July 15, 2021

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket: ER15-2565-__
Energy Imbalance Market Special Report – Transition Period – May 2021 for Turlock Irrigation District

Dear Secretary Bose:

The Department of Market Monitoring (DMM) hereby submits its Energy Imbalance Market (EIM) special report on the transition period of Turlock Irrigation District during its first six months of participation in the EIM for May 2021. Turlock Irrigation District joined the energy imbalance market on March 25, 2021.

Please contact the undersigned directly with any questions or concerns regarding the foregoing.

Respectfully submitted,

By: *__/s/ Eric Hildebrandt__*

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California Independent System Operator Corporation

California ISO

Report on energy imbalance market issues and performance: Turlock Irrigation District for May 2021

July 15, 2021

Prepared by: Department of Market Monitoring

Executive summary

Pursuant to the Commission's October 29, 2015 Order on the ISO's energy imbalance market (EIM), the ISO filed a report on June 25, 2021 covering the period from May 1 through May 31, 2021 (May report) for Turlock Irrigation District (TIDC) in the energy imbalance market.[1] TIDC joined the energy imbalance market on March 25, 2021.

This report provides a review by the Department of Market Monitoring (DMM) of energy imbalance market performance for the TIDC balancing authority area during the period covered in the ISO's May report. This is the second report for the transition period for the TIDC balancing authority area. Key findings in this report include the following:

- Prices in the TIDC area were fairly similar to prices within the ISO. During this time period, prices in the TIDC area averaged $40.71/MWh in the 15-minute market and $35.11/MWh 5-minute market.
- The TIDC balancing authority area failed the upward and downward sufficiency tests during 9 and 16 intervals, respectively. Additionally, TIDC failed the upward and downward bid range capacity tests during 1 and 8 intervals, respectively.
- The frequency of valid over-supply infeasibilities was low, occurring during 1 interval in the 15-minute market, and none in the 15-minute market. There were 14 valid under-supply infeasibilities for the TIDC area during the month.
- Transition period pricing increased 15-minute market prices by $0.07/MWh, and decrease 5-minute market prices by $1.64/MWh for the TIDC area.

Section 1 of this report provides a description of prices and power balance constraint relaxations and section 2 discusses the flexible ramping sufficiency and bid range capacity tests.

[1] The ISO's May 2021 Report was filed at FERC and posted on the ISO website on June 25, 2021: http://www.caiso.com/Documents/Jun25-2021-EIMTransitionPeriodReport-TurlockIrrigationDistrict-May2021-ER15-2565.pdf

1 Energy imbalance market prices

Figure 1.1 and Figure 1.2 show hourly average 15-minute and 5-minute prices during May for TIDC compared with prices in the ISO at the Pacific Gas and Electric (PG&E) default load aggregation point.

Average prices in the Turlock Irrigation District area tracked similarly to prices at the Pacific Gas and Electric (PG&E) default aggregation point within the ISO. Price separations between these two areas occurred primarily during the middle of the day. In the TIDC area during the month, prices averaged $40.71/MWh in the 15-minute market and $35.11/MWh 5-minute market.

Figure 1.1 Average hourly 15-minute price (May 2021)

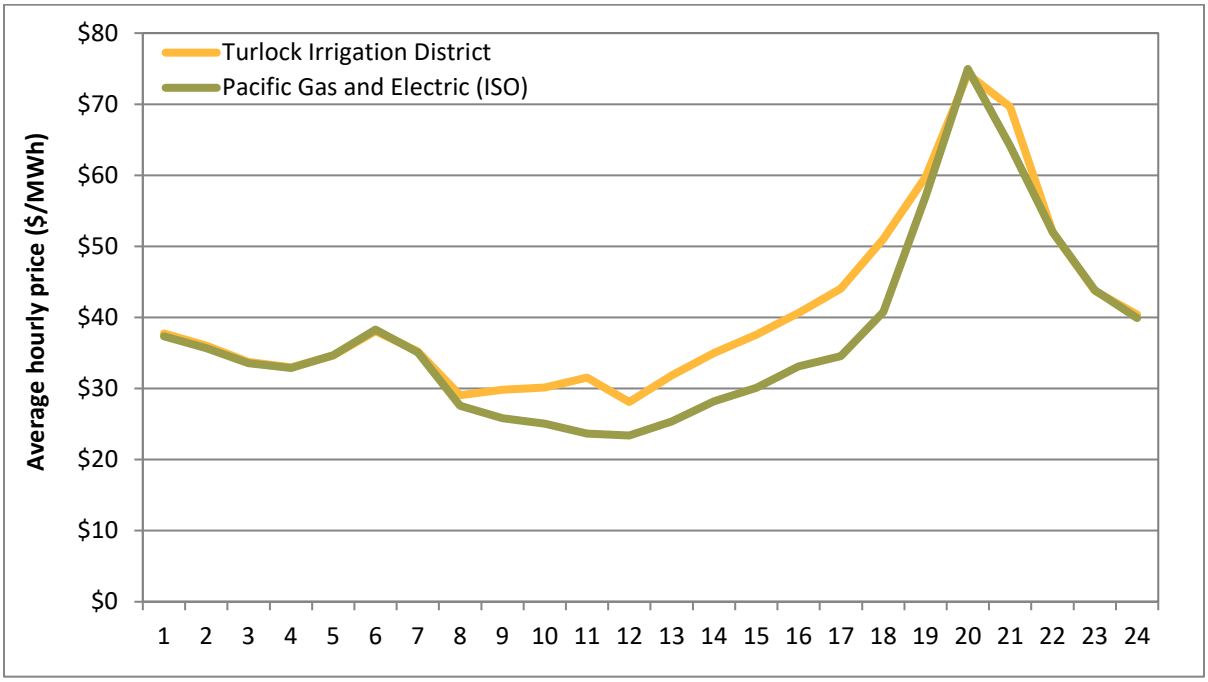
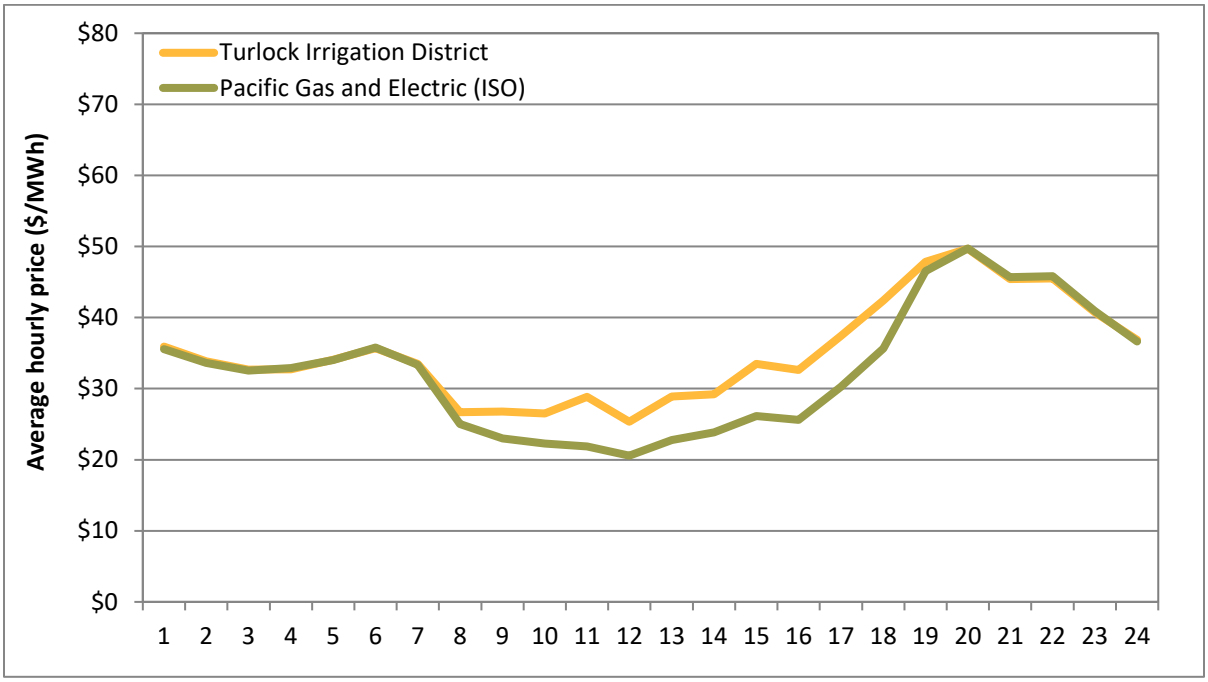


Figure 1.2 Average hourly 5-minute price (May 2021)



All power balance constraint relaxations that occurred in May were subject to the six-month transition period pricing that expires on September 25, 2021. The transition period pricing mechanism sets prices at the highest cost supply bid dispatched to meet demand rather than at the $2,000/MWh penalty parameter while relaxing the constraint for shortages, or the -$155/MWh penalty parameter while relaxing the constraint for excess energy.[2] [3] Power balance constraint relaxations can be grouped in the following categories:

- **Valid under-supply infeasibility** (power balance constraint shortage). These occurred when the power balance constraint was relaxed because load exceeded available generation. The ISO validated that ISO software was working appropriately during these instances.
- **Valid over-supply infeasibility** (power balance constraint excess). These occurred when the power balance constraint was relaxed because generation exceeded load. The ISO validated that ISO software was working appropriately during these instances.
- **Load conformance limiter would have resolved infeasibility.** The load conformance limiter automatically reduces the size of an operator load adjustment and sets prices at the last economic

[2] When transition period pricing provisions are triggered by relaxation of the power balance constraint, any shadow price associated with the flexible ramping product is set to $0/MWh to allow the market software to use the last economic bid dispatched.

[3] The penalty parameter while relaxing the constraint for shortages rose from $1,000/MWh to $2,000/MWh, effective March 21, 2021 per FERC Order 831. https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Market%20Operations

signal when the conditions for the limiter are met.[4] During the transition period, the limiter does not change price outcomes because transition period pricing is applied during these intervals instead. However, in these cases, the load conformance limiter *would have resolved the infeasibility* had transition period pricing not been in effect.

- **Correctable infeasibility.** These occurred when the ISO software relaxed the power balance constraint concurrent with a software error or data error that resulted in a price correction or would have triggered a price correction if transition period pricing were not active.[5]

Figure 1.3 and Figure 1.4 show the weekly frequency of under-supply and over-supply infeasibilities, respectively, in the 15-minute and 5-minute markets. As shown in Figure 1.3, there were 14 valid under-supply infeasibilities in the 5-minute market, and none in the 15-minute market.

As shown in Figure 1.4, valid over-supply infeasibilities were less frequent. One valid over-supply infeasibility occurred in the 15-minute market and none in the 5-minute market for the TIDC area during the month.[6]

There were no intervals during May when the load conformance limiter would have triggered in the 15-minute or 5-minute markets for the TIDC balancing authority area had transition period pricing not been in effect.

[4] The ISO implemented an enhancement to the load conformance limiter, effective February 27, 2019. With the enhancement, the load conformance limiter triggers by a measure based on the change in load adjustment from one interval to the next, rather than the total level of load adjustment.

[5] Section 35 of the ISO tariff provides the ISO authority to correct prices if it detects an invalid market solution or issues due to a data input failure, occurrence of hardware or software failure, or a result that is inconsistent with the ISO tariff. During erroneous intervals, the ISO determined that prices resulting under transition period pricing were equivalent to prices that would result from a price correction, so no further price adjustment was appropriate. http://www.caiso.com/Documents/Section35_MarketValidationAndPriceCorrection_May1_2014.pdf.

[6] The time frame referenced is March 25, 2021 to April 30, 2021. The weeks indicated in Figures 1.3 – 1.6 reference the starting week of "25-Mar"; this starting week is greater than 7 days, covering March 25, 2021 to April 7, 2021.

Figure 1.3 Frequency of under-supply power balance infeasibilities by week Turlock Irrigation District

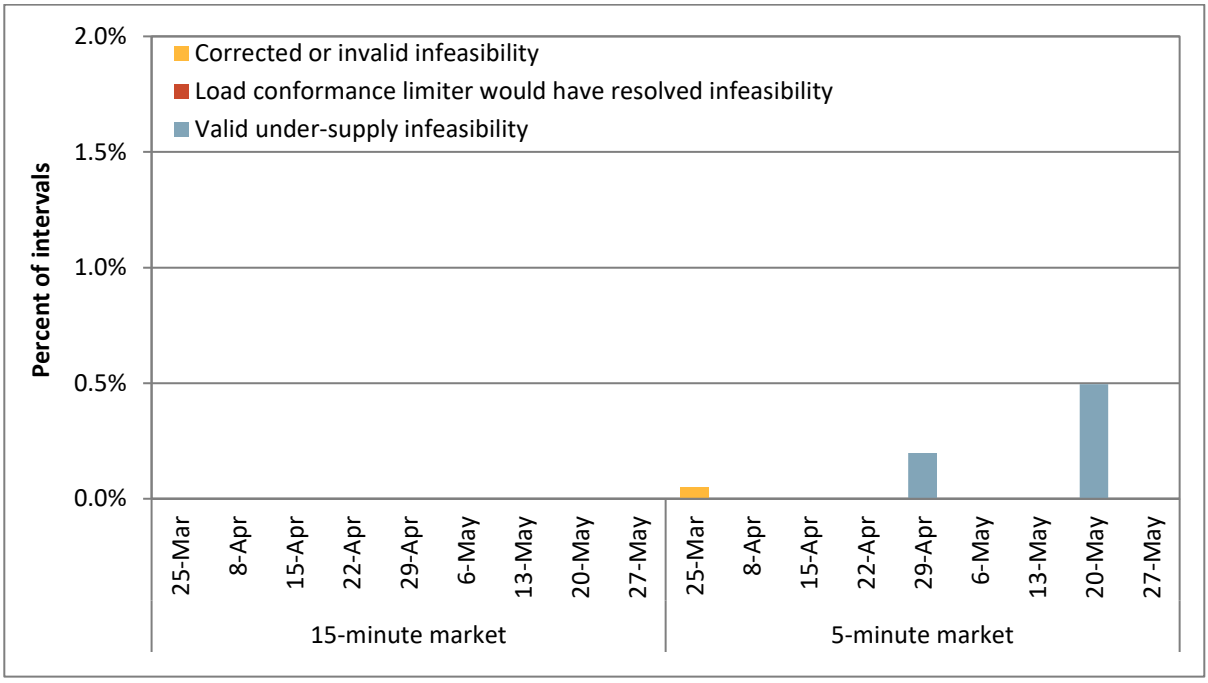


Figure 1.4 Frequency of over-supply power balance infeasibilities by week Turlock Irrigation District

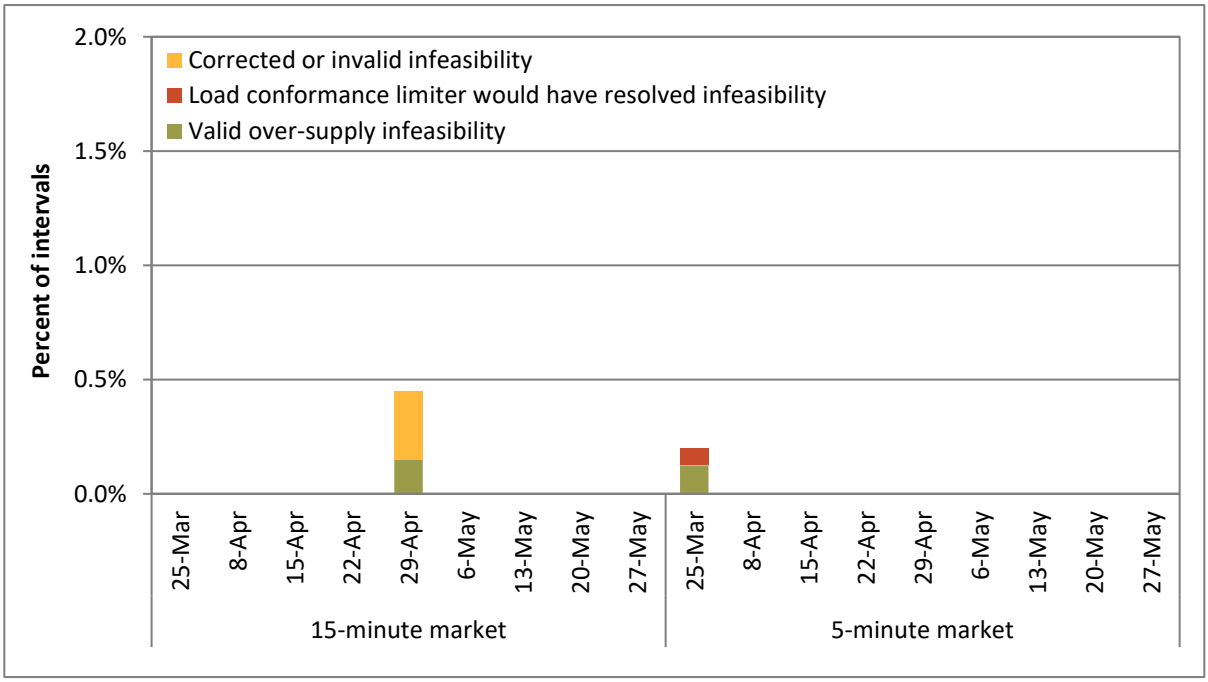
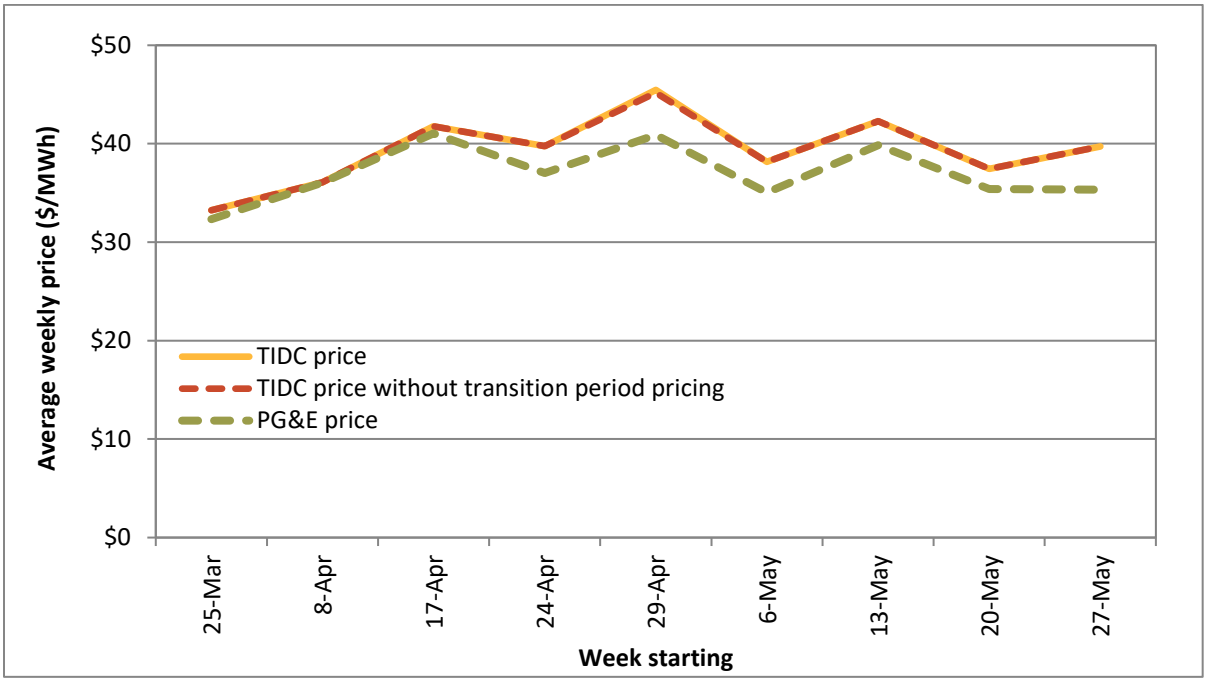


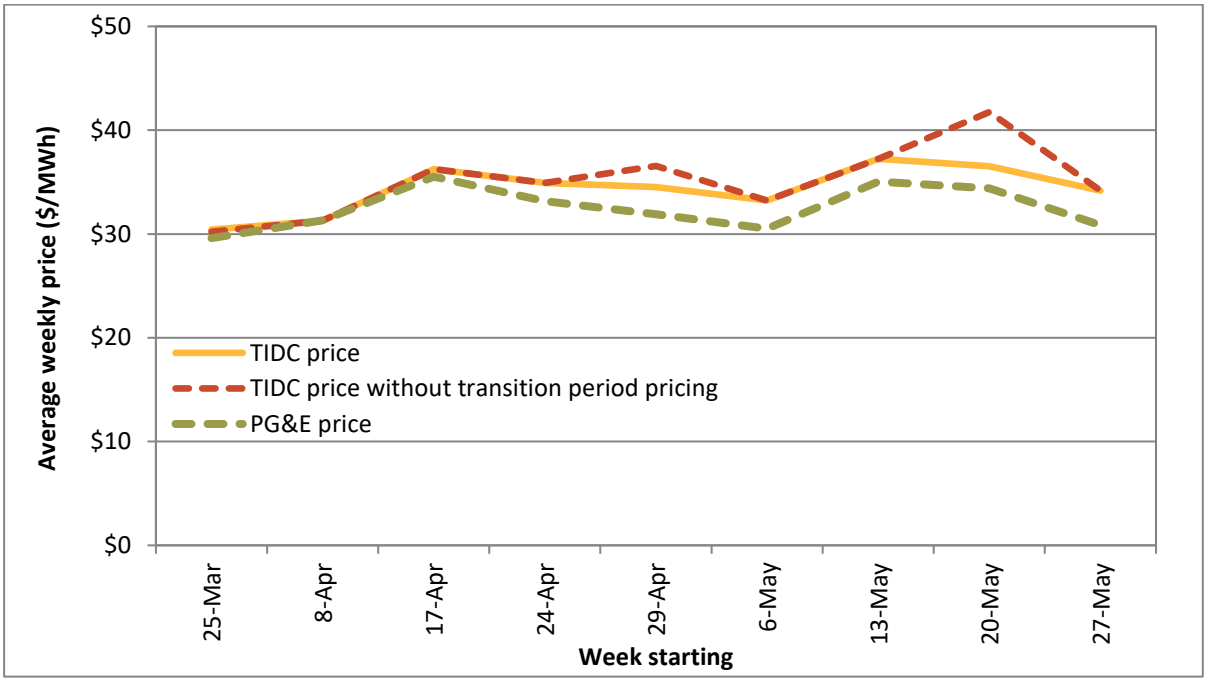
Figure 1.5 and Figure 1.6 show the average weekly prices in the 15-minute and 5-minute markets *with* and *without* the special transition period pricing provisions applied to mitigate prices in the TIDC area during the month.[7] On average for the month, transition period pricing increased 15-minute market prices by $0.07/MWh, while decreasing 5-minute market prices by $1.64/MWh for the TIDC area.

Figure 1.5 Average prices by week – Turlock Irrigation District (TIDC) (15-minute market)



[7] A detailed description of the methodology used to calculate these counterfactual prices that would result without transition period pricing was provided on p. 7 of the January 2017 report for Arizona Public Service from DMM: http://www.caiso.com/Documents/May1_2017_Department_MarketMonitoring_EIMTransitionPeriodReport_ArizonaPublicService_Jan2017_ER15-2565.pdf

Figure 1.6 Average prices by week – Turlock Irrigation District (TIDC) (5-minute market)



2 Flexible ramping sufficiency and bid range capacity tests

As part of the energy imbalance market, each area including the California ISO is subject to a resource sufficiency evaluation. The evaluation is performed prior to each hour to ensure that generation in each area is sufficient without relying on transfers from other balancing areas. The evaluation includes two tests:

- **The bid range capacity test (capacity test)** requires that each area provide incremental bid-in capacity to meet the imbalance between load, intertie, and generation base schedules.
- **The flexible ramping sufficiency test (sufficiency test)** requires that each balancing area has enough ramping flexibility over an hour to meet the forecasted change in demand as well as uncertainty.

If an area fails either the bid range capacity test or flexible ramping sufficiency test, energy imbalance market transfers into that area cannot be increased.[8] Failures of the capacity and sufficiency test are important because these outcomes limit transfer capability. Constraining transfer capability may affect the efficiency of the EIM by limiting transfers into and out of a balancing area that could potentially provide benefits to other balancing areas. Reduced transfer capability also affects the ability for an area to balance load, since there is less availability to import-from or export-to neighboring areas. This can result in local prices being set at power balance constraint penalty parameters.

The TIDC balancing authority area failed the upward and downward sufficiency tests during 9 and 16 intervals, respectively. Additionally, TIDC failed the upward and downward bid range capacity tests during 1 and 8 intervals, respectively.

[8] If an area fails either test in the upward direction, net EIM imports (negative) during the hour cannot exceed the lower of either the base transfer or optimal transfer from the last 15-minute interval prior to the hour.