

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

**Table of Contents**

<u>34.</u>	<u>Real-Time Market</u>	<u>3</u>
<u>34.1</u>	<u>Inputs to the Real-Time Market</u>	<u>3</u>
<u>34.1.1</u>	<u>Day-Ahead Market Results as Inputs to the Real-Time Market</u>	<u>3</u>
<u>34.1.2</u>	<u>Market Model and System Information</u>	<u>3</u>
<u>34.1.3</u>	<u>Bids in the Real-Time Market</u>	<u>3</u>
<u>34.1.4</u>	<u>Real-Time Validation of Schedules and Bids</u>	<u>4</u>
<u>34.1.5</u>	<u>Mitigating Bids in the RTM</u>	<u>5</u>
<u>34.1.6</u>	<u>Eligible Intermittent Resources Forecast</u>	<u>7</u>
<u>34.2</u>	<u>The Hour-Ahead Scheduling Process</u>	<u>8</u>
<u>34.2.1</u>	<u>The HASP Optimization</u>	<u>8</u>
<u>34.2.2</u>	<u>Treatment of Self-Schedules in HASP</u>	<u>9</u>
<u>34.2.3</u>	<u>Ancillary Services in the HASP and FMM</u>	<u>9</u>
<u>34.2.4</u>	<u>HASP Results</u>	<u>10</u>
<u>34.2.5</u>	<u>Cessation of the HASP</u>	<u>10</u>
<u>34.3</u>	<u>Real-Time Unit Commitment</u>	<u>10</u>
<u>34.3.1</u>	<u>RTUC Optimization</u>	<u>10</u>
<u>34.3.2</u>	<u>Commitment of Short Start Units</u>	<u>11</u>
<u>34.3.3</u>	<u>[Not Used]</u>	<u>11</u>
<u>34.4</u>	<u>Fifteen Minute Market</u>	<u>11</u>
<u>34.4.1</u>	<u>Real-Time Ancillary Services Procurement</u>	<u>13</u>
<u>34.5</u>	<u>Real-Time Dispatch</u>	<u>13</u>
<u>34.5.1</u>	<u>Real-Time Economic Dispatch</u>	<u>14</u>
<u>34.5.2</u>	<u>Real-Time Contingency Dispatch</u>	<u>15</u>
<u>34.5.3</u>	<u>Real-Time Manual Dispatch</u>	<u>16</u>
<u>34.6</u>	<u>Short-Term Unit Commitment</u>	<u>16</u>
<u>34.7</u>	<u>General Dispatch Principles</u>	<u>17</u>
<u>34.8</u>	<u>Dispatch Instructions to Units, Participating Loads, PDRs, and RDRRs</u>	<u>20</u>
<u>34.9</u>	<u>Utilization of the Energy Bids</u>	<u>20</u>
<u>34.9.1</u>	<u>[Not Used]</u>	<u>21</u>
<u>34.9.2</u>	<u>[Not Used]</u>	<u>21</u>
<u>34.9.3</u>	<u>[Not Used]</u>	<u>21</u>
<u>34.9.4</u>	<u>[Not Used]</u>	<u>21</u>
<u>34.10</u>	<u>Dispatch of Energy from Ancillary Services</u>	<u>21</u>
<u>34.10.1</u>	<u>[Not Used]</u>	<u>22</u>
<u>34.10.2</u>	<u>[Not Used]</u>	<u>22</u>
<u>34.11</u>	<u>Exceptional Dispatch</u>	<u>23</u>
<u>34.11.1</u>	<u>System Reliability Exceptional Dispatches</u>	<u>23</u>
<u>34.11.2</u>	<u>Other Exceptional Dispatches</u>	<u>24</u>
<u>34.11.3</u>	<u>Transmission-Related Modeling Limitations</u>	<u>24</u>
<u>34.11.4</u>	<u>Reporting Requirements</u>	<u>24</u>
<u>34.12</u>	<u>CAISO Market Adjustment to Non-Priced Quantities in the RTM</u>	<u>25</u>
<u>34.12.1</u>	<u>Increasing Supply</u>	<u>25</u>
<u>34.12.2</u>	<u>Decreasing Supply</u>	<u>26</u>
<u>34.12.3</u>	<u>Post-HASP Process</u>	<u>27</u>
<u>34.12.4</u>	<u></u>	<u>27</u>
<u>34.13</u>	<u>Means of Dispatch Communication</u>	<u>28</u>
<u>34.13.1</u>	<u>Response Required by Resources to Dispatch Instructions</u>	<u>29</u>
<u>34.13.2</u>	<u>Failure to Conform to Dispatch Instructions</u>	<u>30</u>
<u>34.13.3</u>	<u>Co-located Resources and Dispatch Instructions</u>	<u>31</u>
<u>34.14</u>	<u>Metered Subsystems</u>	<u>32</u>
<u>34.14.1</u>	<u>[Not Used]</u>	<u>32</u>
<u>34.15</u>	<u>Treatment of Resource Adequacy Capacity in the RTM</u>	<u>32</u>
<u>34.15.1</u>	<u>[Not Used]</u>	<u>33</u>

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

<a href="#">34.15.2</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.15.3</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.15.4</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.15.5</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.15.6</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.16</a>	<a href="#">Real-Time Activities in the Hour Prior to Settlement Period</a>	<a href="#">33</a>
<a href="#">34.16.1</a>	<a href="#">Confirm Interchange Transaction Schedules (ITSs)</a>	<a href="#">33</a>
<a href="#">34.16.2</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.16.3</a>	<a href="#">[Not Used]</a>	<a href="#">33</a>
<a href="#">34.17</a>	<a href="#">Rules for Real-Time Dispatch of Imbalance Energy Resources</a>	<a href="#">33</a>
<a href="#">34.17.1</a>	<a href="#">Resource Constraints</a>	<a href="#">33</a>
<a href="#">34.17.2</a>	<a href="#">Calculation of Dispatch Operating Points After Instructions</a>	<a href="#">35</a>
<a href="#">34.17.3</a>	<a href="#">[Not Used]</a>	<a href="#">36</a>
<a href="#">34.17.4</a>	<a href="#">Inter-Hour Dispatch of Resources with Real-Time Energy Bids</a>	<a href="#">36</a>
<a href="#">34.17.5</a>	<a href="#">Inter-Hour Resources Dispatch without Real-Time Energy Bids</a>	<a href="#">37</a>
<a href="#">34.17.6</a>	<a href="#">Intra-Hour Exceptional Dispatches</a>	<a href="#">37</a>
<a href="#">34.18</a>	<a href="#">Ancillary Services in the Real-Time Market</a>	<a href="#">38</a>
<a href="#">34.18.1</a>	<a href="#">Dispatch of Self-Provided Ancillary Services</a>	<a href="#">38</a>
<a href="#">34.18.2</a>	<a href="#">Ancillary Services Requirements for RTM Dispatch</a>	<a href="#">38</a>
<a href="#">34.19</a>	<a href="#">Dispatch Information and Instructions</a>	<a href="#">40</a>
<a href="#">34.19.1</a>	<a href="#">Dispatch Information to be Supplied by the CAISO</a>	<a href="#">40</a>
<a href="#">34.19.2</a>	<a href="#">Dispatch Information to be Supplied by SC</a>	<a href="#">40</a>
<a href="#">34.19.3</a>	<a href="#">Dispatch Information to be Supplied by UDCs</a>	<a href="#">41</a>
<a href="#">34.19.4</a>	<a href="#">Dispatch Information to be Supplied by PTOs</a>	<a href="#">41</a>
<a href="#">34.19.5</a>	<a href="#">Dispatch Information to be Supplied by Balancing Authorities</a>	<a href="#">41</a>
<a href="#">34.20</a>	<a href="#">Pricing Imbalance Energy</a>	<a href="#">42</a>
<a href="#">34.20.1</a>	<a href="#">General Principles</a>	<a href="#">42</a>
<a href="#">34.20.2</a>	<a href="#">Determining Real-Time LMPs</a>	<a href="#">42</a>
<a href="#">34.21</a>	<a href="#">Temporary Waiver of Timing Requirements for the RTM</a>	<a href="#">44</a>
<a href="#">34.21.1</a>	<a href="#">Criteria for Temporary Waiver</a>	<a href="#">44</a>
<a href="#">34.21.2</a>	<a href="#">Information to be Published on Secure Communication System</a>	<a href="#">44</a>
<a href="#">34.22</a>	<a href="#">Real-Time Dispatch of RDRRs</a>	<a href="#">44</a>
<a href="#">34.22.1</a>	<a href="#">Testing of RDRRs</a>	<a href="#">45</a>

### **34. Real-Time Market**

The CAISO conducts the Real-Time Market on any given Operating Day in which Scheduling Coordinators may submit Bids, and the CAISO commits and Dispatches Energy and procures Energy and Ancillary Services. The Real-Time Market consists of the following processes: (1) the Hour-Ahead Scheduling Process, (2) Real-Time Unit Commitment (RTUC), (3) the Short-Term Unit Commitment (STUC), (4) the Fifteen Minute Market (FMM), and (5) the Real-Time Dispatch (RTD).

The CAISO shall dispatch all resources, including Participating Load and Proxy Demand Resource, pursuant to submitted Bids or pursuant to the provisions below on Exceptional Dispatch.

#### **34.1 Inputs to the Real-Time Market**

The CAISO utilizes the following data and information as inputs in conducting the Real-Time Market:

##### **34.1.1 Day-Ahead Market Results as Inputs to the Real-Time Market**

All of the Real-Time Market processes utilize results produced by the Day-Ahead Market for each Trading Hour of the Trading Day, including the combined commitments contained in the Day-Ahead Schedules, Day-Ahead Ancillary Services Awards, and RUC Awards. These DAM results are inputs to the RTM. The transactions associated with DAM results are settled based on the relevant DAM prices, and are not deemed performed in the Real-Time Market.

##### **34.1.2 Market Model and System Information**

The CAISO utilizes the Base Market Model used in the Day-Ahead Market and adjusted as described in 27.5.1 and 27.5.6, and other system information provided through the State Estimator output, resource outage and derate/rerate information in conducting all of the Real-Time Market processes. Updates to the Base Market Model adjusted as described in Sections 27.5.1 and 27.5.6 used in all of the Real-Time Market processes include current estimates of real-time unscheduled flow at the Interties. The CAISO utilizes the most up-to-date Base Market Model and system information throughout the Real-Time Market processes to the extent feasible.

##### **34.1.3 Bids in the Real-Time Market**

Scheduling Coordinators may submit Bids, including Self-Schedules, for Supply that the CAISO shall use for the Real-Time Market, starting from the time Day-Ahead Schedules are posted, which is approximately 1:00 p.m., unless the posting of the Day-Ahead Market results are delayed for reasons

specified in Section 31.6, until seventy-five (75) minutes prior to each applicable Trading Hour in the Real-Time. Scheduling Coordinators can submit Bids in the form of: (1) an Economic Bid for a Schedule in the RTM; (2) a Self-Schedule for acceptance to the RTM; (3) a Self-Schedule Hourly Block for acceptance in the HASP; (4) a Variable Energy Resource Self-Schedule for the RTM; (5) an Economic Hourly Block Bid for acceptance in the HASP; or (6) an Economic Hourly Block Bid with Intra-Hour Option for acceptance in the HASP and the FMM. This includes Self-Schedules by Participating Load that is modeled using the Pumped-Storage Hydro Unit. Scheduling Coordinators may not submit Bids, including Self-Schedules, for CAISO Demand in the RTM. Scheduling Coordinators may submit Bids, including Self-Schedules, for exports at Scheduling Points in the RTM. The rules for submitted Bids specified in Section 30 apply to Bids submitted to the RTM. Scheduling Coordinators may not submit Virtual Bids to the Real-Time Market, although Virtual Awards from the DAM are settled for their liquidated positions based on prices from the FMM. In the case of Multi-Stage Generating Resources, the RTM procedures will optimize Transition Costs in addition to the Start-Up Costs and Minimum Load Costs. If a Scheduling Coordinator submits a Self-Schedule or a Submission to Self-Provide Ancillary Services for a given MSG Configuration in a given Trading Hour, all of the RTM processes will consider the Start-Up Cost, Minimum Load Cost, and Transition Cost associated with any Economic Bids for other MSG Configurations as incremental costs between the other MSG Configurations and the self-scheduled MSG Configuration. In such cases, incremental costs are the additional costs incurred to transition or operate in an MSG Configuration in addition to the costs associated with the self-scheduled MSG Configuration.

#### **34.1.4 Real-Time Validation of Schedules and Bids**

After the Market Close of the Real-Time Market, the CAISO performs a validation process consistent with the provisions set forth in Section 30.7 and the following additional rules. The CAISO will insert a Generated Bid to cover any RUC Award or Day-Ahead Schedule in the absence of any Self-Schedule or Economic Bid components, or to fill in any gaps between any Self-Schedule Bid and any Economic Bid components to cover a RUC Award or Day-Ahead Schedule for use in the RTM. Schedules and Bids submitted to the RTM to supply Energy and Ancillary Services will be considered in the various RTM processes, including the MPM process, the HASP, the STUC, the RTUC, the FMM and the RTD.

### **34.1.5 Mitigating Bids in the RTM**

#### **34.1.5.1 Generally**

After the Market Close of the RTM, after the CAISO has validated the Bids pursuant to Section 30.7 and Section 34.1.4, and prior to conducting any other RTM processes, the CAISO conducts a MPM process. The results are used in the RTM optimization processes. Bids on behalf of Demand Response Resources, Participating Load, and Hybrid Resources are considered in the MPM process but are not subject to Bid mitigation. Energy storage resources whose PMax is less than five (5) MW are considered in the MPM process, but not subject to Bid mitigation.

#### **34.1.5.2 Fifteen-Minute MPM**

The CAISO conducts the MPM process as the first pass of each fifteen-minute interval in the RTUC horizon starting with the unmitigated Bid set as validated pursuant to Section 30.7 and Section 34.1.4. The MPM process produces results for each fifteen-minute interval of the RTUC horizon and thus may produce mitigated Bids for any given resource for any fifteen-minute interval in the RTUC run horizon that applies to any CAISO Market Process that is based on a specific RTUC run. The determination as to whether a Bid is mitigated is made based on the non-competitive Congestion component of each LMP for each fifteen-minute interval of the RTUC run horizon, using the methodology set forth in Section 31.2.3 except that a resource may have a non-competitive Congestion component in a fifteen-minute interval based on a Transmission Constraint deemed non-competitive either in the base case for meeting Demand or in the cases of modeling the dispatch of Energy for the capacity corresponding to upward and downward Uncertainty Awards, respectively. If a Bid is mitigated in the MPM pass for a fifteen-minute interval in the RTUC run horizon, the mitigated Bid will be utilized in the corresponding binding HASP and FMM process for the fifteen-minute interval. If a Bid is not mitigated in a fifteen-minute MPM pass, the CAISO will still mitigate that Bid in subsequent fifteen-minute intervals of the RTUC horizon if the MPM pass for the subsequent intervals determine that mitigation is needed.

#### **34.1.5.3 Real-Time Dispatch MPM**

The RTD MPM process produces results for each five-minute interval of a Trading Hour. The determination as to whether a Bid is mitigated is made based on the non-competitive Congestion component of each LMP for each five-minute interval, using the methodology set forth in Section 31.2.3

except that a resource may have a non-competitive Congestion component in a five-minute interval based on a Transmission Constraint deemed non-competitive either in the base case for meeting Demand or in the cases of modeling the dispatch of Energy for the capacity corresponding to upward and downward Uncertainty Awards, respectively. The RTD MPM process is performed for a configurable number of RTD advisory intervals after the binding RTD interval, and the mitigated Bids are used in the corresponding RTD intervals of the following RTD.

#### **34.1.5.4 Reliability Must Run Resources**

For a Condition 1 Legacy RMR Unit, the use of RMR Proxy Bids is determined based on the non-competitive Congestion component of each LMP for each fifteen (15) minute interval of the applicable Trading Hour, using the methodology set forth in Section 31.2.3 above. If a Condition 2 Legacy RMR Unit is issued a Manual RMR Dispatch by the CAISO, then RMR Proxy Bids for all of the unit's Maximum Net Dependable Capacity will be considered in the MPM process. For both Condition 1 and Condition 2 Legacy RMR Units, when mitigation is triggered, a RMR Proxy Bid is calculated using the same methodology described above for non-RMR Units. For a Condition 1 Legacy RMR Unit that has submitted Bids and has not been issued a Manual RMR Dispatch, to the extent that the non-competitive Congestion component of an LMP calculated in the MPM process is greater than zero, and that MPM process dispatches a Condition 1 Legacy RMR Unit at a level such that some portion of its market Bid exceeds the Competitive LMP at the Legacy RMR Unit's Location, the resource will be flagged as an RMR Dispatch if it is dispatched pursuant to a Legacy RMR Contract at a level higher than the dispatch level determined by the Competitive LMP. Both Condition 1 and Condition 2 Legacy RMR Units may be issued manual RMR Dispatches at any time to address local reliability needs or to resolve non-competitive constraints.

#### **34.1.5.5 Competitive LMP Parameter**

When a Bid is mitigated, the CAISO will add a cost, not to exceed \$0.01/MWh, to the Competitive LMP used in the MPM process prior to the DAM or RTM process. The CAISO will set the Competitive LMP Parameter as low as possible while creating a reasonable price separation between the area where mitigation applies and other areas where mitigation does not apply. The CAISO will publish the value of the Competitive LMP Parameter in the Business Practice Manual.

### **34.1.6 Eligible Intermittent Resources Forecast**

#### **34.1.6.1 Eligible Intermittent Resources using their own Forecast**

For Eligible Intermittent Resources, including Participating Intermittent Resources, that have elected to use the resource's own forecast as specified in Section 4.8.2.1.1, the responsible Scheduling Coordinator must submit to the CAISO its forecast for the binding interval by 37.5 minutes prior to flow (the start of the applicable FMM optimization for the binding interval). If such Scheduling Coordinator does not provide such forecast to the CAISO, the CAISO will use the resource's direct telemetry MW output for Dispatch purposes. The CAISO shall use the forecast provided by the Scheduling Coordinator to establish MWh quantities to be cleared for that resource in the FMM if the resource has submitted only a Self-Schedule to the RTM. If a Scheduling Coordinator for a Variable Energy Resource submits an Economic Bid to the RTM (either with or without a Self-Schedule), then the CAISO receives and processes all Variable Energy Resources forecasts (as selected by CAISO) which establishes the upper economic limit for that resource in the FMM. Participating Intermittent Resources may elect not to use the forecast provided by the CAISO, in which case they must be certified to use their own forecast as provided in Section 4.8.2.1.1. In addition, the CAISO will not utilize the forecast it produces for the Participating Intermittent Resources using their own forecast. As provided in Section 4.8.2.1.1, the Scheduling Coordinator may submit such forecast in fifteen or five minute granularity. If the Scheduling Coordinator submits the forecast in five-minute granularity, the CAISO will use the average of the three five-minute forecasts provided by the Scheduling Coordinator to determine the MWh to be cleared in the FMM for that resource.

#### **34.1.6.2 Eligible Intermittent Resources using the CAISO Forecast**

Eligible Intermittent Resources that have elected to use the CAISO forecast as specified in Section 4.8.2.1.2 are not required to submit a forecast for the binding interval by 37.5 minutes prior to flow. For Participating Intermittent Resources for which Scheduling Coordinators have elected to use the output forecast provided by the CAISO and have selected such a flag in their Master File, the CAISO will use the MWh forecast data the CAISO produces for such a resource at 37.5 minutes prior to the applicable FMM as follows: (a) as the MWh amounts input to be cleared for that resource in the FMM if only a Self-Schedule is submitted, or (b) as the upper economic limit used for that resource in the FMM if an Economic Bid with or without a Self-Schedule is submitted. Dispatch instructions may also be affected by

transmission and resource operational constraints and utilization of updated forecasts. The forecast used by the CAISO will be in fifteen-minute granularity. Scheduling Coordinators representing Participating Intermittent Resources whose output is designated to satisfy a Resource Adequacy requirement must submit Variable Energy Resource Self-Schedules in the RTM in accordance with the output forecast provided by the CAISO, or an Economic Bid.

#### **34.1.6.3 Hybrid Resources**

The CAISO will use reasonable efforts to issue Real-Time Market Schedules that observe Hybrid Resources' Dynamic Limits, High Sustainable Limits, State of Charge, and production forecasts, as applicable. Hybrid Resources with a variable component may elect to receive a CAISO forecast to inform their bidding, or they may elect to use their own forecast.

### **34.2 The Hour-Ahead Scheduling Process**

#### **34.2.1 The HASP Optimization**

The Hour-Ahead Scheduling Process is a Real-Time Market process and a special run of the RTUC through which the CAISO accepts or rejects the following Bids submitted by Scheduling Coordinators at Scheduling Points: (1) Self-Schedule Hourly Blocks for Energy and Ancillary Services, (2) VER Self-Schedules for Energy, (3) Economic Hourly Block Bids for Energy and Ancillary Services, and (4) Economic Hourly Block Bids with Intra-Hour Option for Energy and providing an hourly schedule that can be changed at most once in the Trading Hour. The CAISO also produces advisory Energy schedules and Ancillary Services awards. Through the HASP, the CAISO may also issue binding unit commitment instructions for any resource participating in the RTM. After the Market Close for the RTM for the relevant Trading Hour, the RTM Bids have been validated, and the RTM Bids have been mitigated and the MPM process has been performed, the CAISO then conducts the HASP optimization. The CAISO does not accept Bids for CAISO Demand for any of the Real-Time Market processes. Therefore, CAISO clears Supply Bids against the CAISO Forecast of CAISO Demand plus submitted Export Bids, to the extent the Export Bids are selected in the MPM process. The HASP optimization also factors in forecasted unscheduled flow at the Interties, as do all the Real-Time Market processes. The HASP optimization does not produce Settlement prices for Energy or Ancillary Services and the CAISO settles all Bids accepted through the HASP based on FMM Schedules and Awards and FMM LMPs and ASMPs.



### **34.2.2 Treatment of Self-Schedules in HASP**

The HASP optimization does not adjust submitted Self-Schedule Hourly Blocks for Energy or Ancillary Services, or Self-Scheduled Variable Energy Resources unless it is not possible to balance Supply and the CAISO Forecast of CAISO Demand plus Export Bids and manage Congestion using the available Economic Bids, in which case the HASP performs non-economic adjustments to Self-Schedules to accommodate operational restrictions. Once accepted, Self-Schedule Hourly Blocks for Energy or Ancillary Services are considered as Self-Schedules or Self-Provision, respectively, in each of the four FMM intervals. For accepted Variable Energy Resource Self-Schedules from external resources that are not Dynamic Schedules, the CAISO uses the Self-Schedule in the HASP optimization and the Scheduling Coordinator can update the Self-Schedule based on the most current Energy forecast, if it is qualified to do so by the CAISO and the Scheduling Coordinator registers it as such in the Master File. The HASP produces advisory MWh schedules for each of the four fifteen-minute intervals for FMM Economic Bids cleared in HASP, which can vary from the MWhs schedules cleared in the FMM. The MWh quantities of Self-Schedules of Supply that clear in the HASP constitute a feasible Dispatch for the Real-Time Market at the time HASP is executed, but the HASP results do not constitute a final Schedule for Generating Units because these resources may be adjusted for reasons other than economics in the FMM or RTD, if necessary to manage Congestion and clear Supply and Demand. The submission of a change to an ETC Self-Schedule beyond the deadline specified in Section 16.9.1, that is permitted pursuant to the terms of the applicable ETC, shall not be deemed to be an unbalanced ETC Self-Schedule for the purposes of Settlement, consistent with the ETC and TOR Self-Schedule Settlement treatment described in Section 11.5.7.

### **34.2.3 Ancillary Services in the HASP and FMM**

All Operating Reserves procured in the Real-Time Market are Contingency Only Operating Reserves, as described in Section 30.5.2.6. Scheduling Coordinators submitting Ancillary Services Bids for Non-Dynamic System Resources in the Real-Time Market must also submit an Energy Bid under the same Resource ID for the associated Ancillary Services Bid. For these Non-Dynamic System Resources, the CAISO will only use the Ancillary Services Bid in the HASP optimization and will not Schedule Energy in the HASP, FMM, or RTD from the Energy Bid provided under the same Resource ID as the Ancillary

Services Bid. The CAISO may dispatch Energy from the Contingency Only Operating Reserves awarded to Non-Dynamic System Resources in the HASP through the Real-Time Contingency Dispatch as described in Section 34.5.2.

#### **34.2.4 HASP Results**

The CAISO publishes the results of the HASP processes no later than forty-five (45) minutes prior to the Trading Hour.

#### **34.2.5 Cessation of the HASP**

If, despite the variation of any time requirement or omission of any step, the CAISO is unable to operate any or all of the HASP processes, the CAISO may abort the HASP and perform all remaining Real-Time Market processes. When the CAISO aborts the HASP, Bids for HASP Block Intertie Schedules will revert to RUC Schedules and Day-Ahead Ancillary Service Awards.

### **34.3 Real-Time Unit Commitment**

#### **34.3.1 RTUC Optimization**

The Real-Time Unit Commitment (RTUC) process uses SCUC and is run every fifteen (15) minutes to make commitment decisions for Short Start Units having Start-Up Times for the next four to seven subsequent fifteen-minute intervals, depending on when during the hour the run occurs. For Multi-Stage Generating Resources the RTUC will issue a binding Transition Instruction separately from the binding Start-Up or Shut Down instructions. The RTUC can also be run with the Contingency Flag activated, in which case the RTUC can commit Contingency Only Operating Reserves. If RTUC is run without the Contingency Flag activated, it cannot commit Contingency Only Operating Reserves. RTUC is run at the following time intervals: (1) at approximately 12 minutes prior to the first Trading Hour, to serve as the HASP run, for T-45 minutes to T+60 minutes; (2) at approximately 7.5 minutes into the current hour for T-30 minutes to T+60 minutes; (3) at approximately 22.5 minutes into the current hour for T-15 minutes to T+60 minutes; and (4) at approximately 37.5 minutes into the current hour for T to T+60 minutes, where T is the beginning of the next Trading Hour. The HASP is a special RTUC run that is performed at approximately 71.5 minutes before each Trading Hour and has the additional responsibility of pre-dispatching Energy and awarding Ancillary Services for HASP Block Intertie Schedules. A Day-Ahead Schedule or RUC Schedule for an MSG Configuration that is later impacted by the resource's derate or

outages, will be reconsidered in the RTUC and the FMM taking into consideration the impacts of the derate or outage on the available MSG Configurations. Not all resources identified as needed in a given RTUC run will necessarily receive CAISO commitment instructions immediately, because during the Trading Day the CAISO may issue a commitment instruction to a resource only at the latest possible time that allows the resource to be ready to provide Energy when it is expected to be needed.

#### **34.3.2 Commitment of Short Start Units**

RTUC produces binding and advisory Start-Up and Shut-Down Dispatch Instructions for Short Start Units that have Start-Up Times that can be committed prior to the end of the relevant time period of the RTUC run as described in Section 34.3.1. A Start-Up Dispatch Instruction is considered binding in any given RTUC run if there would not be sufficient time for a subsequent RTUC run to Start-Up the resource. A Start-Up Instruction is considered advisory if it is not binding, such that the resource could achieve its target Start-Up Time as determined in the current RTUC run in a subsequent RTUC run based on its Start-Up Time. A Shut-Down Instruction is considered binding if the resource could achieve the target Shut-Down Time as determined in the current RTUC run in a subsequent RTUC run. A Shut-Down Dispatch Instruction is considered advisory if the resource Shut-Down Instruction is not binding such that the resource could achieve its target Shut-Down time as determined in the current RTUC run in a subsequent RTUC run. A binding Dispatch Instruction that results in a change in Commitment Status will be issued, in accordance with Section 6.3, after review and acceptance of the Start-Up Instruction by the CAISO Operator. An advisory Dispatch Instruction changing the Commitment Status of a resource may be modified by the CAISO Operator to a binding Dispatch Instruction and communicated in accordance with Section 6.3 after review and acceptance by the CAISO Operator. For Multi-Stage Generating Resources the CAISO will also issue binding Transition Instructions when the Multi-Stage Generating Resource must change from one MSG Configuration to another. A Transition Instruction is considered binding in any given RTUC run if the Transition Time for the Multi-Stage Generating Resource is such that there would not be sufficient time for a subsequent RTUC run to transition the resource.

#### **34.3.3 [Not Used]**

### **34.4 Fifteen Minute Market**

The CAISO conducts the Fifteen Minute Market using the second interval of each RTUC run horizon as

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

follows: (1) at approximately 7.5 minutes prior to the first Trading Hour, for T-45 minutes to T+60 minutes where the binding interval is T-30 to T-15; (2) at approximately 7.5 minutes into the current hour for T-30 minutes to T+60 minutes where the binding interval is T-15 to T; (3) at approximately 22.5 minutes into the current hour for T-15 minutes to T+60 minutes for the binding interval T to T+15; and (4) at approximately 37.5 minutes into the current hour for T to T+60 minutes for the binding interval T+15 to T+30, where T is the beginning of the next Trading Hour. In these intervals the CAISO conducts the FMM to (1) determine financially binding FMM Schedules and corresponding Locational Marginal Prices for all Pricing Nodes, including all Scheduling Points; (2) determine financially and operationally binding Ancillary Services Awards and corresponding ASMPs, procure required additional Ancillary Services and calculate ASMP used for settling procured Ancillary Service capacity for the next fifteen-minute Real-Time Ancillary Service interval for all Pricing Nodes, including Scheduling Points; (3) determine LAP Locational Marginal Prices that are the basis for settling Demand; and (4) determine FMM Uncertainty Awards. In any FMM interval that falls within a time period in which a Multi-Stage Generating Resource is transitioning from one MSG Configuration to another MSG Configuration, the CAISO: (1) will not award any incremental Ancillary Services; (2) will disqualify any Day-Ahead Ancillary Services Awards; (3) will disqualify Day-Ahead qualified Submissions to Self-Provide Ancillary Services Award, and (4) will disqualify Submissions to Self-Provide Ancillary Services in RTM. Each particular FMM market optimization produces binding settlement prices for Energy, Flexible Ramping Product, and Ancillary Services for the first FMM interval in the FMM horizon but the optimization considers the advisory results from subsequent market intervals within the FMM horizon. The CAISO settles Hourly Block Schedules from Proxy Demand Resources, Reliability Demand Response Resources, Hourly Intertie Schedules, and Hourly Ancillary Services Awards accepted in the HASP as FMM Schedules and FMM Ancillary Services Awards in accordance with Section 11.5 and 11.10.1.2, respectively. In the event that a FMM run fails, the CAISO reverts to Day-Ahead Market Ancillary Services Awards and RUC Schedules results corresponding to the same interval, or the corresponding interval from the previous RTUC. The FMM will clear Supply against the CAISO Forecast of CAISO Demand and exports. The FMM issues Energy Schedules and Ancillary Services Awards by twenty-two and a half minutes prior to the binding fifteen-minute interval.

#### **34.4.1 Real-Time Ancillary Services Procurement**

If the CAISO determines that additional Ancillary Services are required, other than those procured in the IFM, then the FMM will procure Ancillary Services on a fifteen (15) minute basis as necessary to meet reliability requirements and will determine Real-Time Ancillary Service interval ASMPs for such AS for the next Commitment Period. All Operating Reserves procured in the RTM are considered Contingency Only Operating Reserves. Any Ancillary Service awarded in FMM will be taken as fixed for the three (3) five (5) minute RTD intervals of its target fifteen (15) minute interval. In the FMM, all resources certified and capable of providing Operating Reserves that have submitted Real-Time Energy Bids shall also submit applicable Spinning or Non-Spinning Reserves Bids, respectively, depending on whether the resource is online or offline. The CAISO will utilize the RTM to procure Operating Reserves to restore its Operating Reserve requirements in cases when: (1) Operating Reserves awarded in the IFM have been dispatched to provide Energy, (2) resource(s) awarded to provide Operating Reserves in the IFM are no longer capable of providing such awarded Operating Reserves, or (3) the Operator determines that additional Operating Reserves are necessary to maintain Operating Reserves within NERC and WECC reliability standards, and any requirements of the NRC. The CAISO will utilize the FMM to procure additional Regulation capacity in Real-Time in cases when: (1) resource(s) awarded to provide Regulation in the IFM are no longer capable of providing such awarded Regulation, or (2) the Operator determines that additional Regulation is necessary to maintain sufficient control consistent with NERC and WECC reliability standards, and any requirements of the NRC and Good Utility Practice. The FMM will produce fifteen (15) minute ASMPs for the four (4) binding fifteen (15) minute intervals for the applicable Trading Hour. These fifteen (15) minute ASMPs are then used for the Settlement of the fifteen (15) minute AS Awards. The FMM run will also produce fifteen (15) minute Shadow Prices for each of the Interties for the four (4) fifteen (15) minute intervals for the applicable Trading Hour. These fifteen (15) minute Shadow Prices are then used to charge for Intertie Real-Time AS Award providers for Congestion on the Interties. FMM AS Awards are settled in accordance with 11.10.1.3.

#### **34.5 Real-Time Dispatch**

The RTED uses a Security Constrained Economic Dispatch (SCED) algorithm every five (5) minutes

throughout the Trading Hour to determine optimal Dispatch Instructions to balance Supply and Demand and determine Uncertainty Awards. The RTD can operate in three modes: RTED, RTCD and RTMD. In any given five-minute interval, the RTD optimization looks ahead over multiple five-minute intervals, but the CAISO issues Dispatch Instructions only for the next target five-minute interval. The CAISO will use the Real-Time Economic Dispatch (RTED) under most circumstances to optimally dispatch resources based on their Bids. The RTED can be used to Dispatch Contingency Only Operating Reserves, pursuant to Section 34.10, when needed to avoid an imminent System Emergency. The Real-Time Contingency Dispatch (RTCD) can be invoked in place of the RTED when a transmission or generation contingency occurs and will include all Contingency Only Operating Reserves in the optimization. If the CAISO awards a Non-Dynamic System Resource Ancillary Services in the IFM, HASP, or FMM and issues a Dispatch Instruction in the middle of the Trading Hour for Energy associated with its Ancillary Services (Operating Reserve) capacity, the CAISO will Dispatch the Non-Dynamic System Resource to operate at a constant level until the end of the Trading Hour. If the CAISO dispatches a Non-Dynamic System Resource such that the binding interval of the Dispatch is in the next Trading Hour, the CAISO will dispatch Energy from the Non-Dynamic System Resource at a constant level until the end of the next Trading Hour. The dispatched Energy will not exceed the awarded Operating Reserve capacity for the next Trading Hour and will be at a constant level for the entire next Trading Hour. The Real Time Manual Dispatch (RTMD) will be invoked as a fall-back mechanism only when the RTED or RTCD fails to provide a feasible Dispatch. These three (3) modes of the RTD are described in Sections 34.5.1, 34.5.2, and 34.5.3.

#### **34.5.1 Real-Time Economic Dispatch**

RTED mode of operation for RTD normally runs every five (5) minutes starting at approximately 7.5 minutes prior to the start of the next Dispatch Interval and produces binding Dispatch Instructions for Energy for the next Dispatch Interval and advisory Dispatch Instructions for multiple future Dispatch Intervals through at least the next Trading Hour. After being reviewed by the CAISO Operator, only binding Dispatch Instructions are communicated for the next Dispatch Interval in accordance with Section 6.3. RTED will produce a Dispatch Interval LMP for each PNode for the Dispatch Interval associated with the binding Dispatch Instructions. The RTED Dispatch target is the middle of the interval between five (5)

minutes boundary points. For Variable Energy Resources that forecast with 5 minute granularity, the CAISO will use the 5-minute forecast available prior to the start of the RTD optimization as an input into the optimization to determine the instructed Energy of the resource. RTD will be based on the 5-minute forecast value, subject to transmission and resource operational constraints, as the instructed Energy for the binding RTD interval provided that the Variable Energy Resource is optimized through the RTED.

### **34.5.2 Real-Time Contingency Dispatch**

#### **34.5.2.1 RTCD Mode**

RTCD mode of operation for RTD is run in response to a significant Contingency event, such that waiting until the next normal RTD run is not adequate and/or Operating Reserves identified as Contingency Only need to be activated in response to the event. The CAISO Operator may activate Operating Reserves identified as Contingency Only either on a resource specific-basis or for all such resources. When activating Contingency Only reserves in RTCD, the original Energy Bids associated with the resources providing Operating Reserve will be used for the RTCD. RTCD uses SCED to produce an optimized set of binding Dispatch Instructions for one (1) or more ten-minute Dispatch Intervals instead of a normal five-minute Dispatch Interval. Resources must respond to RTCD Dispatch Instructions as soon as possible. After being reviewed by the CAISO Operator, only binding Dispatch Instructions are communicated for the next Dispatch Interval in accordance with Section 6.3. When activating a RTCD and returning to normal RTED run after a RTCD run, five-minute Dispatch Interval LMPs will be produced for each PNode based on the last available price from either the RTCD or normal RTED run relative to a five-minute target Dispatch Interval.

#### **34.5.2.2 RTDD Mode**

RTDD is a special mode of the RTCD available to the CAISO Operator when 300 MW or more of capacity is needed to respond to a significant Contingency event. RTDD will not use SCED. Instead, RTDD will give Dispatch priority to Energy Bids from Operating Reserve capacity over Energy Bids from non-Operating Reserve capacity. RTDD will dispatch the Operating Reserve capacity in merit order and will then dispatch the non-Operating Reserve capacity in merit order based on available MW within the capacity's ten-minute ramping capability. As with the RTCD mode, in the RTDD mode, the CAISO Operator may activate Operating Reserves identified as Contingency Only either on a resource-specific

basis or for all such resources. Resources must respond to RTDD Dispatch Instructions as soon as possible. During each ten-minute Dispatch Interval in which RTDD is employed, the Energy Bid of the highest-priced resource dispatched under RTDD will be used to set the Market Clearing Price on a system-wide basis for all resources dispatched under RTDD. The Market Clearing Price will not reflect Transmission Losses or Transmission Constraints.

#### **34.5.3 Real-Time Manual Dispatch**

RTMD mode of operation for RTD is a merit-order run activated upon CAISO Operator request as a backup process in case the normal RTED process fails to converge. The RTMD run will provide the CAISO Operator a list of resources and quantity of MW available for Dispatch in merit-order based on Operational Ramp Rate but otherwise ignores Transmission Losses and Transmission Constraints. The CAISO Operator may dispatch resources from the list by identifying the quantity of FMM Instructed Imbalance Energy or RTD Instructed Imbalance Energy that is required for the system and/or directly selecting resources from the merit order taking into consideration actual operating conditions. After Dispatches have been selected, reviewed and accepted by the CAISO Operator, Dispatch Instructions will be communicated in accordance with Section 6.3. While the RTMD mode is being used for Dispatch a uniform five-minute MCP will be produced for all PNodes based on the merit order Dispatch. Until RTMD is actually run and RTMD-based Dispatch Instructions are issued after RTED fails to converge, all five-minute Dispatch Interval LMPs will be set to the last LMP at each Node produced by the last RTED run that converged.

#### **34.6 Short-Term Unit Commitment**

Once per hour, near the top of each Trading Hour, immediately after the FMM and the RTUC for the same interval is completed the CAISO performs a Short-Term Unit Commitment (STUC) run using SCUC and the CAISO Forecast of CAISO Demand over a 270-minute time horizon to commit Short Start Units, with Start-Up Times greater than the time period covered by the RTUC described in Section 34.3. In any given Trading Hour, the STUC may commit resources for the third fifteen-minute interval of the current Trading Hour and extending into the next four (4) Trading Hours. The STUC looks ahead over a period of at least three (3) hours beyond the Trading Hour for which the RTUC optimization was run. STUC will utilize: (1) Bids previously submitted in the RTM by the Scheduling Coordinator for that Trading Hour; or



(2) the Clean Bid from the Day-Ahead Market if the resource has a Day-Ahead Schedule or received a Start-Up Instruction in RUC for the Trading Hour; or (3) the Generated Bid if the resource has a Real-Time must-offer obligation for that Trading Hour and has not submitted a Bid in the RTM. The CAISO revises these replicated Bids each time the hourly STUC is run, to utilize the most recently available Bids. Not all resources identified for need as a given STUC run will necessarily receive CAISO commitment instructions immediately, because during the Trading Day the CAISO may issue a commitment instruction to a resource only at the latest possible time that allows the resource to be ready to provide Energy when it is expected to be needed. A Start-Up Instruction produced by STUC is considered binding if the resource could not achieve the target Start-Up Time as determined in the current STUC run in a subsequent RTUC or STUC run as a result of the Start-Up Time of the resource. A Start-Up Instruction produced by STUC is considered advisory if it is not binding, such that the resource could achieve its target start time as determined in the current RTUC run in a subsequent STUC or RTUC run based on its Start-Up Time. A binding Dispatch Instruction produced by STUC that results in a change in Commitment Status will be issued, in accordance with Section 6.3, after review and acceptance of the Start-Up Instruction by the CAISO Operator. The STUC may, but is not required to, decommit a resource in the same 270 minute look-ahead time period for which it was previously committed. STUC does not produce Locational Marginal Prices for Settlement. A Day-Ahead Schedule or RUC Schedule for an MSG Configuration that is later impacted by the resource's derate or outages, will be reconsidered in the STUC process taking into consideration the impacts of the derate or outage on the available MSG Configurations.

### **34.7 General Dispatch Principles**

The CAISO shall conduct all Dispatch activities consistent with the following principles:

- (1) The CAISO shall issue AGC instructions electronically as often as every four (4) seconds from its Energy Management System (EMS) to resources providing Regulation and on Automatic Generation Control to meet NERC and WECC performance requirements;
- (2) In each run of the RTED or RTCD the objective will be to meet the projected Energy requirements and Uncertainty Requirements over the applicable forward-looking time period of that run, subject to transmission and resource operational constraints, taking

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

into account the short term CAISO Forecast of CAISO Demand or forecast of EIM Demand, adjusted as necessary by the CAISO or EIM operator to reflect scheduled changes to Interchange and non-dispatchable resources in subsequent Dispatch Intervals;

- (3) Dispatch Instructions will be based on Energy Bids for those resources that are capable of intra-hour adjustments and will be determined through the use of SCED except when the CAISO must utilize the RTDD and RTMD;
- (4) When dispatching Energy from awarded Ancillary Service capacity the CAISO will not differentiate between Ancillary Services procured by the CAISO and Submissions to Self-Provide an Ancillary Service;
- (5) The Dispatch Instructions of a resource for a subsequent Dispatch Interval shall take as a point of reference the actual output obtained from either the State Estimator solution or the last valid telemetry measurement and the resource's operational ramping capability. For Multi-Stage Generating Resources the determination of the point of reference is further affected by the MSG Configuration and the information contained in the Transition Matrix;
- (6) In determining the Dispatch Instructions for a target Dispatch Interval while at the same time achieving the objective to minimize Dispatch costs to meet the forecasted conditions of the entire forward-looking time period, the Dispatch for the target Dispatch Interval will be affected by: (a) Dispatch Instructions in prior intervals; (b) actual output of the resource; (c) forecasted conditions in subsequent intervals within the forward-looking time period of the optimization; and (d) operational constraints of the resource, such that a resource may be dispatched in a direction for the immediate target Dispatch Interval that is different than the direction of change in Energy needs from the current Dispatch Interval to the next immediate Dispatch Interval, considering the applicable MSG Configuration;
- (7) Through Start-Up Instructions the CAISO may instruct resources to Start-Up or Shut-Down, or may reduce Load for Participating Loads, Reliability Demand Response

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

Resources, and Proxy Demand Resources, over the forward-looking time period for the RTM based on submitted Bids, Start-Up Bids and Minimum Load Bids, Pumping Costs and Pump Shut-Down Costs, as appropriate for the resource, or for Multi-Stage Generating Resource as appropriate for the applicable MSG Configuration, consistent with operating characteristics of the resources that the SCED is able to enforce. In making Start-Up or Shut-Down decisions in the RTM, the CAISO may factor in limitations on number of run hours or Start-Ups of a resource to avoid exhausting its maximum number of run hours or Start-Ups during periods other than peak loading conditions;

- (8) The CAISO shall only start up resources that can start within the applicable time periods of the various CAISO Markets Processes that comprise the RTM;
- (9) The RTM optimization may result in resources being shut down consistent with their Bids and operating characteristics provided that: (a) the resource does not need to be on-line to provide Energy; (b) the resource is able to start up within the applicable time periods of the processes that comprise the RTM; (c) the Generating Unit is not providing Regulation or Spinning Reserve; and (d) Generating Units online providing Non-Spinning Reserve may be shut down if they can be brought up within ten (10) minutes as such resources are needed to be online to provide Non-Spinning Reserves;
- (10) For resources that are both providing Regulation and have submitted Energy Bids for the RTM, Dispatch Instructions will be based on the Regulation Ramp Rate of the resource rather than the Operational Ramp Rate if the Dispatch Operating Target remains within the Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation;
- (11) For Multi-Stage Generating Resources the CAISO will issue Dispatch Instructions by Resource ID and Configuration ID;
- (12) The CAISO may issue Transition Instructions to instruct resources to transition from one MSG Configuration to another over the forward-looking time period for the RTM based on submitted Bids, Transition Bids, and Minimum Load Bids, as appropriate for the MSG Configurations involved in the MSG Transition, consistent with Transition Matrix and

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

operating characteristics of these MSG Configurations. The RTM optimization will factor in limitations on Minimum Run Time and Minimum Down Time defined for each MSG configuration and Minimum Run Time and Minimum Down Time at the Generating Unit.

- (13) The CAISO may make Reliability Demand Response Resources eligible for Dispatch in accordance with applicable Operating Procedure.

### **34.8 Dispatch Instructions to Units, Participating Loads, PDRs, and RDRRs**

The CAISO may issue Dispatch Instructions covering:

- (a) Ancillary Services;
- (b) Energy, which may be used for:
  - (i) Congestion relief;
  - (ii) provision of imbalance energy; or
  - (iii) replacement of an Ancillary Service;
- (c) agency operation of Generating Units, Participating Loads, Proxy Demand Resources, or Interconnection schedules, for example:
  - (i) output or Demand that can be Dispatched to meet Applicable Reliability Criteria;
  - (ii) Generating Units that can be Dispatched for Black Start;
  - (iii) Generating Units that can be Dispatched to maintain governor control regardless of their Energy schedules;
- (d) the operation of voltage control equipment applied on Generating Units as described in this CAISO Tariff;
- (e) MSS Load following instructions provided to the CAISO, which the CAISO incorporates to create their Dispatch Instructions;
- (f) Dispatch necessary to respond to a System Emergency or imminent emergency;
- (g) Transition Instructions;
- (h) Dispatch of Reliability Demand Response Resources pursuant to Section 34.22; or
- (i) Uncertainty Awards.

### **34.9 Utilization of the Energy Bids**

The CAISO uses Energy Bids for the following purposes: (i) satisfying Real-Time Energy needs; (ii)

mitigating Congestion; (iii) maintaining aggregate Regulation reserve capability in Real-Time; (iv) allowing recovery of Operating Reserves utilized in Real-Time operations; (v) procuring Voltage Support required from resources beyond their power factor ranges in Real-Time; (vi) establishing LMPs; (vii) as the basis for Bid Cost Recovery; (viii) to the extent a Real-Time Energy Bid Curve is submitted starting at minimum operating level for a Short Start Unit that is scheduled to be on-line, the RTM may Dispatch such a resource down to its minimum operating level and may issue a Shut-Down Instruction to the resource based on its Minimum Load Energy costs; and (ix) satisfying Uncertainty Requirements.

**34.9.1 [Not Used]**

**34.9.2 [Not Used]**

**34.9.3 [Not Used]**

**34.9.4 [Not Used]**

**34.10 Dispatch of Energy from Ancillary Services**

The CAISO may issue Dispatch Instructions to Participating Generators, Participating Loads, Proxy Demand Resources, (via communication with the Scheduling Coordinators of Demand Response Providers) System Units and System Resources contracted to provide Ancillary Services (either procured through the CAISO Markets, Self-Provided by Scheduling Coordinators, or through Exceptional Dispatch or dispatched in accordance with a Legacy RMR Contract) for the Supply of Energy. During normal operating conditions, the CAISO may Dispatch those Participating Generators, Participating Loads, Proxy Demand Resources, System Units and System Resources that have contracted to provide Spinning Reserve and Non-Spinning Reserve, except for those reserves designated as Contingency Only, in conjunction with the normal Dispatch of Energy. Contingency Only reserves are Operating Reserve capacity that have been designated, either by the Scheduling Coordinator or the CAISO, as available to supply Energy in the Real-Time only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency. During normal operating conditions, the CAISO may also elect to designate any reserve not previously identified as Contingency Only by Scheduling Coordinator as Contingency Only reserves. In the event of an unplanned Outage, a Contingency or a threatened or actual System Emergency, the CAISO may dispatch Contingency Only reserves. If Contingency Only reserves are dispatched through the RTCD, which as described in Section

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

34.5.2 only Dispatches in the event of a Contingency, such Dispatch and pricing will be based on the original Energy Bids. If Contingency Only or other scheduled reserves are dispatched in response to a System Emergency that has occurred because the CAISO has run out of Economic Bids when no Contingency event has occurred, the RTED will Dispatch such reserves using the Soft Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. For CAISO Market intervals for which the conditions and parameters specified in Section 27.4.3.3 apply, the RTED will Dispatch such reserves using the Hard Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. If a Participating Generator, Participating Load, System Unit or System Resource that is supplying Operating Reserve is Dispatched to provide Energy, the CAISO shall replace the Operating Reserve as necessary to maintain NERC and WECC reliability standards, including any requirements of the NRC. If the CAISO uses Operating Reserve to meet Real-Time Energy requirements, and if the CAISO needs Operating Reserves to satisfy NERC and WECC reliability standards, including any requirements of the NRC, the CAISO shall restore the Operating Reserves to the extent necessary to meet NERC and WECC reliability standards, including any requirements of the NRC through either the procurement of additional Operating Reserve in the RTM or the Dispatch of other Energy Bids in SCED to allow the resources that were providing Energy from the Operating Reserve to return to their Dispatch Operating Target. The Energy Bid Curve is not used by the AGC system when Dispatching Energy from Regulation. For Regulation Up capacity, the upper portion of the resource capacity from its Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve. For a resource providing Regulation Up or Operating Reserves the remaining Energy Bid Curve shall be allocated to any RTM AS Awards in the following order from higher to lower capacity where applicable: (a) Spinning Reserve; and (b) Non-Spinning Reserve. For resources providing Regulation Up, the applicable upper Regulation Limit shall be used as the basis of allocation if it is lower than the upper portion of the Energy Bid Curve. The remaining portion of the Energy Bid Curve, if there is any, shall constitute a Bid for RTM Energy. For Regulation Down capacity, the lower portion of the resource capacity from its applicable Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve.

**34.10.1 [Not Used]**

**34.10.2 [Not Used]**

### **34.11 Exceptional Dispatch**

The CAISO may issue Exceptional Dispatches for the circumstances described in this Section 34.11, which may require the issuance of forced Shut-Downs, forced Start-Ups, or forced MSG Transitions and shall be consistent with Good Utility Practice. Dispatch Instructions issued pursuant to Exceptional Dispatches shall be entered manually by the CAISO Operator into the Day-Ahead or RTM optimization software so that they will be accounted for and included in the communication of Day-Ahead Schedules and Dispatch Instructions to Scheduling Coordinators. Exceptional Dispatches are not used to establish the LMP at the applicable PNode. The CAISO will record the circumstances that have led to the Exceptional Dispatch. When considering the issuance of an Exceptional Dispatch to RA Capacity, the CAISO shall consider the effectiveness of the resource from which the capacity is being provided, along with Start-Up Bids, Transition Bids, and Minimum Load Bids, as adjusted pursuant to Section 30.7.10.2, if applicable, when issuing Exceptional Dispatches to commit a resource to operate at Minimum Load. When the CAISO issues Exceptional Dispatches for Energy to RA Capacity, the CAISO shall also consider Energy Bids, if available and as appropriate. Additionally, where the Exceptional Dispatch results in a CPM designation, the CAISO shall make CPM designations of Eligible Capacity for an Exceptional Dispatch by applying the criteria and procedures specified in Section 43A.4.

#### **34.11.1 System Reliability Exceptional Dispatches**

The CAISO may issue a manual Exceptional Dispatch for Generating Units, System Units, Participating Loads, Proxy Demand Resources, Reliability Demand Response Resources, Dynamic System Resources, RMR Resources, and Condition 2 Legacy RMR Units pursuant to Section 41.9 in Appendix H, in addition to or instead of resources with a Day-Ahead Schedule dispatched by RTM optimization software during a System Emergency, or to prevent an imminent System Emergency or a situation that threatens System Reliability and cannot be addressed by the RTM optimization and system modeling. To the extent possible, the CAISO shall utilize available and effective Bids from resources before dispatching resources without Bids. To deal with any threats to System Reliability, the CAISO may also issue a manual Exceptional Dispatch in the Real-Time for Non-Dynamic System Resources that have not been or would not be selected by the RTM for Dispatch, but for which the relevant Scheduling Coordinator has received a HASP Block Intertie Schedule.

#### **34.11.2 Other Exceptional Dispatches**

The CAISO may also issue manual Exceptional Dispatches for resources in addition to or instead of resources with a Day-Ahead Schedule or dispatched by the RTM optimization software to: (1) perform Ancillary Services testing; (2) perform pre-commercial operation testing for Generating Units; (3) perform periodic testing of Generating Units, including PMax testing; (4) mitigate for Overgeneration; (5) provide for Black Start; (6) provide for Voltage Support; (7) accommodate TOR or ETC Self-Schedule changes after the Market Close of the RTM; (8) reverse a commitment instruction issued through the IFM that is no longer optimal as determined through RUC; or (9) in the event of a Market Disruption, to prevent a Market Disruption, or to minimize the extent of a Market Disruption; or (10) reverse the operating mode of a Pumped-Storage Hydro Unit. The CAISO will not consider Start-Up Costs, Minimum Load Costs, or Energy Bids in connection with the issuance of Exceptional Dispatches to perform Ancillary Services testing, to perform PMax testing, or to perform pre-commercial operation testing for Generating Units.

#### **34.11.3 Transmission-Related Modeling Limitations**

The CAISO may also manually Dispatch resources in addition to or instead of resources with a Day-Ahead Schedule or dispatched by the RTM optimization software, during or prior to the Real-Time as appropriate, to address transmission-related modeling limitations in the Full Network Model.

Transmission-related modeling limitations for the purposes of Exceptional Dispatch, including for settlement of such Exceptional Dispatch as described in Section 11.5.6, shall consist of any FNM modeling limitations that arise from transmission maintenance, lack of Voltage Support at proper levels as well as incomplete or incorrect information about the transmission network, for which the Participating TOs have primary responsibility. The CAISO shall also manually Dispatch resources under this Section 34.11.3 in response to system conditions including threatened or imminent reliability conditions for which the timing of the Real-Time Market optimization and system modeling are either too slow or incapable of bringing the CAISO Controlled Grid back to reliable operations in an appropriate time-frame based on the timing and physical characteristics of available resources to the CAISO. All reliability-based Exceptional Dispatch Instructions for Reliability Demand Response Resources, including for testing, will be issued under this Section 34.11.3.

#### **34.11.4 Reporting Requirements**



California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

The CAISO will report on Exceptional Dispatches as part of market performance reporting and post those reports on the CAISO Website.

#### **34.12 CAISO Market Adjustment to Non-Priced Quantities in the RTM**

All Self-Schedules are respected by the SCED and SCUC to the maximum extent possible and are protected from curtailment in the Congestion Management process to the extent that there are effective Economic Bids that can relieve Congestion. If all Effective Economic Bids for the RTM are exhausted, all Self-Schedules between the Minimum Load and the lowest Energy level of the first Energy Bid point will be subject to uneconomic adjustments based on assigned scheduling priorities. This functionality of the optimization software is implemented through the setting of scheduling parameters as described in Section 27.4.3 and specified in Section 27.4.3.1 and the BPMs. Through this process, imports and exports may be reduced to zero, Demand may be reduced to zero, and Generation may be reduced to a lower operating limit (or Regulation Limit) (or to a lower Regulation Limit plus any qualified Regulation Down Award or Self-Provided Ancillary Services, if applicable). Any Self-Schedules below the Minimum Load level are treated as fixed Self-Schedules and are not subject to uneconomic adjustments for Congestion Management but may be subject to decommitment via an Exceptional Dispatch if necessary as a last resort to relieve Congestion that could not otherwise be managed.

##### **34.12.1 Increasing Supply**

The scheduling priorities as defined in the RTM optimization to meet the need for increasing Supply as reflected from higher to lower priority are as follows:

<b>Scheduling Run Priority</b>	<b>Scheduling Parameters Under Soft Energy Bid Cap (27.4.3.2)</b>	<b>Scheduling Parameters Under Hard Energy Bid Cap (27.4.3.3)</b>
CAISO Forecast of CAISO Demand; the export Self-Schedule of a Priority Wheeling Through; exports explicitly identified in a Resource Adequacy Plan backed by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports; or Self-Schedules for exports at Scheduling Points in the RTM backed by Generation from non-Resource Adequacy Capacity or from non-RUC Capacity	\$1450	\$2900

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

RUC Schedules that are Self-Schedules of exports at Scheduling Points not backed by Generation from non-Resource Adequacy Capacity, or the RUC Schedules that are the export Self-Schedules of non-Priority Wheeling Throughs	\$1250	\$2500
Real-Time Market Self-Schedules of exports at Scheduling Points not backed by Generation from non-Resource Adequacy Capacity or non-RUC capacity, or the Real-Time Market Self-Schedules that are the export Self-Schedules of a non-Priority Wheeling Through	\$1150	\$2300
Contingency Only Operating Reserve if activated by Operator to provide Energy (as indicated by the Contingency Flag and the Contingency condition)	\$1000	\$2000

#### 34.12.2 Decreasing Supply

The scheduling priorities as defined in the RTM optimization to meet the need for decreasing Supply as reflected from higher to lower priority are as follows:

<b>Scheduling Run Priority</b>	<b><u>Scheduling Parameters Under Soft Energy Bid Cap (27.4.3.2)</u></b>	<b><u>Scheduling Parameters Under Hard Energy Bid Cap (27.4.3.3)</u></b>
Non-Participating Load increase	Not Applicable	Not Applicable
Reliability Must Run (RMR) Schedule (Day-Ahead manual pre-dispatch or Manual RMR Dispatches or Dispatches that are flagged as RMR Dispatches following the MPM, for Legacy RMR Units and Exceptional Dispatch for RMR Resources process)	-\$6000	-\$12000
Transmission Ownership Right (TOR) Self-Schedule	-\$5900	-\$11800
Existing Rights (ETC) Self-Schedule	-\$5100 to -\$5900	-\$10200 to -\$11800
Regulatory Must-Run and Regulatory Must-Take (RMT) Self-Schedule;	-\$1400	-\$2800
Participating Load increase	Not Applicable	Not Applicable
Day-Ahead Supply Schedule	-\$1200	-\$2400
Self-Schedule Hourly Block	-\$1100	-\$2200

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

Import Self-Schedule of a non-Priority Wheeling Through	\$0	\$0
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These dispatch priorities as defined in the RTM optimization may be superseded by operator actions and procedures as necessary to ensure reliable operations.

### **34.12.3 Post-HASP Process**

In the event there is a transmission limitation on an Intertie in the import direction and HASP cannot meet CAISO Forecast of CAISO Demand or fully accommodate a Priority Wheeling Through transaction, the CAISO will perform a post-HASP process to pro rata allocate available transmission capacity between CAISO Demand and Priority Wheeling Through transactions, as described in the Business Practice Manual. The CAISO Demand pro rata share will be based on the lower of (1) the sum of the Real-Time Bid quantities of applicable Resource Adequacy Resources, shown non-Resource Adequacy Resources under contract, CPM imports with ATC or supported by TRM, resources supported by ATC awarded in the daily request window process, and imports supported by TRM or (2) the sum of shown Resource Adequacy Capacity and non-Resource Adequacy Capacity under contract that are supported by ATC, including resources supported by capacity awarded ATC in the daily request window process, CPM import capacity awarded ATC or supported by TRM, plus the remaining TRM quantity. The Priority Wheeling Through pro rata share for each Self-Schedule will be based on the lower of (1) the submitted Real-Time Market Self-Schedules of the Priority Wheeling Through transactions, or (2) the Priority Wheeling Through quantity awarded ATC under Section 23. The ATC for CAISO Demand and Priority Wheeling Throughs cannot exceed the Total Transfer Capability (TTC) of an Intertie. The amount of capacity considered for pro rata allocation in the post-HASP Process cannot exceed the TTC of the Intertie. The ATC the CAISO awards to Priority Wheeling Through transactions in the post-HASP Process cannot exceed the Priority Wheeling Through quantity the CAISO calculates in this pro rata allocation. In no event, will the CAISO reduce Priority Wheeling Through transactions solely in the event of a CAISO supply shortfall that triggers a power balance infeasibility. Energy scheduled via the post-HASP process will be settled as Exceptional Dispatch Energy pursuant to Section 11.5.6.1, as applicable.

### **34.12.4**

At its sole discretion, the CAISO may, after HASP, apply the market scheduling run priorities in Section

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

34.12.1 through manual operator intervention to curtail lower priority HASP hourly block export schedules even before the CAISO Balancing Authority Area is in an energy emergency alert. When the CAISO is in an emergency alert level 3 (EEA 3), subject to operator judgement and consistent with good utility practice, it will curtail in accordance with the priority specified below to prevent the need to arm Load, or reduce the amount of Load that is armed, and meet its operating reserve obligations. For purposes of this section, the CAISO would curtail lower priority exports in the following order:

- (a) Real-Time economic hourly block export schedules that cleared HASP,
- (b) Real-Time Self-Schedule hourly block export schedules not backed by Generation from non-Resource Adequacy Capacity and cleared HASP, then
- (c) Day-Ahead hourly block export schedules not backed by Generation from non-Resource Adequacy Capacity that also cleared HASP.

To accommodate curtailment of lower priority exports in the order set forth above, the CAISO will consider any schedule to export energy, other than an export backed by Generation from non-Resource Adequacy Capacity, as firm provisional energy. A Scheduling Coordinator's failure to comply with the tagging requirements specified in the Business Practice Manual for any export schedule other than an export backed by Generation from non-Resource Adequacy Capacity will result in a default to the priority specified in (a) above (e.g., will be curtailed in the same tranche as the Real-Time economic hourly block export schedules that cleared HASP).

### **34.13 Means of Dispatch Communication**

The CAISO dispatches Regulation by AGC to Participating Generators and, for Dynamic System Resources, through dedicated communication links that satisfy the CAISO's standards for external imports of Regulation. The CAISO communicates all other Dispatch Instructions electronically, except that, at the CAISO's discretion, the CAISO may communicate Dispatch Instructions by telephone, or facsimile. Scheduling Coordinators shall confirm the Dispatch Instructions that are communicated orally by repeating them to the CAISO employee providing the Dispatch Instruction. Except in the case of deteriorating system conditions or an actual or threatened System Emergency, and except for Dispatch Instructions for Regulation, the CAISO sends all Dispatch Instructions to the Scheduling Coordinator. The recipient Scheduling Coordinator shall immediately communicate the Dispatch Instruction to the

operator of the resource. The CAISO may, with the prior permission of the applicable Scheduling Coordinator, communicate with and give Dispatch Instructions to the operators of the resource directly without having to communicate through their Scheduling Coordinator. The CAISO shall record the communications between the CAISO and Scheduling Coordinators relating to Dispatch Instructions in a manner that permits auditing of the Dispatch Instructions, and of the response of the resources, as applicable. In situations of deteriorating system conditions or System Emergency, the CAISO reserves the right to communicate directly with the resource(s) as required to ensure System Reliability. Scheduling Coordinators are required to advise the CAISO immediately of any change in resource availability that prevents the recipient of a Dispatch Instruction from performing in accordance with that Dispatch Instruction.

#### **34.13.1 Response Required by Resources to Dispatch Instructions**

Resources must:

- (a) unless otherwise stated in the Dispatch Instruction, comply with a Dispatch Instruction immediately upon receipt;
- (b) respond to all Dispatch Instructions in accordance with Good Utility Practice;
- (c) meet voltage criteria in accordance with the provisions in the CAISO Tariff;
- (d) meet any applicable Operational Ramp Rates;
- (e) respond to Dispatch Instructions for Ancillary Services within the required time periods and (in the case of Participating Generators providing Regulation) respond to AGC from the EMS;
- (f) if a time frame is stated in a Dispatch Instruction, respond to a Dispatch Instruction within the stated time frame; and
- (g) not intentionally generate above or below Dispatch Operating Target.

Notwithstanding the requirements to comply with and respond to Dispatch Instructions, when an Eligible Intermittent Resource's Dispatch Operating Target is equal to its forecasted output, it may produce to its capability. An Eligible Intermittent Resource in the process of developing a CAISO forecast pursuant to Section 3.1 of Appendix Q may produce to its capability when its Dispatch Operating Target is equal to its scheduled output.

In any event, the CAISO may issue an Operating Instruction if necessary to maintain system reliability consistent with Sections 7.6 or 7.7. Upon receiving such an Operating Instruction, an Eligible Intermittent Resource must not generate in excess of its Dispatch Operating Target until the Operating Instruction expires, except when physically impossible. When such an Operating Instruction is in effect, Eligible Intermittent Resources should follow a linear ramp between Dispatch Operating Targets, except when physically impossible.

#### **34.13.2 Failure to Conform to Dispatch Instructions**

In the event that, in carrying out the Dispatch Instruction, an unforeseen problem arises (relating to plant operations or equipment, personnel or the public safety), the recipient of the Dispatch Instruction must notify the CAISO or, in the case of a Generator, the relevant Scheduling Coordinator immediately. The relevant Scheduling Coordinator shall notify the CAISO of the problem immediately. If a resource is unavailable or incapable of responding to a Dispatch Instruction, or fails to respond to a Dispatch Instruction in accordance with its terms, the resource shall be considered to be non-conforming to the Dispatch Instruction unless the resource has notified the CAISO of an event that prevents it from performing its obligations within thirty (30) minutes of the onset of such event through a submission in the CAISO's outage management system pursuant to Section 9. Notification of non-compliance via the Automated Dispatch System (ADS) will not supplant nor serve as the official notification mechanism to the CAISO. If the resource is considered to be non-conforming as described above, the Scheduling Coordinator for the resource concerned shall be subject to Uninstructed Imbalance Energy as specified in Section 11.5.2. This applies whether any Ancillary Services concerned are contracted or Self-Provided. For a Non-Dynamic System Resource Dispatch Instruction prior to the Trading Hour, the Scheduling Coordinator shall inform the CAISO of its ability to conform to a Dispatch Instruction via ADS. The Non-Dynamic System Resource has the option to accept, partially accept, or decline the Dispatch Instruction, but in any case must respond within the timeframe specified in a Business Practice Manual. The Non-Dynamic System Resource can change its response within the indicated timeframe. If a Non-Dynamic System Resource does not respond within the indicated timeframe, the Dispatch Instruction will be considered accepted.

When a resource demonstrates that it is not following Dispatch Instructions, the RTM will no longer

assume that the resource will ramp from its current output level. The RTM assumes the resource to be “non-compliant” if it is deviating its five (5)-minute Ramping capability for more than N intervals by a magnitude determined by the CAISO based on its determination that it is necessary to improve the calculation of the expected imbalance energy as further defined in the BPM. When a resource is identified as “non-compliant,” RTM will set the Dispatch Operating Target for that resource equal to its actual output in the Market Clearing software such that the persistent error does not cause excessive AGC action and consequently require CAISO to take additional action to comply with reliability requirements. Such a resource will be considered to have returned to compliance when the resource’s State Estimator or telemetry value (whichever is applicable) is within the above specified criteria. During the time when the resource is “non-compliant,” the last applicable Dispatch target shall be communicated to the Scheduling Coordinator as the Dispatch Operating Target. The last applicable Dispatch target may be (i) the last Dispatch Operating Target within the current Trading Hour that was instructed prior to the resource becoming “non-compliant,” or (ii) the Day-Ahead Schedule, or (iii) awarded Self-Schedule Hourly Block depending on whether the resource submitted a Bid and the length of time the resource was “non-compliant,” or (iv) for a Dynamic System Resource or a Pseudo-Tie Generating Unit that is an Eligible Intermittent Resource, the most recently available telemetry for the actual output. During the time the resource is deemed to be “non-compliant” the CAISO will suspend the resource’s eligibility for Ancillary Services and Uncertainty Awards.

#### **34.13.3 Co-located Resources and Dispatch Instructions**

Co-located Resources that are Non-Generator Resources may deviate from Dispatch Instructions only pursuant to this Section. A Co-located Resource that is a Non-Generator Resource may deviate from a Dispatch Instruction where a co-located Eligible Intermittent Resource at the same Generating Facility is producing above its Dispatch Operating Target due to meteorological conditions such that the Co-located Resources’ combined output would exceed the Interconnection Service Capacity of the Co-located Resources, or otherwise threaten reliability or safety. Such deviations may only occur through proper control technologies that ensure the combined output of all Co-located Resources does not exceed the Generating Facility’s Interconnection Service Capacity. Co-located Resources that are Non-Generator Resources may deviate from Dispatch Instructions to observe their registered Charging Constraints

consistent with Section 30.5.6.3. All deviations from Dispatch Instructions will be subject to Uninstructed Imbalance Energy.

#### **34.14 Metered Subsystems**

Scheduling Coordinators that represent MSSs may submit Bids for Supply of Energy to the RTM, irrespective of whether the MSS is a Load following MSS. All Bids submitted for MSS generating resources for the RTM and all Dispatch Instructions shall be generating resource-specific. MSS non-Load following resources are responsible for following Dispatch Instructions. Load following MSS Operators shall provide the CAISO with an estimate of the number of MWs the applicable generating resource(s) will be generating over the next two hours in five-minute interval resolution. The Dispatch Instructions for Load following resources are incorporated with Generation estimates provided by MSS Operators. Such MSS Load following resources can deviate from the Dispatch Instructions in Real-Time to facilitate the following of Load without being subject to the Uninstructed Deviation Penalty as further described in Section 11.23. The State Estimator will estimate all MSS Load in Real-Time and the CAISO will incorporate the information provided by the Load following MSS Operator for utilization in clearing the RTM and its Dispatch Instructions.

##### **34.14.1 [Not Used]**

#### **34.15 Treatment of Resource Adequacy Capacity in the RTM**

Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40 shall be required to submit Energy Bids for: (1) all such Resource Adequacy Capacity and (2) any Ancillary Services capacity awarded or self-provided in the IFM, HASP, or Real-Time Market. In the absence of submitted Bids, as part of the validation described in 30.7, Generated Bids will be used for Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40. For any capacity from a Resource Adequacy Resource not required to offer Resource Adequacy Capacity in accordance with Section 40 that was awarded or is self-providing Operating Reserves capacity in the IFM, Scheduling Coordinators must submit an Energy Bid for no less than the amount of awarded or self-provided Operating Reserves capacity above their Day-Ahead Schedule. Resource Adequacy Resources that are not required to offer their Resource Adequacy Capacity in accordance with Section 40 may voluntarily submit Energy Bids or Ancillary Services Bids. Submitted



California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

Energy Bids shall be subject to the maximum and minimum Bid requirements and Mitigation Measures as set forth in Section 39.

**34.15.1 [Not Used]**

**34.15.2 [Not Used]**

**34.15.3 [Not Used]**

**34.15.4 [Not Used]**

**34.15.5 [Not Used]**

**34.15.6 [Not Used]**

**34.16 Real-Time Activities in the Hour Prior to Settlement Period**

**34.16.1 Confirm Interchange Transaction Schedules (ITSs)**

Also in the hour prior to the beginning of the Operating Hour the CAISO will:

- (a) adjust Interchange transaction schedules (ITSs) as required under Existing Contracts in accordance with the procedures in the CAISO Tariff for the management of Existing Contracts;
- (b) adjust ITSs as required by changes in transfer capability of transmission paths occurring after Market Close of the RTM; and
- (c) agree on ITS changes with adjacent Balancing Authorities.

**34.16.2 [Not Used]**

**34.16.3 [Not Used]**

**34.17 Rules for Real-Time Dispatch of Imbalance Energy Resources**

**34.17.1 Resource Constraints**

The SCED shall enforce the following resource physical constraints:

- (a) **Minimum and maximum operating resource limits.** Outages and limitations due to transmission clearances shall be reflected in these limits. The more restrictive operating or regulating limit shall be used for resources providing Regulation so that the SCED shall not Dispatch them outside their Regulating Range.
- (b) **Forbidden Operating Regions.** When ramping in the Forbidden Operating Region, the implicit ramp rate will be used as determined based on the time it takes for the resource

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

to cross its Forbidden Operating Region. A resource can only be ramped through a Forbidden Operating Region after being dispatched into a Forbidden Operating Region. The CAISO will not Dispatch a resource within its Forbidden Operating Regions in the Real-Time Market, except that the CAISO may Dispatch the resource through the Forbidden Operating Region in the direction that the resource entered the Forbidden Operating Region at the maximum applicable Ramp Rate over consecutive Dispatch Intervals. A resource with a Forbidden Operating Region cannot provide Ancillary Services in a particular fifteen (15) minute Dispatch Interval unless that resource can complete its transit through the relevant Forbidden Operating Region within that particular Dispatch Interval.

- (c) **Operational Ramp Rates and Start-Up Times.** The submitted Operational Ramp Rate for resources shall be used as the basis for all Dispatch Instructions, provided that the Dispatch Operating Target for resources that are providing Regulation remains within their applicable Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation. The Ramp Rate for Non-Dynamic System Resources cleared in the FMM will not be observed. Rather, the ramp of the Non-Dynamic System Resource will respect inter-Balancing Authority Area Ramping conventions established by WECC. Ramp Rates for Dynamic System Resources will be observed like Participating Generators in the RTD. Each Energy Bid shall be Dispatched only up to the amount of imbalance energy that can be provided within the Dispatch Interval based on the applicable Operational Ramp Rate. The Dispatch Instruction shall consider the relevant Start-Up Time as, if the resource is off-line, the relevant Operational Ramp Rate function, and any other resource constraints or prior commitments such as Schedule changes across hours and previous Dispatch Instructions. The Start-Up Time shall be determined from the Start-Up Time function and when the resource was last shut down. The Start-Up Time shall not apply if the corresponding resource is on-line or expected to start.

- (d) **Maximum number of daily Start-Ups.** The SCED shall not cause a resource to exceed

its daily maximum number of Start-Ups.

- (e) **Minimum Run Time and Down Time.** The SCED shall not start up off-line resources before their Minimum Down Time expires and shall not shut down on-line resources before their Minimum Run Time expires. For Multi-Stage Generating Resources these requirements shall be observed both for the Generating Unit and MSG Configuration.
- (f) **Operating (Spinning and Non-Spinning) Reserve.** The SCED shall Dispatch Spinning and Non-Spinning Reserve subject to the limitations set forth in Section 34.18.2.
- (g) **Non-Dynamic System Resources.** If Dispatched, each Non-Dynamic System Resource flagged for hourly pre-dispatch in the next Trading Hour shall be Dispatched to operate at a constant level over the entire Trading Hour. The HASP shall perform the hourly pre-dispatch for each Trading Hour once prior to the Operating Hour. The hourly pre-dispatch shall not subsequently be revised by the SCED and the resulting HASP Block Intertie Schedules are financially binding and are settled pursuant to Section 11.5.4.
- (h) **Daily Energy use limitation to the extent that Energy limitation is expressed in a resource's Bid.** If the Energy Limits are violated for purposes of Exceptional Dispatches for System Reliability, the Bid will be settled as provided in Section 11.5.6.1.

#### **34.17.2 Calculation of Dispatch Operating Points After Instructions**

The RTED process shall calculate Dispatch Operating Points as follows:

- (a) After the RTUC issues a Start-Up Instruction, RTED moves the Dispatch Operating Point of a resource immediately from zero (0) MW to the applicable Minimum Load, as defined in the Master File or as modified via pursuant to Section 9.3.3, of a Generating Unit at the start of the Dispatch Interval pertaining to the Start-Up Instruction. The Dispatch Operating Point shall then be determined using the resource's applicable Operational Ramp Rate as further described in Sections 34.17.4, 34.17.5, and 34.17.6.
- (b) After the RTUC issues a Shut-Down Instruction, RTED shall first ramp the Dispatch Operating Point down to the applicable Minimum Load, as defined in the Master File or as modified pursuant to Section 9.3.3, of a Generating Unit at the end of the Dispatch Interval pertaining to the Shut-Down Instruction, using the resource's applicable

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

Operational Ramp Rate. The Dispatch Operating Point shall then be set immediately to zero (0) MW.

- (c) After the RTUC issues a Transition Instruction: (1) for MSG Configurations where the operating ranges of the two MSG Configurations do not overlap, the RTD will move the Dispatch Operating Point of the resource immediately from the boundary of the “from” MSG Configuration to the boundary of the “to” MSG Configuration, as defined in the Master File or as modified via the CAISO’s outages reporting mechanism defined in Section 9, of a Multi-Stage Generating Resource; and (2) for MSG Configurations for which the operating ranges of the two MSG Configurations do overlap, RTD will move the Dispatch Operating Point of the resource within the overlapping operating range of the MSG Configuration until the MSG Transition is complete.

**34.17.3 [Not Used]**

**34.17.4 Inter-Hour Dispatch of Resources with Real-Time Energy Bids**

Dispatch Instructions associated with the ramp between the Real-Time Market Bid in one hour and the Real-Time Market Bid in the immediately succeeding Trading Hour shall be determined optimally by the SCED if the CAISO has Bids for either or both relevant Operating Hours. For any Operating Hour(s) for which Bids have been submitted Dispatch Instructions will be optimized such that the Dispatch Operating Point is within the Bid range(s). For any Operating Hour without submitted Bids, Dispatch Instructions will be optimized such that the Dispatch Operating Point conforms to the Schedule within the Operating Hour. Energy resulting from the Standard Ramp shall be deemed Standard Ramping Energy and will be settled in accordance with Section 11.5.1. Energy resulting from any ramp extending beyond the Standard Ramp will be deemed Ramping Energy Deviation and will be settled in accordance with Section 11.5.1. Energy delivered or consumed as a result of CAISO Dispatch of a resource’s Energy Bid in one Operating Hour to a Dispatch Operating Point such that the resource cannot return to its successive Operating Hour Schedule or to an infra-marginal operating point by the beginning of the next Operating Hour is Residual Imbalance Energy and shall be settled as RTD Instructed Imbalance Energy as provided for in Section 11.5.1 and also may be eligible for recovery of its applicable Energy Bid Costs in accordance with Section 11.8. Similarly, Energy delivered or consumed as a result of CAISO Dispatch of

a resource's Energy Bid in a future Operating Hour to a Dispatch Operating Point different from its current Operating Point prior to the end of the current Operating Hour is also considered Residual Imbalance Energy and shall be settled as RTD Instructed Imbalance Energy as provided for in Section 11.5.1 and also may be eligible for recovery of its applicable Energy Bid Costs in accordance with Section 11.8. When Ramping Energy Deviation and Residual Imbalance Energy coexist within a given Dispatch Interval, the Ramping Energy Deviation shall be the portion of RTD Instructed Imbalance Energy that is produced or consumed within the Schedule-change band defined by the accepted RTM Bids of the two consecutive Settlement Periods; the Residual Imbalance Energy shall be the portion of RTD Instructed Imbalance Energy that is produced or consumed outside the Schedule-change band.

#### **34.17.5 Inter-Hour Resources Dispatch without Real-Time Energy Bids**

Dispatch Instructions shall be issued for each Dispatch Interval as needed to prescribe the ramp between a resource's accepted Self-Schedule in one Trading Hour and its accepted Self-Schedule in the immediately succeeding Trading Hour. Such Dispatch Instructions shall be based on the lesser of: (1) the applicable Operational Ramp Rate as provided for in Section 30.7.7 and (2) the Ramp Rate associated with the Standard Ramp. The Dispatch Instructions for Ramping of Generating Units without Real-Time Energy Bids in both Operating Hours shall ramp the resource between hourly Schedules symmetrically to the extent possible subject to the Regulation Ramping limitations across hourly boundaries in twenty (20) to sixty (60) minutes assuming Congestion can be resolved utilizing Economic Bids. The minimum twenty (20)-minute ramp is required for smooth hourly Schedule changes and is consistent with Intertie scheduling agreements between Balancing Authority Areas. Energy resulting from the Standard Ramp shall be deemed Standard Ramping Energy and will be settled in accordance with Section 11.5.1. Energy resulting from any ramp extending beyond the Standard Ramp will be deemed Ramping Energy Deviation and will be settled in accordance with Section 11.5.1.

#### **34.17.6 Intra-Hour Exceptional Dispatches**

For the special case where an Exceptional Dispatch begins in the new hour and the rules above would result in the violation of the resource's inter-temporal constraint(s), the following rules are applied and the Energy is settled as FMM Exceptional Dispatch Energy or RTD Exceptional Dispatch Energy as described in Section 11.5.6.

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

- (a) If the ramp time is greater than one hour or greater than what can be achieved when RTM receives the constraint, RTM starts the ramp at the earliest possible time and continues Ramping the resource in the new Trading Hour.
- (b) If the ramp time results in starting the ramp less than ten (10) minutes before the start of the hour, RTM instead starts the ramp at ten (10) minutes before the start of the hour and ramps the resource at a uniform rate so that it meets the constraint by the start time of the Exceptional Dispatch.
- (c) If the new hour's Day-Ahead Schedule is beyond the Exceptional Dispatch constraint, RTM resumes the basic Ramping rules after the Exceptional Dispatch constraint is met, but limits the Ramp Rate as necessary to ensure that the resource does not complete its ramp before ten (10) minutes after the hour.

**34.18 Ancillary Services in the Real-Time Market**

**34.18.1 Dispatch of Self-Provided Ancillary Services**

The Scheduling Coordinator scheduling an Interruptible Import will be responsible for Operating Reserves associated with the Interruptible Import, regardless of whether the Scheduling Coordinator is an LSE or not. For all other Submissions to Self-Provide an Ancillary Service, the Energy Bid shall be used to determine the Dispatch, subject to the limitation on the Dispatch of Spinning Reserve and Non-Spinning Reserve set forth in Section 34.18.2.2.

**34.18.2 Ancillary Services Requirements for RTM Dispatch**

The following requirements apply to the Dispatch of Ancillary Services in the RTM:

**34.18.2.1 Regulation**

- (a) Regulation provided from Generating Units or System Resources must meet the standards specified in this CAISO Tariff and Part A of Appendix K;
- (b) The CAISO will Dispatch Regulation through the EMS, which Dispatch of Regulation by EMS does not set the RTM LMP;
- (c) In the event of an unscheduled increase in system Demand or a shortfall in Generation output and Regulation margin drops, the CAISO will use Dispatch Energy in the RTM or Dispatch Operating Reserve to restore Regulation margin; and

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

- (d) When scheduled Operating Reserve is used for restoration of Regulation reserve, the CAISO shall arrange for the replacement of that Operating Reserve.

**34.18.2.2 Operating Reserves**

- (a) Spinning Reserve:
  - (i) Spinning Reserve provided from Generating Units and System Resources must meet the standards specified in Part B of Appendix K;
  - (ii) The CAISO will Dispatch Spinning Reserve as may be required to meet the Applicable Reliability Criteria;
  - (iii) The CAISO may Dispatch Spinning Reserve as balancing Energy to return Regulation Generating Units to their Set Points and restore full Regulation margin; and
  - (iv) The CAISO will Dispatch Spinning Reserve as determined by the SCED, subject to Sections 34.4 and 34.10.
- (b) Non-Spinning Reserve:
  - (i) Non-Spinning Reserve provided from Generating Units, Demands, and System Resources must meet the standards specified in Part C of Appendix K;
  - (ii) The CAISO may Dispatch Non-Spinning Reserve in place of Spinning Reserve to meet Applicable Reliability Criteria;
  - (iii) The CAISO will Dispatch Non-Spinning Reserve as determined by the SCED, subject to Sections 34.4 and 34.10; and
  - (iv) The CAISO may Dispatch Non-Spinning Reserve to replace Spinning Reserve if there is a shortfall in Spinning Reserve because of a deficiency of balancing Energy.

**34.18.2.3 Replacement of Operating Reserve**

If Operating Reserve is used for Energy, the CAISO may replace such Operating Reserve through Dispatch of additional Energy available from Energy Bids submitted to the RTM or through procurement of additional reserves based on optimization of a resource's RTM Ancillary Service Bid and its Energy Bid.

**34.18.2.4 Voltage Support**

- (a) Voltage Support provided from Generating Units shall meet the standards specified in this CAISO Tariff and Part E of Appendix K.
- (b) The CAISO may Dispatch Generating Units to increase or decrease MVar output within power factor limits established pursuant to Section 8.2.3.3 (or within other limits specified by the CAISO in any exemption granted pursuant to Section 8.2.3.3) at no cost to the CAISO when required for System Reliability.
- (c) The CAISO may Dispatch each Generating Unit to increase or decrease MVar output outside of established power factor limits, but within the range of the Generating Unit's capability curve, at a price calculated in accordance with the CAISO Tariff.
- (d) If Voltage Support is required in addition to that provided pursuant to Section 34.18.2.4 (b) and (c), the CAISO will reduce output of Participating Generators certified in accordance with Appendix K . The CAISO will select Participating Generators in the vicinity where such additional Voltage Support is required.
- (e) The CAISO will monitor voltage levels at Interconnections to maintain them in accordance with the applicable inter-Balancing Authority Area agreements.

**34.19 Dispatch Information and Instructions**

**34.19.1 Dispatch Information to be Supplied by the CAISO**

Communication of Dispatch information provided by the CAISO shall be in accordance with Section 6.3.

**34.19.2 Dispatch Information to be Supplied by SC**

Each Scheduling Coordinator shall be responsible for the submission of Bids and Dispatch of Generation and Demand in accordance with its Day-Ahead Schedule. Each Scheduling Coordinator shall keep the CAISO apprised of any change or potential change in the current status of all Generating Units and Intertie Schedules. This will include any changes in Generating Unit capacity that could affect planned Dispatch and conditions that could affect the reliability of a Generating Unit. Each Scheduling Coordinator shall immediately pass to the CAISO any information which it receives from a Generator which the Generator provides to the Scheduling Coordinator pursuant to Sections 34.11.1 and 34.11.2. Each Scheduling Coordinator shall immediately pass to the CAISO any information it receives from a



MSS Operator which the MSS Operator provides to the Scheduling Coordinator regarding any change or potential change in the current status of all Generating Units, System Units and Intertie Schedules. This information includes any changes in MSS System Units and Generating Unit capacity that could affect planned Dispatch and conditions that could affect the reliability of the System Unit or Generating Unit.

#### **34.19.3 Dispatch Information to be Supplied by UDCs**

Each UDC shall keep the CAISO informed of any change or potential change in the status of its transmission lines and station equipment at the point of Interconnection with the CAISO Controlled Grid.

Each UDC shall keep the CAISO informed as to any event or circumstance in the UDC's service territory that could affect the reliability of the CAISO Controlled Grid. This would include adverse weather conditions, fires, bomb threats, etc.

#### **34.19.4 Dispatch Information to be Supplied by PTOs**

Each PTO shall report any change or potential change in equipment status of the PTO's transmission assets turned over to the control of the CAISO or in equipment that affects transmission assets turned over to the control of the CAISO immediately to the CAISO (this will include line and station equipment, line protection, Remedial Action Schemes and communication problems, etc.). Each PTO shall also keep the CAISO immediately informed as to any change or potential change in the PTO's transmission system that could affect the reliability of the CAISO Controlled Grid. This would include adverse weather conditions, fires, bomb threats, etc.

Each PTO shall schedule all Outages of its lines and station equipment which are under the Operational Control of the CAISO in accordance with the appropriate procedures in Section 9.3. Each PTO shall coordinate any requests for or responses to Forced Outages on its transmission lines or station equipment which are under the Operational Control of the CAISO directly with the appropriate CAISO Control Center as defined in Section 7.1.

#### **34.19.5 Dispatch Information to be Supplied by Balancing Authorities**

The CAISO and each adjacent Balancing Authority shall keep each other informed of any change or potential change in the status of the Interconnection and any changes in the Interconnection's TTC. The CAISO and each adjacent Balancing Authority shall keep each other informed of situations such as adverse weather conditions, fires, etc., that could affect the reliability of any Interconnection.

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

The CAISO and each adjacent Balancing Authority shall follow all applicable NERC and WECC scheduling procedures. This will include checking the Interconnection schedules for the next Settlement Period prior to the start of the Energy ramp going into that hour. The CAISO and each adjacent Balancing Authority shall check and agree on actual MWh net Interchange after the hour for the previous Settlement Period. One Balancing Authority Area shall change its actual number to reflect that of the other Balancing Authority Area in accordance with WECC standard procedures.

The CAISO and each adjacent Balancing Authority shall exchange MW, MVar, terminal and bus voltage data with each other on a four second update basis. MWh data for the previous hour shall be exchanged once per hour. All MW and MWh data for both the CAISO Balancing Authority Area and the adjacent Balancing Authority Areas must originate from the same metering equipment. All provisions in Sections 4.6.1.1(i) and 4.6.1.1 (ii) refer to information and data obtained from metering used for Balancing Authority Area operations and not metering used for billing and Settlement.

## **34.20 Pricing Imbalance Energy**

### **34.20.1 General Principles**

FMM Instructed Imbalance Energy and RTD Instructed Imbalance Energy shall be paid or charged at the applicable FMM or RTD LMP. Uninstructed Imbalance Energy shall be paid or charged the applicable RTD LMP. These prices are determined using the Dispatch Interval LMPs. The Dispatch Interval LMPs shall be based on the Bid of the marginal Generating Units, System Units, Participating Loads, Reliability Demand Response Resources, and Proxy Demand Resources dispatched by the CAISO to increase or reduce Demand or Energy output in each Dispatch Interval as provided in Section 34.20.2.1.

The CAISO will respond to the Dispatch Instructions issued by the SCED to the extent practical in the time available and acting in accordance with Good Utility Practice. The CAISO will record the reasons for any variation from the Dispatch Instructions issued by the SCED.

### **34.20.2 Determining Real-Time LMPs**

#### **34.20.2.1 Dispatch Interval Real-Time LMPs**

#### **34.20.2.1.1 Computation**

For each Dispatch Interval, the CAISO will compute updated imbalance energy needs and will Dispatch Generating Units, System Units, Dynamic System Resources, Participating Load, Reliability Demand Response Resources, and Proxy Demand Resources according to the CAISO's SCED during that time period to meet imbalance energy requirements. The RTM transactions will be settled at the Dispatch Interval LMPs in accordance with Section 11.5.

#### **34.20.2.1.2 Eligibility to Set the Real-Time LMP**

All Generating Units, Participating Loads, Proxy Demand Resources, Reliability Demand Response Resources (other than those Reliability Demand Response Resources addressed below in this Section 34.19.2.3), Dynamic System Resources, System Units, or COGs subject to the provisions in Section 27.7, with Bids, including Generated Bids, that are unconstrained due to Ramp Rates or other temporal constraints are eligible to set the LMP, provided that (a) a Generating Unit or a Dynamic Resource-Specific System Resource is Dispatched between its Minimum Operating Limit and the highest MW value in its Economic Bid or Generated Bid, or (b) a Participating Load, a Proxy Demand Resource, a Reliability Demand Response Resource, a Dynamic System Resource that is not a Resource-Specific System Resource, or a System Unit is Dispatched between zero (0) MW and the highest MW value within its submitted Economic Bid range or Generated Bid. A Reliability Demand Response Resource that is dispatched in Real-Time by an entity other than the CAISO in order to mitigate a local transmission or distribution system emergency pursuant to applicable state or local programs, contracts, or regulatory requirements not set forth in the CAISO Tariff, or to perform a test, will not be eligible to set the LMP. If a resource is Dispatched below its Minimum Operating Limit or above the highest MW value in its Economic Bid range or Generated Bid, or the CAISO enforces a resource-specific constraint on the resource due to an RMR or Exceptional Dispatch, the resource will not be eligible to set the LMP. Resources identified as MSS Load following resources are not eligible to set the LMP. A resource constrained at an upper or lower operating limit or dispatched for a quantity of Energy such that its full Ramping capability is constraining the ability of the resource to be dispatched for additional Energy in target interval, cannot be marginal (i.e., it is constrained by the Ramping capability) and thus is not eligible to set the Dispatch Interval LMP. Non-Dynamic System Resources are not eligible to set the Dispatch Interval LMP.

Dynamic System Resources are eligible to set the Dispatch Interval LMP. A Constrained Output Generator that has the ability to be committed or shut off within applicable time periods that comprise the RTM will be eligible to set the Dispatch Interval LMP if any portion of its Energy is necessary to serve Demand. Dispatches of Regulation resources by EMS in response to AGC will not set the RTM LMP. Dispatches of Regulation resources to a Dispatch Operating Target by RTM SCED will be eligible to set the RTM LMP.

### **34.21 Temporary Waiver of Timing Requirements for the RTM**

#### **34.21.1 Criteria for Temporary Waiver**

The CAISO may at its sole discretion implement any temporary variation or waiver of the timing requirements of this Section 34, Section 6.5.4, and Section 6.5.5 (including the omission of any step) if any of the following criteria are met:

- (i) such waiver or variation of timing requirements is reasonably necessary to preserve System Reliability, prevent an imminent or threatened System Emergency or to retain Operational Control over the CAISO Controlled Grid during an actual System Emergency.
- (ii) because of error or delay, the CAISO requires additional time to fulfill its responsibilities;
- (iii) problems with data or the processing of data cause a delay in receiving or issuing Bids or publishing information on the CAISO's secure communication system;
- (iv) problems with telecommunications or computing infrastructure cause a delay in receiving or issuing Day-Ahead Schedules or publishing information on the CAISO's secure communication system.

#### **34.21.2 Information to be Published on Secure Communication System**

If the CAISO temporarily implements a waiver or variation of such timing requirements, the CAISO will publish the following information on the CAISO's secure communication system as soon as practicable:

- (i) the exact timing requirements affected;
- (ii) details of any substituted timing requirements;
- (iii) an estimate of the period for which this waiver or variation will apply; and
- (iv) reasons for the temporary waiver or variation.

### **34.22 Real-Time Dispatch of RDRRs**

California Independent System Operator Corporation  
Fifth Replacement Electronic Tariff

The CAISO may issue an Exceptional Dispatch Instruction for the Reliability Demand Response Resource for reliability or to perform a test as provided in Section 34.11.3. An entity other than the CAISO that has a contractual or tariff-based right to do so, may dispatch a Reliability Demand Response Resource in Real-Time in order to (1) mitigate a local transmission or distribution system emergency pursuant to applicable state or local programs, contracts, or regulatory requirements not set forth in the CAISO Tariff or (2) perform a test. If an entity other than the CAISO dispatches a Reliability Demand Response Resource in Real-Time in order to mitigate a local transmission or distribution system emergency or perform a test, the Scheduling Coordinator for the Demand Response Provider representing the Reliability Demand Response Resource shall immediately inform the CAISO, through the CAISO's Outage reporting system, that such dispatch has occurred or will occur and the MW amount of the dispatch.

**34.22.1 Testing of RDRRs**

The CAISO may issue one (1) unannounced Exceptional Dispatch Instruction per year to each Reliability Demand Response Resource pursuant to Section 34.11.2 in order to test the availability and performance of the Reliability Demand Response Resource. The Demand Response Provider representing the Reliability Demand Response Resource may also test its Reliability Demand Response Resources in coordination with the CAISO. Any Demand Response Provider initiated testing will not trigger any CAISO settlement. The CAISO will share the results of all tests of the Reliability Demand Response Resource with the applicable Local Regulatory Authority. All tests of the Reliability Demand Response Resource shall count toward its RDRR Availability Limit. If, prior to the performance of a CAISO unannounced yearly test, the Reliability Demand Response Resource provides Demand Response Services in that year, its provision of Demand Response Services will eliminate the need for that year's test. Testing of Reliability Demand Response Resources will be conducted as described in the applicable Operating Procedure or Business Practice Manual.