/2017	11	11	9.64	Yes	105.08	95.44
129	4/5/2017	11	12	9.57	Yes	105.08	95.51
130	4/5/2017	18	1	26.97	Yes	105.08	78.11
131	4/5/2017	18	2	26.97	Yes	105.08	78.11
132	4/5/2017	18	12	36.59	Yes	105.08	68.49
133	4/5/2017	19	1	26.96	Yes	105.08	78.12
134	4/5/2017	19	2	26.97	Yes	105.08	78.11
135	4/5/2017	19	3	26.97	Yes	105.08	78.11
136	4/5/2017	19	4	27.02	Yes	105.08	78.06
137	4/5/2017	19	5	27.03	Yes	105.08	78.05

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138	4/5/2017	19	6	26.21	Yes	105.08	78.87
139	4/5/2017	19	7	27.18	Yes	105.08	77.90
140	4/5/2017	19	8	27.19	Yes	105.08	77.89
141	4/5/2017	19	9	27.22	Yes	105.08	77.86
142	4/5/2017	19	10	27.31	Yes	105.08	77.77
143	4/5/2017	19	11	27.31	Yes	105.08	77.77
144	4/5/2017	19	12	27.31	Yes	105.08	77.77
145	4/5/2017	22	1	27.18	Yes	105.08	77.90
146	4/5/2017	22	2	27.18	Yes	105.08	77.90
147	4/5/2017	22	3	27.19	Yes	105.08	77.89
148	4/5/2017	22	4	27.19	Yes	105.08	77.89
149	4/5/2017	22	5	27.20	Yes	105.08	77.88
150	4/5/2017	22	6	27.17	Yes	105.08	77.91
151	4/5/2017	22	7	24.09	Yes	105.08	80.99
152	4/5/2017	22	8	25.72	Yes	105.08	79.36
153	4/5/2017	22	9	26.07	Yes	105.08	79.01
154	4/5/2017	22	10	26.54	Yes	105.08	78.54
155	4/5/2017	22	11	26.13	Yes	105.08	78.95
156	4/5/2017	22	12	26.22	Yes	105.08	78.86
157	4/5/2017	23	1	27.06	Yes	105.08	78.02
158	4/5/2017	23	2	27.06	Yes	105.08	78.02
159	4/5/2017	23	3	27.06	Yes	105.08	78.02
160	4/5/2017	23	4	27.04	Yes	105.08	78.04
161	4/5/2017	23	5	27.04	Yes	105.08	78.04
162	4/5/2017	23	6	27.04	Yes	105.08	78.04
163	4/5/2017	23	7	26.97	Yes	105.08	78.11
164	4/5/2017	23	8	26.97	Yes	105.08	78.11
165	4/5/2017	23	9	26.97	Yes	105.08	78.11
166	4/5/2017	23	10	26.97	Yes	105.08	78.11
167	4/5/2017	23	11	25.46	Yes	105.08	79.62
168	4/5/2017	23	12	24.89	Yes	105.08	80.19
169	4/5/2017	24	1	-14.84	Yes	105.08	119.92
170	4/5/2017	24	2	-14.85	Yes	105.08	119.93
171	4/5/2017	24	3	20.54	Yes	105.08	84.54
172	4/5/2017	24	4	-14.86	Yes	105.08	119.94
173	4/5/2017	24	5	-14.87	Yes	105.08	119.95
174	4/5/2017	24	10	21.93	Yes	105.08	83.15
175	4/5/2017	24	11	21.02	Yes	105.08	84.06
176	4/5/2017	24	12	21.46	Yes	105.08	83.62
177	4/6/2017	1	1	9.37	Yes	105.08	95.71
178	4/6/2017	1	2	10.98	Yes	105.08	94.10
179	4/6/2017	1	3	11.58	Yes	105.08	93.50
180	4/6/2017	1	4	14.68	Yes	105.08	90.40
181	4/6/2017	1	5	14.73	Yes	105.08	90.35
182	4/6/2017	1	6	12.42	Yes	105.08	92.66
183	4/6/2017	1	7	12.90	Yes	105.08	92.18

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184	4/6/2017	1	8	12.91	Yes	105.08	92.17
185	4/6/2017	1	9	12.73	Yes	105.08	92.35
186	4/6/2017	1	10	11.95	Yes	105.08	93.13
187	4/6/2017	1	11	11.75	Yes	105.08	93.33
188	4/6/2017	1	12	11.76	Yes	105.08	93.32
189	4/6/2017	8	1	29.43	Yes	105.08	75.65
190	4/6/2017	8	2	29.47	Yes	105.08	75.61
191	4/6/2017	8	3	25.59	Yes	105.08	79.49
192	4/6/2017	8	4	25.82	Yes	105.08	79.26
193	4/6/2017	8	5	25.88	Yes	105.08	79.20
194	4/6/2017	8	6	27.85	Yes	105.08	77.23
195	4/6/2017	8	7	30.02	Yes	105.08	75.06
196	4/6/2017	8	8	26.43	Yes	105.08	78.65
197	4/6/2017	8	9	25.73	Yes	105.08	79.35
198	4/6/2017	8	10	24.90	Yes	105.08	80.18
199	4/6/2017	8	11	26.06	Yes	105.08	79.02
200	4/6/2017	8	12	26.00	Yes	105.08	79.08
201	4/6/2017	9	1	50.01	Yes	105.08	55.07
202	4/6/2017	9	2	48.75	Yes	105.08	56.33
203	4/6/2017	9	3	44.27	Yes	105.08	60.81
204	4/6/2017	9	4	106.82	Yes	105.08	-1.74
205	4/6/2017	9	5	43.97	Yes	105.08	61.11
206	4/6/2017	9	6	45.13	Yes	105.08	59.95
207	4/6/2017	9	7	33.68	Yes	105.08	71.40
208	4/6/2017	9	8	27.24	Yes	105.08	77.84
209	4/6/2017	9	9	20.54	Yes	105.08	84.54
210	4/6/2017	9	10	19.44	Yes	105.08	85.64
211	4/6/2017	9	11	18.53	Yes	105.08	86.55
212	4/6/2017	9	12	24.27	Yes	105.08	80.81
213	4/6/2017	10	1	26.89	Yes	79.877	52.99
214	4/6/2017	10	2	26.49	Yes	79.877	53.39
215	4/6/2017	10	3	1.74	Yes	79.877	78.13
216	4/6/2017	10	4	21.03	Yes	79.877	58.85
217	4/6/2017	10	5	36.85	Yes	79.877	43.03
218	4/6/2017	10	6	28.19	Yes	79.877	51.69
219	4/6/2017	10	7	25.40	Yes	79.877	54.48
220	4/6/2017	10	8	27.23	Yes	79.877	52.65
221	4/6/2017	10	9	27.23	Yes	79.877	52.64
222	4/6/2017	10	10	26.65	Yes	79.877	53.22
223	4/6/2017	10	11	26.30	Yes	79.877	53.58
224	4/6/2017	10	12	25.81	Yes	79.877	54.06
225	4/6/2017	11	1	23.67	Yes	34.792	11.12
226	4/6/2017	11	2	26.11	Yes	34.792	8.68
227	4/6/2017	11	4	22.54	Yes	34.792	12.26
228	4/6/2017	11	5	22.56	Yes	34.792	12.23
229	4/6/2017	11	6	24.89	Yes	34.792	9.90

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230	4/6/2017	11	7	34.87	Yes	34.792	-0.08
231	4/6/2017	11	8	28.62	Yes	34.792	6.17
232	4/6/2017	11	9	20.78	Yes	34.792	14.02
233	4/6/2017	11	10	16.87	Yes	34.792	17.92
234	4/6/2017	11	11	24.36	Yes	34.792	10.43
235	4/6/2017	11	12	27.83	Yes	34.792	6.96
236	4/6/2017	12	1	26.80	Yes	45.957	19.16
237	4/6/2017	12	2	27.47	Yes	45.957	18.49
238	4/6/2017	12	3	28.17	Yes	45.957	17.78
239	4/6/2017	12	4	26.73	Yes	45.957	19.22
240	4/6/2017	12	5	26.61	Yes	45.957	19.35
241	4/6/2017	12	6	26.75	Yes	45.957	19.21
242	4/6/2017	12	7	26.14	Yes	45.957	19.82
243	4/6/2017	12	8	29.52	Yes	45.957	16.43
244	4/6/2017	12	9	28.87	Yes	45.957	17.08
245	4/6/2017	12	10	27.48	Yes	45.957	18.48
246	4/6/2017	12	11	27.48	Yes	45.957	18.48
247	4/6/2017	12	12	27.05	Yes	45.957	18.91
248	4/6/2017	13	1	39.45	Yes	34.216	-5.23
249	4/6/2017	13	2	36.69	Yes	34.216	-2.47
250	4/6/2017	13	3	35.31	Yes	34.216	-1.09
251	4/6/2017	13	4	31.24	Yes	34.216	2.97
252	4/6/2017	13	5	29.10	Yes	34.216	5.12
253	4/6/2017	13	6	23.92	Yes	34.216	10.30
254	4/6/2017	13	7	25.60	Yes	34.216	8.61
255	4/6/2017	13	8	22.98	Yes	34.216	11.24
256	4/6/2017	13	9	20.83	Yes	34.216	13.38
257	4/6/2017	13	10	30.88	Yes	34.216	3.34
258	4/6/2017	13	11	30.02	Yes	34.216	4.19
259	4/6/2017	13	12	35.30	Yes	34.216	-1.09
260	4/6/2017	14	3	41.38	Yes	32.756	-8.63
261	4/6/2017	14	4	32.90	Yes	32.756	-0.14
262	4/6/2017	14	5	39.36	Yes	32.756	-6.60
263	4/6/2017	14	6	33.21	Yes	32.756	-0.45
264	4/6/2017	14	7	32.95	Yes	32.756	-0.19
265	4/6/2017	14	8	32.92	Yes	32.756	-0.17
266	4/6/2017	14	9	29.86	Yes	32.756	2.90
267	4/6/2017	14	10	27.36	Yes	32.756	5.40
268	4/6/2017	14	11	23.72	Yes	32.756	9.03
269	4/6/2017	14	12	24.54	Yes	32.756	8.22
270	4/6/2017	15	1	26.47	Yes	36.172	9.70
271	4/6/2017	15	2	29.04	Yes	36.172	7.14
272	4/6/2017	15	3	29.79	Yes	36.172	6.38
273	4/6/2017	15	4	29.31	Yes	36.172	6.87
274	4/6/2017	15	5	23.79	Yes	36.172	12.38
275	4/6/2017	15	6	26.58	Yes	36.172	9.59

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276	4/6/2017	15	7	31.58	Yes	36.172	4.59
277	4/6/2017	15	8	33.55	Yes	36.172	2.62
278	4/6/2017	15	9	34.40	Yes	36.172	1.77
279	4/6/2017	15	10	34.68	Yes	36.172	1.49
280	4/6/2017	15	11	36.41	Yes	36.172	-0.24
281	4/6/2017	15	12	29.07	Yes	36.172	7.10
282	4/6/2017	16	1	166.31	Yes	999	832.69
283	4/6/2017	16	2	122.14	Yes	999	876.86
284	4/6/2017	16	3	922.14	Yes	999	76.86
285	4/6/2017	16	4	62.80	Yes	999	936.20
286	4/6/2017	16	5	47.25	Yes	999	951.75
287	4/6/2017	16	6	882.60	Yes	999	116.40
288	4/6/2017	16	7	45.45	Yes	999	953.55
289	4/6/2017	16	8	48.51	Yes	999	950.49
290	4/6/2017	16	9	880.31	Yes	999	118.69
291	4/6/2017	16	10	912.00	Yes	999	87.00
292	4/6/2017	16	11	912.00	Yes	999	87.00
293	4/6/2017	16	12	912.00	Yes	999	87.00
294	4/6/2017	18	1	25.42	Yes	999	973.58
295	4/6/2017	18	2	22.18	Yes	999	976.82
296	4/6/2017	18	3	24.49	Yes	999	974.51
297	4/6/2017	18	4	24.94	Yes	999	974.06
298	4/6/2017	18	5	25.70	Yes	999	973.30
299	4/6/2017	18	10	35.25	Yes	999	963.75
300	4/6/2017	18	11	30.57	Yes	999	968.43
301	4/6/2017	18	12	27.77	Yes	999	971.23
302	4/6/2017	19	1	21.69	Yes	999	977.31
303	4/6/2017	19	2	23.06	Yes	999	975.94
304	4/6/2017	19	3	24.18	Yes	999	974.82
305	4/6/2017	19	4	24.07	Yes	999	974.93
306	4/6/2017	19	5	23.66	Yes	999	975.34
307	4/6/2017	19	6	30.96	Yes	999	968.04
308	4/6/2017	19	7	24.76	Yes	999	974.24
309	4/6/2017	19	8	31.14	Yes	999	967.86
310	4/6/2017	19	9	37.91	Yes	999	961.09
311	4/6/2017	19	10	32.80	Yes	999	966.20
312	4/6/2017	19	11	27.91	Yes	999	971.09
313	4/6/2017	19	12	24.75	Yes	999	974.25
314	4/6/2017	21	1	23.73	Yes	999	975.27
315	4/6/2017	21	2	21.66	Yes	999	977.34
316	4/6/2017	21	3	22.06	Yes	999	976.94
317	4/6/2017	21	4	22.03	Yes	999	976.97
318	4/6/2017	21	5	17.71	Yes	999	981.29
319	4/6/2017	21	6	20.83	Yes	999	978.17
320	4/6/2017	21	7	18.95	Yes	999	980.05
321	4/6/2017	21	8	19.60	Yes	999	979.40

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322	4/6/2017	21	9	18.13	Yes	999	980.87
323	4/6/2017	21	10	17.72	Yes	999	981.28
324	4/6/2017	21	11	16.46	Yes	999	982.54
325	4/6/2017	21	12	16.46	Yes	999	982.54
326	4/6/2017	24	1	6.65	Yes	999	992.35
327	4/6/2017	24	2	6.65	Yes	999	992.35
328	4/6/2017	24	3	6.65	Yes	999	992.35
329	4/6/2017	24	4	6.65	Yes	999	992.35
330	4/6/2017	24	5	6.65	Yes	999	992.35
331	4/6/2017	24	6	6.65	Yes	999	992.35
332	4/6/2017	24	7	6.65	Yes	999	992.35
333	4/6/2017	24	8	6.65	Yes	999	992.35
334	4/6/2017	24	9	14.74	Yes	999	984.26
335	4/6/2017	24	10	11.85	Yes	999	987.15
336	4/6/2017	24	11	11.69	Yes	999	987.31
337	4/6/2017	24	12	11.69	Yes	999	987.31
338	4/7/2017	2	1	-14.95	Yes	999	1013.95
339	4/7/2017	2	2	30.24	Yes	999	968.76
340	4/7/2017	2	3	448.44	Yes	999	550.56
341	4/7/2017	2	4	870.30	Yes	999	128.70
342	4/7/2017	2	5	870.30	Yes	999	128.70
343	4/7/2017	2	6	871.90	Yes	999	127.10
344	4/7/2017	2	7	30.23	Yes	999	968.77
345	4/7/2017	2	8	17.07	Yes	999	981.93
346	4/7/2017	2	9	-14.91	Yes	999	1013.91
347	4/7/2017	2	10	-14.80	Yes	999	1013.80
348	4/7/2017	2	11	-14.92	Yes	999	1013.92
349	4/7/2017	2	12	21.33	Yes	999	977.67
350	4/7/2017	3	1	0.46	Yes	999	998.54
351	4/7/2017	3	2	7.73	Yes	999	991.27
352	4/7/2017	3	3	12.01	Yes	999	986.99
353	4/7/2017	3	4	11.90	Yes	999	987.10
354	4/7/2017	3	5	11.70	Yes	999	987.30
355	4/7/2017	3	6	11.93	Yes	999	987.07
356	4/7/2017	3	7	12.04	Yes	999	986.96
357	4/7/2017	3	8	12.78	Yes	999	986.22
358	4/7/2017	3	9	11.91	Yes	999	987.09
359	4/7/2017	3	10	13.21	Yes	999	985.79
360	4/7/2017	3	11	12.15	Yes	999	986.85
361	4/7/2017	3	12	11.93	Yes	999	987.07
362	4/7/2017	7	1	4.21	Yes	999	994.79
363	4/7/2017	7	2	9.27	Yes	999	989.73
364	4/7/2017	7	3	13.23	Yes	999	985.77
365	4/7/2017	7	4	13.69	Yes	999	985.31
366	4/7/2017	7	5	14.57	Yes	999	984.43
367	4/7/2017	7	6	14.80	Yes	999	984.20

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368	4/7/2017	7	7	30.12	Yes	999	968.88
369	4/7/2017	7	8	30.12	Yes	999	968.88
370	4/7/2017	7	9	30.13	Yes	999	968.87
371	4/7/2017	7	10	30.17	Yes	999	968.83
372	4/7/2017	7	11	30.16	Yes	999	968.84
373	4/7/2017	7	12	27.99	Yes	999	971.01
374	4/7/2017	9	1	37.62	Yes	999	961.38
375	4/7/2017	9	2	230.22	Yes	999	768.78
376	4/7/2017	9	3	230.22	Yes	999	768.78
377	4/7/2017	9	4	230.22	Yes	999	768.78
378	4/7/2017	9	5	230.22	Yes	999	768.78
379	4/7/2017	9	6	230.22	Yes	999	768.78
380	4/7/2017	9	7	230.22	Yes	999	768.78
381	4/7/2017	9	8	39.85	Yes	999	959.15
382	4/7/2017	9	9	25.03	Yes	999	973.97
383	4/7/2017	9	10	34.77	Yes	999	964.23
384	4/7/2017	9	11	40.21	Yes	999	958.79
385	4/7/2017	9	12	45.91	Yes	999	953.09
386	4/7/2017	16	1	19.05	Yes	999	979.95
387	4/7/2017	16	2	15.04	Yes	999	983.96
388	4/7/2017	16	3	15.49	Yes	999	983.51
389	4/7/2017	16	4	6.30	Yes	999	992.70
390	4/7/2017	16	5	8.67	Yes	999	990.33
391	4/7/2017	16	6	8.70	Yes	999	990.30
392	4/7/2017	16	7	13.95	Yes	999	985.05
393	4/7/2017	16	8	10.67	Yes	999	988.33
394	4/7/2017	16	9	14.92	Yes	999	984.08
395	4/7/2017	16	10	14.64	Yes	999	984.36
396	4/7/2017	16	11	13.94	Yes	999	985.06
397	4/7/2017	16	12	14.64	Yes	999	984.36
398	4/7/2017	18	1	15.48	Yes	999	983.52
399	4/7/2017	18	2	15.17	Yes	999	983.83
400	4/7/2017	18	3	19.20	Yes	999	979.80
401	4/7/2017	18	4	26.85	Yes	999	972.15
402	4/7/2017	18	5	23.12	Yes	999	975.88
403	4/7/2017	18	6	22.33	Yes	999	976.67
404	4/7/2017	18	7	33.43	Yes	999	965.57
405	4/7/2017	18	8	33.43	Yes	999	965.57
406	4/7/2017	18	9	850.74	Yes	999	148.26
407	4/7/2017	18	10	224.68	Yes	999	774.32
408	4/7/2017	18	11	519.51	Yes	999	479.49
409	4/7/2017	18	12	841.04	Yes	999	157.96
410	4/14/2017	12	1	-6.38	No	50	56.38
411	4/14/2017	12	2	-13.54	No	50	63.54
412	4/14/2017	12	3	-13.06	No	50	63.06
413	4/14/2017	12	4	-7.31	No	50	57.31

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414	4/14/2017	12	5	-9.64	No	50	59.64
415	4/14/2017	12	6	-9.16	No	50	59.16
416	4/14/2017	12	7	-7.33	No	50	57.33
417	4/14/2017	12	8	-13.22	No	50	63.22
418	4/14/2017	12	9	-9.66	No	50	59.66
419	4/14/2017	12	10	-4.57	No	50	54.57
420	4/14/2017	12	11	-6.39	No	50	56.39
421	4/14/2017	12	12	-13.45	No	50	63.45
422	4/14/2017	13	1	-13.40	No	50	63.40
423	4/14/2017	13	2	-13.46	No	50	63.46
424	4/14/2017	13	3	-13.44	No	50	63.44
425	4/14/2017	13	4	-13.31	No	50	63.31
426	4/14/2017	13	5	-13.61	No	50	63.61
427	4/14/2017	13	6	-13.89	No	50	63.89
428	4/14/2017	13	7	-13.92	No	50	63.92
429	4/14/2017	13	8	-13.96	No	50	63.96
430	4/14/2017	13	9	-13.96	No	50	63.96
431	4/14/2017	13	10	-14.01	No	50	64.01
432	4/14/2017	13	11	-14.01	No	50	64.01
433	4/14/2017	13	12	-14.01	No	50	64.01
434	4/14/2017	14	1	-13.85	Yes	50	63.85
435	4/14/2017	14	2	-13.76	Yes	50	63.76
436	4/14/2017	14	3	-13.76	Yes	50	63.76
437	4/14/2017	14	4	-13.65	Yes	50	63.65
438	4/14/2017	14	5	-13.65	Yes	50	63.65
439	4/14/2017	14	6	-13.59	Yes	50	63.59
440	4/14/2017	14	7	-13.60	Yes	50	63.60
441	4/14/2017	14	8	-13.60	Yes	50	63.60
442	4/14/2017	14	9	-13.60	Yes	50	63.60
443	4/14/2017	14	10	-13.72	Yes	50	63.72
444	4/14/2017	14	11	-13.87	Yes	50	63.87
445	4/14/2017	14	12	-13.87	Yes	50	63.87
446	4/14/2017	15	1	-13.92	Yes	499	512.92
447	4/14/2017	15	2	-13.76	Yes	499	512.76
448	4/14/2017	15	3	-13.59	Yes	499	512.59
449	4/14/2017	15	4	-13.89	Yes	499	512.89
450	4/14/2017	15	5	-13.87	Yes	499	512.87
451	4/14/2017	15	6	-13.85	Yes	499	512.85
452	4/14/2017	15	7	-13.85	Yes	499	512.85
453	4/14/2017	15	8	-13.85	Yes	499	512.85
454	4/14/2017	15	9	-13.85	Yes	499	512.85
455	4/14/2017	15	10	-14.09	Yes	499	513.09
456	4/14/2017	15	11	-14.17	Yes	499	513.17
457	4/14/2017	15	12	-14.17	Yes	499	513.17
458	4/22/2017	13	1	0.01	No	999	998.99
459	4/22/2017	13	2	0.01	No	999	998.99

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460	4/22/2017	13	3	0.00	No	999	999.00
461	4/22/2017	13	10	10.21	No	999	988.79
462	4/22/2017	13	11	11.03	No	999	987.97
463	4/22/2017	13	12	14.03	No	999	984.97
464	4/22/2017	14	1	15.62	No	999	983.38
465	4/22/2017	14	2	12.96	No	999	986.04
466	4/22/2017	14	3	13.98	No	999	985.02
467	4/22/2017	14	4	13.95	No	999	985.05
468	4/22/2017	14	5	13.77	No	999	985.23
469	4/22/2017	14	6	14.99	No	999	984.01
470	4/22/2017	14	7	15.91	No	999	983.09
471	4/22/2017	14	8	16.11	No	999	982.89
472	4/22/2017	14	9	16.23	No	999	982.77
473	4/22/2017	14	10	16.03	No	999	982.97
474	4/22/2017	14	11	14.91	No	999	984.09
475	4/22/2017	14	12	15.80	No	999	983.20
476	4/28/2017	13	1	-13.76	No	105.08	118.84
477	4/28/2017	13	2	-13.73	No	105.08	118.81
478	4/28/2017	13	3	-13.45	No	105.08	118.53
479	4/28/2017	13	4	-14.44	No	105.08	119.52
480	4/28/2017	13	5	-14.42	No	105.08	119.50
481	4/28/2017	13	6	-12.95	No	105.08	118.03
482	4/28/2017	13	7	-13.51	No	105.08	118.59
483	4/28/2017	13	8	-13.61	No	105.08	118.69
484	4/28/2017	13	9	-13.70	No	105.08	118.78
485	4/28/2017	13	10	-13.68	No	105.08	118.76
486	4/28/2017	13	11	-13.66	No	105.08	118.74
487	4/28/2017	13	12	-13.65	No	105.08	118.73
488	4/28/2017	14	1	-13.32	No	105.08	118.40
489	4/28/2017	14	2	-13.32	No	105.08	118.40
490	4/28/2017	14	3	-13.58	No	105.08	118.66
491	4/28/2017	14	4	-13.59	No	105.08	118.67
492	4/28/2017	14	5	-13.59	No	105.08	118.67
493	4/28/2017	14	6	-13.59	No	105.08	118.67
494	4/28/2017	14	7	-13.56	No	105.08	118.64
495	4/28/2017	14	8	-13.56	No	105.08	118.64
496	4/28/2017	14	9	-13.56	No	105.08	118.64
497	4/28/2017	14	10	-13.59	No	105.08	118.67
498	4/28/2017	14	11	-13.59	No	105.08	118.67
499	4/28/2017	14	12	-13.56	No	105.08	118.64
500	4/29/2017	11	1	-0.01	No	105.08	105.09
501	4/29/2017	11	2	0.01	No	105.08	105.07
502	4/29/2017	11	3	0.01	No	105.08	105.07
503	4/29/2017	11	4	0.01	No	105.08	105.07
504	4/29/2017	11	10	0.01	No	105.08	105.07
505	4/29/2017	11	11	0.01	No	105.08	105.07

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506	4/29/2017	11	12	0.01	No	105.08	105.07
507	4/29/2017	12	1	0.01	No	105.08	105.07
508	4/29/2017	12	2	0.01	No	105.08	105.07
509	4/29/2017	12	3	0.01	No	105.08	105.07
510	4/29/2017	12	4	0.01	No	105.08	105.07
511	4/29/2017	12	5	0.01	No	105.08	105.07
512	4/29/2017	12	6	0.01	No	105.08	105.07
513	4/29/2017	12	7	0.01	No	105.08	105.07
514	4/29/2017	12	8	0.01	No	105.08	105.07
515	4/29/2017	12	9	0.04	No	105.08	105.04
516	4/29/2017	12	10	0.04	No	105.08	105.04
517	4/29/2017	12	11	0.35	No	105.08	104.73
518	4/29/2017	12	12	0.04	No	105.08	105.04
519	4/29/2017	15	1	15.62	No	105.08	89.46
520	4/29/2017	15	2	15.31	No	105.08	89.77
521	4/29/2017	15	3	15.83	No	105.08	89.25
522	4/29/2017	15	4	15.88	No	105.08	89.20
523	4/29/2017	15	5	16.01	No	105.08	89.07
524	4/29/2017	15	6	16.13	No	105.08	88.95
525	4/29/2017	15	7	16.84	No	105.08	88.24
526	4/29/2017	15	8	17.59	No	105.08	87.49
527	4/29/2017	15	9	17.96	No	105.08	87.12
528	4/29/2017	15	10	20.88	No	105.08	84.20
529	4/29/2017	15	11	20.22	No	105.08	84.86
530	4/29/2017	15	12	17.98	No	105.08	87.10
531	4/29/2017	16	1	15.92	No	105.08	89.16
532	4/29/2017	16	2	15.22	No	105.08	89.86
533	4/29/2017	16	3	15.56	No	105.08	89.52
534	4/29/2017	16	4	15.78	No	105.08	89.30
535	4/29/2017	16	5	16.46	No	105.08	88.62
536	4/29/2017	16	6	17.15	No	105.08	87.93
537	4/29/2017	16	7	15.79	No	105.08	89.29
538	4/29/2017	16	8	16.35	No	105.08	88.73
539	4/29/2017	16	9	16.47	No	105.08	88.61
540	4/29/2017	16	10	17.37	No	105.08	87.71
541	4/29/2017	16	11	19.24	No	105.08	85.84
542	4/29/2017	16	12	16.41	No	105.08	88.67
543	4/29/2017	17	1	14.17	No	105.08	90.91
544	4/29/2017	17	2	14.17	No	105.08	90.91
545	4/29/2017	17	3	13.46	No	105.08	91.62
546	4/29/2017	17	4	0.01	No	105.08	105.07
547	4/29/2017	17	5	0.87	No	105.08	104.21
548	4/29/2017	17	6	0.95	No	105.08	104.13
549	4/29/2017	17	7	14.50	No	105.08	90.58
550	4/29/2017	17	8	15.06	No	105.08	90.02
551	4/29/2017	17	9	16.19	No	105.08	88.89

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552	4/29/2017	17	10	16.32	No	105.08	88.76
553	4/29/2017	17	11	17.30	No	105.08	87.78
554	4/29/2017	17	12	19.06	No	105.08	86.02
555	4/29/2017	18	1	13.92	No	105.08	91.16
556	4/29/2017	18	2	14.95	No	105.08	90.13
557	4/29/2017	18	3	14.97	No	105.08	90.11
558	4/29/2017	18	4	13.58	No	105.08	91.50
559	4/29/2017	18	5	13.58	No	105.08	91.50
560	4/29/2017	18	6	15.00	No	105.08	90.08
561	4/29/2017	18	7	16.37	No	105.08	88.71
562	4/29/2017	18	8	18.89	No	105.08	86.19
563	4/29/2017	18	9	886.50	No	105.08	-781.42
564	4/29/2017	18	10	879.96	No	105.08	-774.88
565	4/29/2017	18	11	45.54	No	105.08	59.54
566	4/29/2017	18	12	43.80	No	105.08	61.28
567	4/29/2017	19	1	20.96	No	105.08	84.12
568	4/29/2017	19	2	20.31	No	105.08	84.77
569	4/29/2017	19	3	22.83	No	105.08	82.25
570	4/29/2017	19	4	23.23	No	105.08	81.85
571	4/29/2017	19	5	24.89	No	105.08	80.19
572	4/29/2017	19	6	26.46	No	105.08	78.62
573	4/29/2017	19	7	23.55	No	105.08	81.53
574	4/29/2017	19	8	25.02	No	105.08	80.06
575	4/29/2017	19	9	36.21	No	105.08	68.87
576	4/29/2017	19	10	52.69	No	105.08	52.39
577	4/29/2017	19	11	155.73	No	105.08	-50.65
578	4/29/2017	19	12	59.41	No	105.08	45.67
579	4/29/2017	20	1	23.54	No	105.08	81.54
580	4/29/2017	20	2	24.15	No	105.08	80.93
581	4/29/2017	20	3	23.54	No	105.08	81.54
582	4/29/2017	20	4	23.37	No	105.08	81.71
583	4/29/2017	20	5	23.37	No	105.08	81.71
584	4/29/2017	20	6	23.29	No	105.08	81.79
585	4/29/2017	20	7	23.07	No	105.08	82.01
586	4/29/2017	20	8	23.07	No	105.08	82.01
587	4/29/2017	20	9	23.07	No	105.08	82.01
588	4/29/2017	20	10	23.23	No	105.08	81.85
589	4/29/2017	20	11	23.23	No	105.08	81.85
590	4/29/2017	20	12	24.50	No	105.08	80.58

Table 9: Price Impact Analysis Information for Pricing Node B in SCE LAP

Number	Trade Date	Trade Hour	Interval	Market LMP	Eligible Flag	Calculated LMP	Change in LMP
1	4/17/2017	21	1	29.44	Yes	0.01	-29.43
2	4/17/2017	21	2	30.54	Yes	0.01	-30.53
3	4/17/2017	21	3	30.74	Yes	0.01	-30.73
4	4/17/2017	21	4	43.43	Yes	0.01	-43.42
5	4/17/2017	21	5	59.94	Yes	0.01	-59.93
6	4/17/2017	21	6	49.39	Yes	0.01	-49.38
7	4/17/2017	21	7	1081.65	Yes	0.01	-1081.64
8	4/17/2017	21	8	1081.78	Yes	0.01	-1081.77
9	4/17/2017	21	9	367.37	Yes	0.01	-367.36
10	4/17/2017	21	10	46.34	Yes	0.01	-46.33
11	4/17/2017	21	11	51.99	Yes	0.01	-51.98
12	4/17/2017	21	12	38.18	Yes	0.01	-38.17
13	4/17/2017	22	1	41.32	Yes	0.01	-41.31
14	4/17/2017	22	2	34.62	Yes	0.01	-34.61
15	4/17/2017	22	3	24.81	Yes	0.01	-24.80
16	4/17/2017	22	4	23.21	Yes	0.01	-23.20
17	4/17/2017	22	5	22.80	Yes	0.01	-22.79
18	4/17/2017	22	6	22.84	Yes	0.01	-22.83
19	4/17/2017	22	7	33.29	Yes	0.01	-33.28
20	4/17/2017	22	8	30.72	Yes	0.01	-30.71
21	4/17/2017	22	9	28.74	Yes	0.01	-28.73
22	4/17/2017	22	10	33.89	Yes	0.01	-33.88
23	4/17/2017	22	11	37.90	Yes	0.01	-37.89
24	4/17/2017	22	12	37.30	Yes	0.01	-37.29
25	4/30/2017	21	1	0.05	Yes	0.01	-0.04
26	4/30/2017	21	2	0.06	Yes	0.01	-0.05
27	4/30/2017	21	3	0.05	Yes	0.01	-0.04
28	4/30/2017	21	4	33.91	Yes	0.01	-33.90
29	4/30/2017	21	5	33.80	Yes	0.01	-33.79
30	4/30/2017	21	6	34.18	Yes	0.01	-34.17
31	4/30/2017	21	7	34.18	Yes	0.01	-34.17
32	4/30/2017	21	8	34.01	Yes	0.01	-34.00
33	4/30/2017	21	9	34.00	Yes	0.01	-33.99
34	4/30/2017	21	10	34.44	Yes	0.01	-34.43

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Number	Trade Date	Trade Hour	Interval	Market LMP	Eligible Flag	Calculated LMP	Change in LMP
35	4/30/2017	21	11	34.20	Yes	0.01	-34.19
36	4/30/2017	21	12	34.23	Yes	0.01	-34.22

Appendix C: Exceptional Dispatch Bid Mitigation Analysis

In April 2017, the ISO applied the exceptional dispatch bid mitigation to the exceptional dispatches. Table 10 shows the costs by instruction type in March. With exceptional dispatch bid mitigation, the costs for these types of exceptional dispatches were \$ 117. Without the exceptional dispatch bid mitigation, the costs for these types of exceptional dispatches would be \$ 197. The cost saving from the exceptional dispatch bid mitigation was \$ 80.

Table 10: Bid Mitigation Analysis for April 2017

Type	Number of Resources	Costs without Bid Mitigation	Costs with Bid Mitigation	Cost Saving
NONTMOD	3	\$197	\$117	\$80
Total	3	\$197	\$117	\$80