

California Independent System Operator Corporation
Fifth Replacement Electronic Tariff

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8. Ancillary Services

8.1 Scope

The CAISO shall be responsible for ensuring that there are sufficient Ancillary Services available to maintain the reliability of the CAISO Controlled Grid consistent with NERC and WECC reliability standards and any requirements of the NRC. The CAISO's Ancillary Services requirements may be self-provided by Scheduling Coordinators as further provided in the Business Practice Manuals. Those Ancillary Services which the CAISO requires to be available but which are not being self-provided will be competitively procured by the CAISO from Scheduling Coordinators in the Day-Ahead and Real-Time Markets consistent with Section 8.3. The provision of Ancillary Services from the Interties with interconnected Balancing Authority Areas is limited to Ancillary Services bid into the competitive procurement processes in the IFM and RTM. The CAISO will not accept Submissions to Self-Provide Ancillary Services that are imports to the CAISO Balancing Authority Area over the Interties with interconnected Balancing Authority Areas, except from Dynamic System Resources certified to provide Ancillary Services or if provided pursuant to ETCs, TORs or Converted Rights. The CAISO will accept Submissions to Self-Provide Ancillary Services from Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area if they are certified to provide Ancillary Services. The CAISO will calculate payments for Ancillary Services supplied by Scheduling Coordinators and charge the cost of Ancillary Services to Scheduling Coordinators based on their Ancillary Service Obligations.

For purposes of this CAISO Tariff, Ancillary Services are: (i) Regulation Up and Regulation Down, (ii) Spinning Reserve, (iii) Non-Spinning Reserve, and (iv) Voltage Support.

These services will be procured as stated in Section 8.3.5. Bids for these services may be submitted by a Scheduling Coordinator for resources that are capable of providing the specific service and that meet applicable Ancillary Service standards and technical requirements, as set forth in Sections 8.1 through 8.4, and are certified by the CAISO to provide Ancillary Services. Identification of specific services in this CAISO Tariff shall not preclude development of additional interconnected operation services over time. The CAISO and Market Participants will seek to develop additional categories of these unbundled services over time as the operation of the CAISO Controlled Grid matures or as required by regulatory authorities.

8.2 Ancillary Services Standards

All Ancillary Services shall meet the CAISO's Ancillary Services standards.

8.2.1 Determination of Ancillary Service Standards

The CAISO shall set the required standard for each Ancillary Service necessary to maintain the reliable operation of the CAISO Controlled Grid. Ancillary Services standards shall meet NERC and WECC reliability standards and any requirements of the NRC. In setting Ancillary Service standards, the CAISO shall consider reasonableness, cost-effectiveness, and adherence to NERC and WECC reliability standards and any requirements of the NRC. The standards developed by the CAISO shall be used as a basis for determining the quantity and type of each Ancillary Service which the CAISO requires to be available. These requirements and standards apply to all Ancillary Services whether self-provided or procured by the CAISO.

8.2.2 Time-Frame for Revising Ancillary Service Standards

The CAISO shall periodically undertake a review of the CAISO Controlled Grid operation to determine any revision to the Ancillary Services standards to be used in the CAISO Balancing Authority Area. At a minimum the CAISO shall conduct such reviews to accommodate revisions to NERC and WECC Reliability Standards and any requirements of the NRC. If the CAISO modifies its Ancillary Services standards, including its rules to determine minimum procurement requirements for Ancillary Services, the CAISO will notify Market Participants. The CAISO may adjust the Ancillary Services standards temporarily to take into account, among other things, variations in system conditions, Real-Time Dispatch constraints, contingencies, and voltage and dynamic stability assessments. Where practicable, the CAISO will provide notice, via the CAISO Website, of any temporary adjustments to Ancillary Service standards by 6:00 p.m. two (2) days ahead of the Operating Day to which the adjustment will apply. Periodic reviews by the CAISO may include, but are not limited to: (a) analysis of the deviation between actual and forecast Demand; (b) analysis of patterns of unplanned resource Outages; (c) analysis of compliance with NERC and WECC Reliability Standards and any requirements of the NRC; (d) analysis of operation during system disturbances; (e) analysis of patterns of shortfalls between Day-Ahead Schedules and actual Generation and Demand; and (f) analysis of patterns of unplanned transmission Outages.

8.2.3 Quantities of Ancillary Services Required; Use of AS Regions

For each of the Ancillary Services, the CAISO shall determine the quantity and location of the Ancillary Service which is required using Ancillary Service Regions as described in Section 8.3.3. For each of the Ancillary Services, the CAISO shall determine the required locational dispersion in accordance with CAISO Controlled Grid reliability requirements. The Ancillary Services provided must be under the direct Dispatch control of the CAISO on a Real-Time Dispatch Interval basis. The CAISO shall determine the quantities it requires as provided for in Sections 8.2.3.1 to 8.2.3.3.

8.2.3.1 Regulation Service

The CAISO shall maintain sufficient resources immediately responsive to the CAISO's EMS control in order to provide sufficient Regulation service to allow the CAISO Balancing Authority Area to meet NERC and WECC reliability standards and any requirements of the NRC by continuously balancing resources to meet deviations between actual and scheduled Demand and to maintain Interchange Schedules. The quantity of Regulation Down and Regulation Up capacity needed for each Settlement Period of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time shall be determined based on several factors as further described in the applicable Business Practice Manual, including but not limited to historic needs for Regulation Down and Regulation Up capacity as well as forecast operating conditions. In HASP, the CAISO will determine the amount of advisory Regulation from Dynamic System Resources required for each Settlement Period in the next Trading Hour. The advisory awards of Regulation from Dynamic System Resources in HASP are not binding and are re-optimized through the FMM and RTD processes in the Real-Time Market. The CAISO will take into account the speed and accuracy of regulation resources in its determination of Regulation requirements, including as it qualifies self-provided Regulation. Upon request of a Scheduling Coordinator, the CAISO will share with the Scheduling Coordinator its reasoning and any related data used to make the determination of whether the Scheduling Coordinator's self-provided Regulation capacity meets its regulation obligation.

The requirement for Regulation Down or Regulation Up needed for each Settlement Period of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time shall each be accompanied by a requirement for Mileage as determined by the CAISO. The CAISO shall determine the Mileage requirements in any Settlement Period based on Regulation capacity requirements as well as the Bid-in

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Regulation capacity for that Settlement Period. Subject to operator adjustment, the Mileage requirement for either Regulation Up or Regulation Down will reflect the minimum of (a) the product of the respective Regulation capacity requirement and the System Mileage Multiplier; (b) the average Instructed Mileage for the applicable Trading Hour from the prior seven (7) days; or (c) the product of each resource's resource specific Mileage multiplier(s) and its Bid-in Regulation capacity summed for all resources. The CAISO will publish on OASIS the estimated quantity, or the percentage used to determine the estimated quantity, of Regulation Reserves required for each hour of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time for the Trading Day. The CAISO will publish on OASIS the Mileage requirements for each hour of the Day-Ahead Market and each fifteen (15) minute period in Real-Time for the Trading Day. The CAISO will also publish on OASIS the average Instructed Mileage from the prior seven (7) days for each hour of a Trading Day no later than seven (7) calendar days after the applicable Trading Day.

8.2.3.1.1 Regulation Performance

The CAISO will measure the accuracy of a resource's response to CAISO EMS signals. The CAISO will sum a resource's Automatic Generation Control set points for each four (4) second Regulation interval every fifteen (15) minutes and then sum the total deviations from the Automatic Generation Control set point for each four (4) second regulation interval during that fifteen (15) minute period. The CAISO will divide the sum of the resource's Automatic Generation Control set points less the sum of the resource's total deviations by the sum of the resource's Automatic Generation Control set points. The CAISO will apply the resulting percentage to a resource's Instructed Mileage to calculate the resource's Regulation performance payments. The CAISO will adjust a resource's Automatic Generation Control set point deviations when the CAISO EMS signal sent to a resource changes direction and the resource under-responds in the prior interval. The adjusted Automatic Generation Control set point will reflect the Automatic Generation Control set point to which the EMS signal directed the resource to move in the prior interval.

The CAISO will use a resource's Historic Regulation Performance Accuracy and certified ramp capability to determine a resource-specific expected Mileage for purposes of awarding Regulation Up and Regulation Down capacity. The CAISO will calculate a separate Historic Regulation Performance

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Accuracy for both Regulation Up and Regulation Down.

A minimum performance threshold of twenty-five (25) percent will apply for a resource to offer Regulation Up and Regulation Down capacity. If a resource's measured accuracy, based on a weighted average of fifteen (15) minute intervals during a calendar month using Instructed Mileage as the weight, is less than twenty-five (25) percent for Regulation Up or Regulation Down, the resource must re-certify to provide the respective service within ninety (90) days from the date the CAISO provides notice to the resource's Scheduling Coordinator of the resource's failure to meet the minimum performance threshold. In the event of lost accuracy data, the CAISO will not use data from these intervals to calculate the resource's Historic Regulation Performance Accuracy or to assess the minimum performance threshold.

8.2.3.2 Spinning and Non-Spinning Reserves

The CAISO shall maintain minimum contingency Operating Reserve made up of Spinning Reserve and Non-Spinning Reserve in accordance with NERC and WECC reliability standards, including any requirements of the NRC. The CAISO from time to time may determine to use more stringent criteria.

8.2.3.3 Voltage Support

The CAISO shall determine on an hourly basis for each day the quantity and location of Voltage Support required to maintain voltage levels and reactive margins within NERC and WECC reliability standards, and any requirements of the NRC using a power flow study based on the quantity and location of scheduled Demand. The PTO or, from time to time, the CAISO shall issue daily voltage schedules (Dispatch Instructions) to Participating Generators, Participating TOs and UDCs, which are required to be maintained for CAISO Controlled Grid reliability. All other Generating Units shall comply with the power factor requirements set forth in contractual arrangements in effect on the CAISO Operations Date, or, if no such contractual arrangements exist and the Generating Unit exists within the system of a Participating TO, the power factor requirements applicable under the Participating TO's TO Tariff or other tariff on file with the FERC.

All Participating Generators shall maintain the CAISO specified voltage schedule if required under their Generator Interconnection Agreement, while operating within the power factor range specified in their interconnection agreements. For all other Generating Units, Participating Generators shall maintain the CAISO specified voltage schedule, while operating within the power factor range specified in their

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interconnection agreements, or, for Regulatory Must-Take Generation with Existing QF Contracts or Amended QF Contracts, Regulatory Must-Run Generation and Reliability Must-Run Generation, consistent with existing obligations. For Generating Units that do not operate under one of these agreements, the minimum power factor range will be within a band of 0.90 lag (producing VARs) and 0.95 lead (absorbing VARs) power factors. Participating Generators with Generating Units existing at the CAISO Operations Date that are unable to meet this operating power factor requirement may apply to the CAISO for an exemption. Prior to granting such an exemption, the CAISO shall require the Participating TO, UDC or other utility to whose system the relevant Generating Units are interconnected to notify it of the existing contractual requirements for Voltage Support established prior to the CAISO Operations Date for such Generating Units. Such requirements may be contained in CPUC Electric Rule 21 or the Interconnection Agreement with the Participating TO, UDC or other utility. The CAISO shall not grant any exemption under this Section from such existing contractual requirements. The CAISO shall be entitled to instruct Participating Generators to operate their Generating Units at specified points within their power factor ranges. Participating Generators shall receive no compensation for operating within these specified ranges.

If the CAISO requires additional Voltage Support, it shall procure this either through Reliability Must-Run Contracts or, if no other more economic sources are available, by instructing a Generating Unit to move its MVar output outside its mandatory range. Only if the Generating Unit must reduce its MW output in order to comply with such an instruction will it be eligible to recover its opportunity cost in accordance with Section 11.10.1.4.

All Loads directly connected to the CAISO Controlled Grid shall maintain reactive flow at grid interface points within a specified power factor band of 0.97 lag to 0.99 lead. Loads shall not be compensated for the service of maintaining the power factor at required levels within the bandwidth. A UDC interconnecting with the CAISO Controlled Grid at any point other than a Scheduling Point shall be subject to the same power factor requirement.

The CAISO will establish voltage control standards with UDCs and the operators of other Balancing Authority Areas and will enter into operational agreements providing for the coordination of actions in the event of a voltage problem occurring.

8.2.3.4 [Not Used]

8.2.3.5 Ancillary Service Substitution

The CAISO, whenever possible, will increase its purchases of an Ancillary Service that can substitute for another Ancillary Service, when doing so is expected to reduce its total cost of procuring Ancillary Services while meeting reliability requirements. Prior to making these purchases, the CAISO will first substitute Self-Provided Ancillary Services for another Ancillary Service consistent with the principles set forth in this Section. The CAISO will make such adjustments in accordance with the following principles:

- (a) The Regulation requirement must be satisfied only by Regulation Bids for resources qualified to provide Regulation;
- (b) Additional Regulation Up capacity can be used to satisfy requirements for Spinning Reserve, or Non-Spinning Reserve;
- (c) Regulation Up and Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up and Spinning Reserve Bids. Spinning Reserve and Regulation may be provided as separate services from the same resource, provided that the sum of Spinning Reserve and Regulation Up provided is not greater than the maximum Ramp Rate of the resource (MW/minute) times ten (10);
- (d) Additional Regulation Up and Spinning Reserve capacity can be used to satisfy requirements for Non-Spinning Reserve;
- (e) Regulation Up, Spinning Reserve, and Non-Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up, Spinning Reserve and Non-Spinning Reserve Bids;
- (f) Total MW purchased from the Regulation Up, Spinning Reserve, and Non-Spinning Reserve markets will not be changed by this Section 8.2.3.5; and
- (g) Regulation Energy resulting from Regulation that substituted for another Ancillary Service continues to be treated as Regulation Energy regardless of what service it substituted.

8.3 Procurement; Certification and Testing; Contracting Period

8.3.1 Procurement of Ancillary Services

The CAISO shall operate competitive Day-Ahead and Real-Time Markets to procure Ancillary Services. The Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) applications used in the Integrated Forward Market (IFM) and the Real-Time Market (RTM) shall calculate optimal resource commitment, Energy, and Ancillary Services Awards and Schedules at least cost to End-Use Customers consistent with maintaining System Reliability. Any Scheduling Coordinator representing resources, System Units, Participating Loads, Proxy Demand Resources or imports of System Resources may submit Bids into the CAISO's Ancillary Services markets provided that it is in possession of a current certificate for the resources concerned. Regulation Up, Regulation Down, and Operating Reserves necessary to meet CAISO requirements not met by self-provision will be procured by the CAISO as described in this CAISO Tariff. The amount of Ancillary Services procured in the IFM is net of (i) Self-Provided Ancillary Services from resources internal to the CAISO Balancing Authority Area (which includes Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area) and Dynamic System Resources certified to provide Ancillary Services and (ii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The amount of Ancillary Services procured in the Real-Time Market is net of (i) available awarded Day-Ahead Ancillary Services, (ii) Self-Provided Ancillary Services from resources internal to the CAISO Balancing Authority Area (which includes Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area) and Dynamic System Resources certified to provide Ancillary Services, (iii) additional Operating Reserves procured in the FMM, and (iv) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The CAISO may procure incremental Ancillary Services in the Real-Time Market based in part on a determination during the FMM that any Ancillary Services capacity awarded or self-provided in the Day-Ahead Market is not available as a result of a resource constraint or Transmission Constraints. Resource constraints may include but are not limited to an Outage of a resource or Ramp Rate constraints. Incremental procurement in the Real-Time Market will exclude Ancillary Services Capacity the CAISO has determined is not available.

The CAISO will manage the Energy from both CAISO-procured and Self-Provided Ancillary Services as part of the FMM and Real-Time Dispatch. In the Day-Ahead Market, the CAISO procures one-hundred (100) percent of its Ancillary Service requirements based on the Day-Ahead Demand Forecast net of

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Self-Provided Ancillary Services. After the Day-Ahead Market, the CAISO procures additional Ancillary Services needed to meet system requirements from all resources in the Real-Time Market. The amount of Ancillary Services procured in the Real-Time Market is based on the CAISO's requirements for Ancillary Services for the Operating Hour net of Self-Provided Ancillary Services.

Awards of AS in the RTM to Non-Dynamic System Resources are for the entire next Operating Hour. The CAISO procurement of Ancillary Services from all other resources in the Real-Time Market is for a fifteen (15) minute FMM interval. The CAISO's procurement of Ancillary Services from Non-Dynamic System Resources, Dynamic System Resources and internal Generation (which includes Generation from Generating Units that are Pseudo-Ties to the CAISO Balancing Authority Area) in the Real-Time Market is based on the Ancillary Service Bids submitted or generated in the RTM consistent with the requirements in Section 30. The CAISO may also procure Ancillary Services pursuant to the requirements in Section 42.1 and as permitted under the terms and conditions of a Reliability Must-Run Contract.

The CAISO will contract for long-term Voltage Support service with owners of Reliability Must-Run Units under Reliability Must-Run Contracts. These requirements and standards apply to all Ancillary Services whether self-provided or procured by the CAISO.

8.3.2 Procurement from Internal and External Resources

The CAISO will procure Spinning Reserves and Non-Spinning Reserves from resources operating within the CAISO Balancing Authority Area (which includes Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area) and from imports of System Resources. Scheduling Coordinators are allowed to bid Regulation from resources located outside the CAISO Balancing Authority Area by dynamically scheduling such System Resources certified to provide Regulation. Each System Resource used to bid Regulation must comply with the Dynamic Scheduling Protocol in Appendix M. Scheduling Coordinators may submit Bids for Operating Reserves from Non-Dynamic System Resources but they may not submit Bids for Regulation from such resources because these resources cannot be dynamically scheduled consistent with Appendix M. When bidding to supply Ancillary Services in the IFM or RTM, imports and Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area compete for use of Intertie transmission capacity when the requested use is in the same direction, e.g., imports of Ancillary Services and Ancillary Services from Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area

compete with Energy on Interties in the import direction, and exports of Ancillary Services (i.e., on demand obligations) compete with Energy on Interties in the export direction. To the extent there is Congestion, imports of Ancillary Services and suppliers of Ancillary Services from Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area will pay Congestion costs in the IFM and RTM markets pursuant to Section 11.10.1.2.1.

8.3.3 Ancillary Service Regions and Regional Limits

The CAISO will procure Ancillary Services using Ancillary Service Regions and Ancillary Service Sub-Regions. There are two Ancillary Service Regions and eight Ancillary Service Sub-Regions. The two Ancillary Service Regions are the System Region (i.e., the CAISO Balancing Authority Area) and the Expanded System Region (i.e., the System Region and Intertie Scheduling Points with adjacent Balancing Authority Areas). As defined by a Business Practice Manual, the eight identified Ancillary Service Sub-Regions are (1) the South of Path 15 Sub-Region, (2) the Expanded South of Path 15 Sub-Region, (3) the South of Path 26 Sub-Region, (4) the Expanded South of Path 26 Sub-Region, (5) the North of Path 15 Sub-Region, (6) the Expanded North of Path 15 Sub-Region, (7) the North of Path 26 Sub-Region, and (8) the Expanded North of Path 26 Sub-Region. The eight Ancillary Service Sub-Regions are embedded within either the System Region or the Expanded System Region. The CAISO may use Ancillary Service Sub-Regions within the System Region or the Expanded System Region to ensure appropriate distribution of the Ancillary Services procured for the CAISO Balancing Authority Area. The definition of the Expanded System Region, the System Region, and the eight Sub-Regions shall apply collectively to the following Ancillary Services: Regulation Up, Regulation Down, Spinning Reserves and Non-Spinning Reserves.

8.3.3.1 Use of Ancillary Service Regions and Ancillary Service Regional Limits

Within the Expanded System Region, the System Region, and the Sub-Regions, the CAISO may establish limits on the amount of Ancillary Services that can be provided from each region or must be provided within each region. When used, these Ancillary Service Regional Limits identify either a maximum or a minimum (or both a maximum and a minimum) amount of Ancillary Services to be obtained within the region. The minimum Ancillary Service limit in the Expanded System Region shall be the quantities of each Ancillary Service required to meet NERC and WECC reliability standards, including any

requirements of the NRC for the CAISO Balancing Authority Area. The CAISO may establish a restriction on the amount of Ancillary Services to be procured from outside the CAISO Balancing Authority Area by establishing a minimum limit for the System Region.

8.3.3.2 Criteria for Use of Ancillary Service Regions and Sub-Regions

The CAISO's use of an Ancillary Service Sub-Region occurs when the CAISO establishes a minimum or maximum limit for that Sub-Region. The CAISO's use of minimum and maximum procurement limits for Ancillary Services help to ensure that the Ancillary Services required in the CAISO Balancing Authority Area are dispersed appropriately throughout the CAISO Balancing Authority Area and accurately reflect the system topology and deliverability needs. The factors the CAISO will use in determining whether to establish or change minimum or maximum limits include, but are not limited to, the following: (a) the CAISO Forecast of CAISO Demand; (b) the location of Demand within the Balancing Authority Area; (c) information regarding network and resource operating constraints that affect the deliverability of Ancillary Services into or out of an Ancillary Service Region; (d) the locational mix of generating resources; (e) generating resource Outages; (f) historical patterns of transmission and generating resource availability; (g) regional transmission limitations and constraints; (h) transmission Outages; (i) Available Transfer Capability; (j) Day-Ahead Schedules or FMM Schedules involving Intertie transactions; (k) whether any Ancillary Services provided from System Resources requiring a NERC tag fail to have a NERC tag; and (l) other factors affecting System Reliability. Ancillary Services procured within a Sub-Region count toward satisfying the Ancillary Service requirements for the System Region or the Expanded System Region.

8.3.3.3 Notice to Market Participants

Pursuant to Section 6.5.2.3.3, the CAISO will publish forecasted Ancillary Service requirements, regional constraints, and the minimum and/or maximum Ancillary Service Regional Limits for the Ancillary Service Regions and any Sub-Regions by 6:00 p.m. on the day before the close of the Day-Ahead Market (two days prior to the Operating Day). After the completion of the Day-Ahead Market for a given Trading Day, the CAISO will publish the limits that were used in the IFM. If prior to the close of the RTM for a Trading Hour the CAISO makes a substantial change to a minimum and/or maximum limit for an Ancillary Service Region or Sub-Region, it will issue a Market Notice as soon as reasonably practicable after the

occurrence of the circumstances that led to the change. After the close of the RTM for a Trading Hour, the CAISO will publish the limits that were used in the RTM.

8.3.3.4 Establishment of New Ancillary Service Regions or Sub-Regions

The CAISO will consider adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region through a stakeholder process if: (a) there is a persistent difficulty in obtaining an appropriate distribution of Ancillary Services in the CAISO Balancing Authority Area using market procurement mechanisms, and (b) adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region would reduce the persistent difficulty in obtaining an appropriate distribution of Ancillary Services in the CAISO Balancing Authority Area using market procurement mechanisms. Factors that would affect the CAISO's determination to consider adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region include, but are not limited to operational reliability needs, the pattern of the growth of Demand in the CAISO Balancing Authority Area, the addition of new generating resources, the retirement of existing generating resources, the addition of new transmission facilities, changes in regional transmission limitations, changes in Available Transfer Capability, and extended transmission or generating resource Outages. If the CAISO considers adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region, the CAISO will conduct an analysis to determine whether the adjustments being considered create market power issues in either the new Ancillary Service Regions being considered or the pre-existing Ancillary Service Regions. The CAISO's analysis will be included in the stakeholder process and stakeholders will be able to comment on any new market power mitigation measures proposed for the CAISO's procurement of Ancillary Services.

8.3.3.5 Base Market Model and Ancillary Services Procurement

The Base Market Model is used in the SCUC application, which optimizes the provision of Ancillary Services and Energy in order to meet Ancillary Service requirements and Energy requirements. The Base Market Model models Transmission Constraints as described in Section 27.5.1. The Ancillary Services Awards reflect the Ancillary Service Region and Sub-Region definitions and requirements. The Ancillary Service requirements, the definition of Ancillary Service Regions and Ancillary Service Sub-Regions, and any minimum or maximum limit that is used within an Ancillary Service Region or Ancillary

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Service Sub-Region are all inputs to the CAISO Markets Processes.

8.3.4 Certification and Testing Requirements

The owner of and Scheduling Coordinator for each resource for which a Bid to provide Ancillary Services or Submission to Self-Provide Ancillary Services is allowed under the CAISO Tariff, and all other System Resources that are allowed to submit a Bid to provide Ancillary Services under this CAISO Tariff, must comply with the CAISO's certification and testing requirements as contained in Appendix K and the CAISO's Operating Procedures. Each resource used to bid Regulation or used to self-provide Regulation must have been certified and tested by the CAISO using the process defined in Part A of Appendix K. Each Dynamic System Resource offering Regulation must comply with the Dynamic Scheduling Protocol in Appendix M. Each resource used to bid Spinning Reserve or used to self-provide Spinning Reserve must have been certified and tested by the CAISO using the process defined in Part B of Appendix K. Each resource used to bid Non-Spinning Reserve or used to self-provide Non-Spinning Reserve must have been certified and tested by the CAISO using the process defined in Part C of Appendix K. CAISO certification to provide Ancillary Services may be revoked by the CAISO under the provisions of this CAISO Tariff, including Appendix K.

8.3.5 Daily and Hourly Procurement

The CAISO shall procure Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve on a daily and Real-Time basis in the IFM and RTM, respectively. The CAISO shall procure Ancillary Services on a longer-term basis pursuant to Section 42.1.3 if necessary to meet Reliability Criteria. The CAISO shall contract for Voltage Support annually (or for such other period as the CAISO may determine is economically advantageous) and on a daily or hourly basis as required to maintain System Reliability.

8.3.6 Market-Base Prices

Public utilities under the FPA must submit Bids for Ancillary Services capped at FERC authorized cost-based rates unless and until FERC authorizes different pricing. Public utilities under the FPA shall seek FERC Ancillary Services rate approval on bases consistent with the CAISO time-frame for contracting for each Ancillary Service (hourly rate for some Ancillary Services, annual rate or otherwise for other Ancillary Services) so that cost-based Bids and market-based Bids for each service shall be on

comparable terms. All other entities may use market-based rates not subject to any restrictions apart from those found in this CAISO Tariff. Public utilities under the FPA which have not been approved to bid at market-based rates will not be paid above their cost-based Bid for the Ancillary Service concerned even if the relevant Market Clearing Price is higher.

8.3.7 AS Bidding Requirements

Scheduling Coordinators may submit Bids or Submissions to Self-Provide an Ancillary Service consistent with the rules specified in Section 30 and any further requirements in this Section 8.3.7. Scheduling Coordinators may (i) submit Bids or Submissions to Self-Provide an Ancillary Service from resources located within the CAISO Balancing Authority Area (which includes Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area) or Dynamic System Resources certified to provide Ancillary Services, (ii) submit Submissions to Self-Provide an Ancillary Service from System Resources located outside the CAISO Balancing Authority Area if provided pursuant to ETCs, TORs, or Converted Rights, (iii) submit Bids for Ancillary Services from Dynamic and Non-Dynamic System Resources located outside the CAISO Balancing Authority Area certified to provide Ancillary Services, or (iv) submit Inter-SC Trades of Ancillary Services. Ancillary Services procured in the IFM and in the Real-Time Market are comprised of the following: Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve. Each resource for which a Scheduling Coordinator wishes to submit Ancillary Service Bids must meet the requirements set forth in this CAISO Tariff. The same resource capacity may be simultaneously offered to the same CAISO Market for multiple Ancillary Services types. Ancillary Services Bids and Submissions to Self-Provide an Ancillary Service can be submitted up to seven (7) days in advance. The CAISO will only use Operating Reserve Ramp Rates for procuring capacity associated with the specific Ancillary Services. The CAISO will issue Real-Time Dispatch Instructions in the Real-Time Market for the Energy associated with the awarded capacity based upon the applicable Operational Ramp Rate submitted with the single Energy Bid Curve in accordance with Section 30.7.7. There is no ability to procure Ancillary Services for export.

To the extent a Scheduling Coordinator has an on-demand obligation to serve loads outside the CAISO Balancing Authority Area, it can do so provided that (1) it is using export transmission capacity available in Real-Time, and (2) the resource capacity providing Energy to satisfy the on-demand obligation is not

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under an RMR Contract or Resource Adequacy Capacity obligation, and has not been paid a RUC Availability Payment for the Trading Hour. All resources subject to the Ancillary Services must offer requirements, as specified in Section 40.6, must submit Bids consistent with the requirements specified therein and in Section 30.

8.3.7.1 Requirement for Imports of Spinning or Non-Spinning Reserves

Scheduling Coordinators may submit Bids for imports of Spinning Reserve or Non-Spinning Reserve from System Resources located outside the CAISO Balancing Authority Area, including Dynamic System Resources, where technically feasible and consistent with NERC and WECC reliability standards and any requirements of the NRC; and provided that such Scheduling Coordinators have certified to the CAISO their ability to deliver the service to the point of interchange with the CAISO Balancing Authority Area (including with respect to their ability to make changes, or cause such changes to be made, to Interchange Schedules during any interval of a Settlement Period at the discretion of the CAISO).

8.3.7.2 Requirement for Imports of Regulation

Scheduling Coordinators may bid imports of Regulation from System Resources located outside the CAISO Balancing Authority Area, where technically feasible and consistent with NERC and WECC reliability standards and any requirements of the NRC, by dynamic scheduling; provided that the Host Balancing Authority for the Host Balancing Authority Area in which the System Resources are located has entered into an operating agreement with the CAISO particular to the operation of dynamic functionality; and provided that such Scheduling Coordinator, with the cooperation of the Host Balancing Authority for the Host Balancing Authority Area in which the resources are located, has been certified by the CAISO as to their ability to dynamically adjust Interchange Schedules based on control signals issued by the CAISO anytime during a Settlement Period at the discretion of the CAISO. Such certification shall include a demonstration of their ability to support the dynamic Interchange of Regulation service based on CAISO control signals received on dedicated communications links (either directly or through EMS computers) for CAISO computer control and telemetry to provide this function in accordance with CAISO standards and procedures posted on the CAISO Website.

8.3.8 Procurement of Voltage Support

Any Participating Generator who is producing Energy shall, upon the CAISO's specific request, provide

reactive energy output outside the Participating Generator's Voltage Support obligation defined in Section 8.2.3.3.

The CAISO shall select Participating Generators' Generating Units which have been certified for Voltage Support to provide this additional Voltage Support. Subject to any locational requirements, the CAISO shall select the least costly Generating Units from a computerized merit order stack to back down to produce additional Voltage Support in each location where Voltage Support is needed.

8.4 Technical Requirements for Providing Ancillary Services

All Generating Units, System Units, Participating Loads, Proxy Demand Resources, and System Resources providing Ancillary Services shall comply with the technical requirements set out in Sections 8.4.1 to 8.4.3 below relating to their operating capabilities, communication capabilities and metering infrastructure. No Scheduling Coordinator shall be permitted to submit a Bid to the CAISO for the provision of an Ancillary Service from a Generating Unit, System Unit, Participating Load, Proxy Demand Resource, or System Resource, or to provide a Submission to Self-Provide an Ancillary Service from a Generating Unit, System Unit, Participating Load, Proxy Demand Resource, or Dynamic System Resource, unless the Scheduling Coordinator is in possession of a current certificate issued by the CAISO confirming that the Generating Unit, System Unit, Participating Load, Proxy Demand Resource, or System Resource complies with the CAISO's technical requirements for providing the Ancillary Service concerned. Scheduling Coordinators can apply for Ancillary Services certificates in accordance with the requirements for considering and processing such applications in Appendix K and the CAISO's Operating Procedures. The CAISO shall have the right to inspect Generating Units, Participating Loads, Proxy Demand Resources, or the individual resources comprising System Units and other equipment for the purposes of the issue of a certificate and periodically thereafter to satisfy itself that its technical requirements continue to be met. If at any time the CAISO's technical requirements are not being met, the CAISO may withdraw the certificate for the Generating Unit, System Unit, Participating Load, Proxy Demand Resource, or System Resource concerned.

8.4.1 Operating Characteristics Required to Provide AS

Each resource for which a Scheduling Coordinator wishes to submit a Bid to provide Ancillary Services must comply with the requirements for the specific Ancillary Service as set forth in Appendix K and the

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Business Practice Manual. The certification requirements in Section 8, Appendix K of the CAISO Tariff, and the Business Practice Manuals shall apply to Multi-Stage Generating Resources based on the MSG Configurations. Scheduling Coordinators shall submit Ancillary Services Bids or Submissions to Self-Provide Ancillary Services to the CAISO Markets only for MSG Configurations that are certified consistent with these requirements. In addition, to the extent the CAISO requires specific operating characteristics for Ancillary Services certification of Multi-Stage Generating Resources the responsible Scheduling Coordinator shall submit to the CAISO such specific operating characteristics at the MSG Configuration level. The requirements in Appendix K and the Business Practice Manuals include Ancillary Service control, capability and availability standards. The requirements also involve the following operating characteristics:

- (a) Ramp Rate increase and decrease (MW/minute);
- (b) power factor (leading and lagging) as required by Section 8.2.3.3;
- (c) maximum output (real and reactive), except that System Resources shall be required to comply only with the requirement for maximum real power;
- (d) minimum output (real and reactive), except that System Resources shall be required to comply only with the requirement for minimum real power;
- (e) Capability to respond immediately to the CAISO's EMS control, control scheme, and range; and
- (f) minimum length of time the resource can be available to provide the relevant Ancillary Service.

In Appendix K and the Business Practice Manuals the CAISO will differentiate the operating characteristics according to the Ancillary Service being provided.

8.4.1.1 Regulation

A resource offering Regulation must have the following operating characteristics and technical capabilities:

- (a) it must be capable of being controlled and monitored by the CAISO EMS by means of the installation and use of a standard CAISO direct communication and direct control system, a description of which and criteria for any temporary exemption from which, the CAISO

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shall publish on the CAISO Website;

- (b) it must be capable of achieving at least the Ramp Rates (increase and decrease in MW/minute) stated in its Bid for the full amount of Regulation capacity offered;
- (c) the Regulation capacity offered must not exceed the maximum Ramp Rate (MW/minute) of that resource times ten (10) minutes;
- (d) the resource to CAISO Control Center telemetry must, in a manner meeting CAISO standards, include indications of whether the resource is on or off CAISO EMS control at the resource terminal equipment;
- (e) the resource must be capable of the full range of movement within the amount of Regulation capability offered without manual resource operator intervention of any kind;
- (f) each Ancillary Service Provider must ensure that its CAISO EMS control and related SCADA equipment for its resource are operational throughout the time period during which Regulation is required to be provided;
- (g) Regulation capacity offered must be dispatchable on a continuous basis for at least sixty (60) minutes in the Day-Ahead Market and at least thirty (30) minutes in the Real-Time Market after issuance of the Dispatch Instruction. The CAISO will measure continuous Energy from the time a resource reaches its award capacity. In the Real-Time Market, where a storage resource using the Non-Generator Resource model will not have sufficient State of Charge to meet its Ancillary Services Schedule, the CAISO will dispatch the storage resource to have sufficient State of Charge to meet its Ancillary Services Schedule. Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation may request the use of Regulation Energy Management as described in Section 8.4.1.2; and
- (h) Regulation capacity offered must meet or exceed the minimum performance threshold of twenty-five (25) percent measured accuracy as specified in Section 8.2.3.1.1.

8.4.1.2 Regulation Energy Management

The CAISO will make Regulation Energy Management available to Scheduling Coordinators for Non-

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Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation. A Scheduling Coordinator for a resource using Regulation Energy Management may submit a Regulation Bid for capacity (MW) of up to four (4) times the maximum Energy (MWh) the resource can generate or curtail for fifteen (15) minutes after issuance of a Dispatch Instruction. In the Real-Time Market, a Scheduling Coordinator for a resource using Regulation Energy Management will produce energy as needed to satisfy the sixty (60) minute continuous Energy requirement for Regulation Awards in the Day-Ahead Market.

Scheduling Coordinators may request to use Regulation Energy Management for these Non-Generator Resources by submitting a request to certify such a resource to provide Regulation using Regulation Energy Management. The owner or operator of a Resource using Regulation Energy Management must comply with Section 4.6 or 4.7, as applicable, and may provide only Regulation in the CAISO Market. A resource using Regulation Energy Management may not provide Energy other than Energy associated with Regulation. Scheduling Coordinators for Resources using Regulation Energy Management may define a Ramp Rate for operating as Generation and a Ramp Rate for operating as Load, respectively. These resources shall comply with the requirements to provide Regulation as specified in this Section 8, Appendix K, and the CAISO's Operating Procedures, including the requirement to undergo a market simulation using Regulation Energy Management as part of the certification procedure.

Scheduling Coordinators for resources using Regulation Energy Management shall register these resources in the Master File. Scheduling Coordinators may only submit Bids for Regulation Up and Regulation Down and Mileage for these resources. Scheduling Coordinators may not submit Energy Bids, Energy Self-Schedules, Residual Unit Commitment Bids, or Ancillary Service Bids other than Regulation and Mileage for these resources. Scheduling Coordinators may not submit any type of commitment costs as part of their Regulation Up and Regulation Down Bids for resources using Regulation Energy Management, including Start-Up Bids, Minimum Load Bids, Pumping Cost or Pump Shut-Down Cost Bids, or Transition Bids. All other bidding rules for Regulation set forth in Section 30 shall apply to resources using Regulation Energy Management.

The CAISO will settle Dispatches from resources using Regulation Energy Management as energy. The portion of Demand of Non-Generator Resources using Regulation Energy Management that is dispatched

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as Regulation in any Settlement Interval shall not be considered Measured Demand for purposes of allocating payments and charges pursuant to Section 11 during that Settlement Interval.

The CAISO shall control the resource's operating set point through its Energy Management System with the objective of maintaining the resource's operating set point at its preferred operating point. In the Day-Ahead Market and FMM, the procurement of Regulation from resources using Regulation Energy Management will not be constrained by the resource's MWh limit to generate, curtail the consumption of, or consume Energy continuously. In the Real-Time Dispatch, the CAISO will base the Dispatches on the resource's capability to provide Regulation. When the resource has a physical MWh limit, the CAISO will observe the resource's MWh constraint during Real-Time Dispatch and will assess whether the CAISO can support the resource's self-provided Regulation capacity or Regulation award with Real-Time Market Dispatches. To the extent the CAISO determines in the Integrated Forward Market or FMM that the MWh constraint of resources using Regulation Energy Management limits the capability of the CAISO, through Real-time Dispatch, to support these resources' self-provided Regulation capacity or Regulation awards, the CAISO may disqualify resources using Regulation Energy Management on a pro rata basis across the System Region from providing Regulation, which shall result in the rescission of the disqualified portion of the resources' self-provided or awarded Regulation capacity payments.

8.4.1.3 Voltage Support

A Generating Unit providing reactive power must be under the control of generator automatic voltage regulators at all times. A Generating Unit may be required to operate underexcited (absorb reactive power) at periods of light system Demand to avoid potential high voltage conditions, or overexcited (produce reactive power) at periods of heavy system Demand to avoid potential low voltage conditions. Unless the CAISO directs the Generating Unit otherwise, the automatic voltage regulator will operate in voltage regulation mode and automatically control the net reactive power of the Generating Unit to regulate to the scheduled voltage as assigned by the Participating TO or the CAISO, within the constraints of the reactive power capability of the Generating Unit. A Generating Unit shall not disable voltage regulation controls, without the permission of the CAISO, while the Generating Unit is in operation.

For Asynchronous Generating Facilities, these provisions also apply to Generating Units required to

provide reactive power capability pursuant to the requirements of FERC Order No. 827.

8.4.2 Ancillary Service Control Standards

The providers of Ancillary Services under this Tariff must comply with the following control standards:

- (a) Regulation. The Area Control Error will be calculated by the CAISO Energy Management System. Control signals will be sent from the CAISO EMS to raise or lower the output of resources providing Regulation when ACE exceeds the allowable CAISO Balancing Authority Area dead band for ACE;
- (b) Spinning Reserve and Non-Spinning Reserve. Each provider of Spinning Reserve or Non-Spinning Reserve must be capable of receiving a Dispatch Instruction within one (1) minute from the time the CAISO Control Center elects to Dispatch the Spinning Reserve resource or Non-Spinning Reserve resource and must ensure that its resource can be at the Dispatched operating level within ten (10) minutes after issuance of the Dispatch Instruction; and
- (c) Voltage Support. Generating Units providing Voltage Support must have automatic voltage regulators which can correct the bus voltages to be within the prescribed Voltage Limits and within the machine capability in less than one (1) minute.

8.4.3 Ancillary Service Capability Standards

The providers of Ancillary Services under this CAISO Tariff must comply with the following capability standards for Spinning Reserve and Non-Spinning Reserve Capability. Each resource or external import of a System Resource scheduled to provide Spinning Reserve and each resource providing Non-Spinning Reserve must be capable of converting the full capacity reserved to Energy production within ten (10) minutes after the issue of the Dispatch Instruction by the CAISO. Each resource scheduled to provide Spinning Reserve and each resource scheduled to provide Non-Spinning Reserve must be capable of maintaining that output or scheduled Interchange for at least thirty (30) minutes from the point at which the resources reaches its award capacity. In the Real-Time Market, where a storage resource using the Non-Generator Resource model will not have sufficient State of Charge to meet its Ancillary Services Schedule, the CAISO will dispatch the storage resource to have sufficient State of Charge to meet its Ancillary Services Schedule.

8.4.4 Ancillary Service Availability Standards

The providers of Spinning Reserve and Non-Spinning Reserve under this CAISO Tariff must comply with the following availability standards. Each Ancillary Service Provider shall ensure: (i) that its resources scheduled to provide Spinning Reserve and Non-Spinning Reserve are available for Dispatch throughout the Settlement Period for which they have been scheduled; and (ii) that its resources scheduled to provide Spinning Reserve are responsive to frequency deviations throughout the Settlement Period for which they have been scheduled.

8.4.5 Communication Equipment

Unless otherwise authorized by the CAISO, all Scheduling Coordinators wishing to submit an Ancillary Service Bid must have the capability to submit to and receive information from the CAISO's secure communication system. In addition, they must be capable of receiving Dispatch Instructions electronically and they must provide the CAISO with a telephone number, or fax number through which Dispatch Instructions for each resource may be given if necessary. The CAISO will determine which method of communication is appropriate; provided that the CAISO will consult with the Scheduling Coordinator, if time permits, and will consider the method of communication then utilized by such Scheduling Coordinator; provided further, that the CAISO shall make the final determination as to the additional communication methods. Ancillary Service Providers whose resources are scheduled, bid in or under contract, shall ensure that there is a twenty-four (24) hour personal point of contact with the CAISO for the resource. Scheduling Coordinators representing Proxy Demand Resources that are scheduled, bid in or under contract shall ensure that there is a twenty-four (24) hour personal point of contact with the CAISO for the Proxy Demand Resource. An Ancillary Service Provider wishing to offer any Ancillary Service must provide a direct ring down voice communications circuit (or a dedicated telephone line available twenty-four (24) hours a day every day of the year) between the control room operator for the resource providing the Ancillary Service and the CAISO Control Center. Each Ancillary Service Provider must also provide an alternate method of voice communications with the CAISO from the control room in addition to the direct communication link required above. Operators of Dynamic System Resources from which Dynamic Schedules or Bids are submitted to the CAISO shall provide communications links meeting CAISO standards for dynamic imports from System Resources. Ancillary Service Providers

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whose resources provide Regulation shall also provide communication links meeting CAISO standards for direct digital control. Operators of System Resources providing Regulation shall provide communications links meeting CAISO standards for imports of Regulation. If any communication system becomes unavailable, the relevant Ancillary Service Provider and the CAISO shall take immediate action to identify the cause of the interruption and to restore the communication system. A Scheduling Coordinator that has provided a Submission to Self-Provide an Ancillary Service, or has submitted a Bid to provide or contracted for Ancillary Services, shall ensure that the resource concerned is able to receive and implement Dispatch Instructions.

8.4.6 Metering Infrastructure

All Participating Generators, owners or operators of Participating Loads, owners or operators of Proxy Demand Resources, and operators of System Units or System Resources which a Scheduling Coordinator wishes to bid to provide Ancillary Services shall have the metering infrastructure for the Generating Units, System Units, Participating Loads, Proxy Demand Resources, or System Resources concerned which complies with requirements to be established by the CAISO relating to:

- (a) meter type;
- (b) meter location;
- (c) meter reading responsibility;
- (d) meter capability in regard to AGC response; and
- (e) any other aspect of metering infrastructure required by the CAISO under this CAISO Tariff.

8.5 Time Frame to Submit and Evaluate Ancillary Service Bids

All Ancillary Service Bids must be submitted pursuant to the rules provided in Section 30.5.

8.6 Obligations for and Self-Provision of Ancillary Services

8.6.1 Ancillary Service Obligations

Each Scheduling Coordinator shall be assigned a share of the total Regulation Down, Regulation Up, Spinning Reserve, and Non-Spinning Reserve requirements by the CAISO, as set forth in Sections

11.10.2, 11.10.3 and 11.10.4, (i.e., a share of the total requirements for each Ancillary Service in the Day-Ahead Market and the Real-Time Market).

8.6.2 Right to Self-Provide

Each Scheduling Coordinator may choose to self-provide all, or a portion, of its Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve obligations in the IFM, and, to the extent needed to satisfy the CAISO's additional requirement, the Real-Time Market, from resources eligible for self-provision, as may be permissible for any given Ancillary Service in these respective markets. The right to self-provide Ancillary Services from capacity that is under a contractual obligation to provide Energy, including but not limited to capacity subject to an RMR Contract and local Resource Adequacy Resources, shall be conditional; self-provision of Ancillary Services from such capacity will only be permitted to the extent that capacity is not needed for Energy as a result of the MPM process described in this CAISO Tariff. To self-provide Ancillary Services a Scheduling Coordinator must provide the CAISO with a Submission to Self-Provide an Ancillary Service. Both Ancillary Service Bids and Submissions to Self-Provide an Ancillary Service can be provided to the CAISO for the same Ancillary Service and for the same hour in the same market. To the extent the Submission to Self-Provide an Ancillary Service is from a resource that is a Partial Resource Adequacy Resource, and Energy is needed, including for purposes under Section 31.3.1.3, from that resource the CAISO shall only disqualify the self-provision of Ancillary Services from the portion of the resource's capacity that has must-offer obligation, provided that the Scheduling Coordinator has not submitted an Energy Bid for the capacity that is not subject to a must-offer obligation. The CAISO will treat resources subject to Resource Adequacy requirements consistent with, and such resources must comply with, the bidding requirements in Section 40.6. If there is an Energy Bid submitted for the capacity of a Partial Resource Adequacy Resource that is not subject to a must-offer obligation the CAISO may disqualify the Submission to Self-Provide an Ancillary Service for the portion of the resources capacity that is not under a must-offer obligation consistent with the principles of co-optimization under the CAISO Tariff.

Prior to evaluating Ancillary Service Bids, the CAISO will determine whether Submissions to Self-Provide Ancillary Services are feasible with regard to resource operating characteristics and regional constraints and are qualified to provide the Ancillary Services in the markets for which they were submitted.

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If the total Submissions to Self-Provide Ancillary Services exceed the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region, the submissions that would otherwise be accepted by the CAISO as feasible and qualified will be awarded on a pro-rata basis among the suppliers offering to self-provide the Ancillary Service up to the amount of the Ancillary Services requirement. If a regional constraint imposes a limit on the total amount of Regulation Up, Spinning Reserve, and Non-Spinning Reserve, and the total self-provision of these Ancillary Services in that region exceeds that limit, Self-Provided AS are qualified pro rata from higher to lower quality service in three tiers: Regulation Up first, followed by Spinning Reserve, and then by Non-Spinning Reserve. Submissions to Self-Provide Ancillary Services in excess of the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region will not be accepted and qualified by the CAISO as Self-Provided Ancillary Services.

The CAISO shall schedule Self-Provided Ancillary Services to the extent qualified in the IFM and the RTM and Dispatch Self-Provided Ancillary Services in the Real-Time. To the extent that a Scheduling Coordinator self-provides Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve, the CAISO shall correspondingly reduce the quantity of the Ancillary Services it procures from Bids submitted in the IFM and the Real-Time Market.

Scheduling Coordinators may trade Ancillary Services so that any Scheduling Coordinator may reduce its Ancillary Services Obligation through purchase of Ancillary Services capacity from another Scheduling Coordinator, or self-provide in excess of its obligation to sell Ancillary Services to another Scheduling Coordinator.

8.6.3 Services which may be Self-Provided

The CAISO shall permit Scheduling Coordinators to self-provide the following Ancillary Services:

- (a) Regulation Up;
- (b) Regulation Down;
- (c) Spinning Reserve; and
- (d) Non-Spinning Reserve.

Submissions to Self-Provide Ancillary Services for Regulation Up and Regulation Down capacity will be rejected if the Energy Bid provided in the submission is outside of the resource's Regulating Range. The

CAISO may from time to time add other Ancillary Services to this list as it considers appropriate.

8.6.4 Time Frame for Informing CAISO of Self-Provision

8.6.4.1 Day-Ahead Schedule

At the Day-Ahead Market, Scheduling Coordinators shall be required to submit information on Self-Provided Ancillary Services within the time frame stated in Section 30. Failure to submit the required information within the stated time frame for any hour shall lead to the self-provision for that hour being declared invalid by the CAISO.

8.6.4.2 RTM

In the RTM, Scheduling Coordinators shall be required to submit information on Self-Provided Ancillary Services within the time frame stated in Section 30.1. Failure to submit the required adjusted information within the stated time frame shall lead to the self-provision being declared invalid by the CAISO.

8.6.4.3 Information to be Submitted by Scheduling Coordinators for Each Service

Scheduling Coordinators electing to self-provide Ancillary Services shall submit the information for each Self-Provided Ancillary Service as described in Section 30.

In the event of an Ancillary Service Inter-SC Trade, the Scheduling Coordinators who are parties to that trade must comply with requirements in Section 28.2.

8.6.4.4 Acceptance of Self-Provided Ancillary Service Submission

The CAISO will refuse to accept a Submission to Self-Provide an Ancillary Service to the extent it fails to meet the requirements contained in this CAISO Tariff. In particular, Self-Provided Ancillary Services must satisfy the following conditions:

- (a) the Scheduling Coordinator has a current certificate of technical eligibility for the resource selected for the Ancillary Services in question;
- (b) to the extent not provided under (a), the resources have the instrumentation, communication and metering equipment necessary to permit the CAISO to dispatch the offered Ancillary Services and verify that the services have been provided;
- (c) the Bid information provided by the Scheduling Coordinator is deemed to be valid in accordance with Appendix E and other provisions of the CAISO Tariff; and
- (d) the resources meet the CAISO's locational requirements for the Ancillary Services.

8.7 Ancillary Service Awards

The CAISO shall provide Scheduling Coordinators with Ancillary Services Awards for the Day-Ahead and Real-Time Markets consistent with the provisions of the CAISO Tariff. The CAISO shall post the Ancillary Service Awards and Ancillary Service Schedules for the applicable Day-Ahead Market no later than the publication of the Day-Ahead Schedule for the applicable Day-Ahead Market; no later than approximately forty-five (45) minutes prior to the Operating Hour of AS awarded as a result of a HASP Block Intertie Schedule; and no later than approximately twenty-two and a half (22.5) minutes prior to the next FMM Interval. Where long-term contracts are involved, the information may be treated as standing information for the duration of the contract.

Once the CAISO has given Scheduling Coordinators notice of the Day-Ahead and Real-Time Market Ancillary Service Awards and Ancillary Service Schedules, these awards and Schedules represent binding commitments made in the markets between the CAISO and the Scheduling Coordinators concerned, subject to any amendments issued as described above.

8.8 [Not Used]

8.9 Verification, Compliance Testing, and Auditing

Availability of contracted and Self-Provided Ancillary Services shall be verified by the CAISO by unannounced testing of resources, by auditing of response to CAISO Dispatch Instructions, and by analysis of the appropriate Meter Data, or Interchange Schedules. The CAISO may test the capability of any resource providing Ancillary Services. Participating Generators, owners or operators of Participating Loads, Scheduling Coordinators representing owners or operators of Proxy Demand Resources, operators of System Units or System Resources, owners or operators of reactive devices and Scheduling Coordinators shall notify the CAISO immediately whenever they become aware that an Ancillary Service is not available in any way. All Ancillary Service Providers shall check, monitor and/or test their system and related equipment routinely to assure availability of the committed Ancillary Services. These requirements apply to Ancillary Services whether the Ancillary Services are contracted or self-provided. For a duration specified by the CAISO, the CAISO may suspend the technical eligibility certificate of a Scheduling Coordinator for a resource which repeatedly fails to perform. The CAISO shall develop measures to discourage repeated non-performance on the part of both bidders and self-providers.

Further, all of these requirements apply to each MSG Configuration.

8.9.1 Compliance Testing for Spinning Reserve

Compliance testing for Spinning Reserve is address in Section 8.10.2.

8.9.2 Compliance Testing for Regulation

The CAISO may test the capability of any resource providing Regulation by using the CAISO EMS to move that resource's output over the full range of its Regulation capacity within a ten (10) minute period.

For a Multi-Stage Generating Resource the full range of Regulation capacity is evaluated at the applicable MSG Configuration.

8.9.3 Compliance Testing for Non-Spinning Reserve

8.9.3.1 Compliance Testing of a Resource

The CAISO may test the Non-Spinning Reserve capability of a resource that is not Curtailable Demand by issuing unannounced Dispatch Instructions requiring the resource to come on line and ramp up or, in the case of a Proxy Demand Resource, to reduce Demand, or, in the case of a System Resource, to affirmatively respond to Real-Time Interchange Schedule adjustment; all in accordance with the Scheduling Coordinator's Bid. Such tests may not necessarily occur on the hour. The CAISO shall measure the response of the resource to determine compliance with its stated capabilities. For a Multi-Stage Generating Resource the full range of Non-Spinning capacity is evaluated at the applicable MSG Configuration.

8.9.3.2 Compliance Testing of Loads as Resources

The CAISO may test the Non-Spinning Reserve capability of a resource providing Curtailable Demand or Proxy Demand Resource providing Demand Response Services by issuing unannounced Dispatch Instructions requiring the operator of the Participating Load or Demand Response Services of that Proxy Demand Resource to report the Curtailable Demand of that Participating Load or Demand Response Services of that Proxy Demand Resource actually being served by the operator at the time of the instruction. No Participating Load or Proxy Demand Resource will be disconnected as part of the test conducted pursuant to this Section 8.9.3.2.

8.9.4 Compliance Testing for Voltage Support

8.9.4.1 Compliance Testing of a Generating Unit

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The CAISO may test the Voltage Support capability of a Generating Unit by issuing unannounced Dispatch Instructions requiring the Generating Unit to adjust its power factor outside the specified power factor band of 0.90 lag to 0.95 lead, but within the limits of the Generating Unit capability curve.

8.9.4.2 Compliance Testing of Other Reactive Devices

The CAISO may test the Voltage Support capability of other reactive devices (shunt capacitors, static var compensators, and synchronous condensers) by issuing unannounced Dispatch Instructions requiring operation of such devices.

8.9.5 [Not Used]

8.9.6 [Not Used]

8.9.7 Consequences of Failure to Pass Compliance Testing

8.9.7.1 Notification of Compliance Testing Results

If a resource fails a compliance test, the CAISO shall notify the Scheduling Coordinator whose resource was the subject of the test and the provider or owner or operator of the resource providing Ancillary Services of such failure by any means as soon as reasonably practicable after the completion of the test. In addition, regardless of the outcome of the test, the CAISO shall provide the Scheduling Coordinator whose resource was subject to a compliance test written notice of the results of such test. The CAISO shall at the same time send a copy of the notice to the provider or owner or operator of the resource providing Ancillary Services. For any Resource Adequacy Resource failing a compliance test, the CAISO also will provide notification of the failure to the California Public Utilities Commission, Local Regulatory Authority, or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and FERC.

8.9.7.2 Penalties for Failure to Pass Compliance Testing

The Scheduling Coordinator whose resource fails a compliance test shall be subject to the financial penalties provided for in the CAISO Tariff. In addition, the CAISO shall institute the sanctions described in Section 8.9.16.

8.9.8 Performance Audits for Standard Compliance

In addition to testing under Section 8.10, the CAISO will periodically audit the performance of resources providing Ancillary Services to confirm the ability of such resources to provide or to meet the applicable

Ancillary Service standard for performance and control.

8.9.9 Performance Audit for Regulation

The CAISO will audit the performance of a Generating Unit providing Regulation by monitoring its response to CAISO EMS control or, in the case of an external import of a System Resource providing Regulation, by monitoring the dynamic Interchange response to CAISO EMS control around its Set Point within its rated MW/minute capability over the range of Regulation capacity scheduled for the current Settlement Period. For a Multi-Stage Generating Resource the range of Regulation capacity evaluated is the range for the applicable MSG Configuration.

8.9.10 Performance Audit for Spinning Reserve

The CAISO will audit the performance of a resource providing Spinning Reserve by auditing its response to Dispatch Instructions and by analysis of telemetry data associated with the resource. Such audits may not necessarily occur on the hour. A resource providing Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move at the MW/minute capability stated in its Bid, reach the amount of Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO, and respond to system frequency deviations as specified in Appendix K. An external import of a System Resource providing Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move at the MW/minute capability stated in its Bid, reach the amount of Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO. For a Multi-Stage Generating Resource the range of Spinning Reserve capacity evaluated is the range for the applicable MSG Configuration.

8.9.11 Performance Audit for Non-Spinning Reserve

The CAISO will audit the performance of a resource providing Non-Spinning Reserve by auditing its response to Dispatch Instructions, and by analysis of telemetry data associated with the resource. Such audits may not necessarily occur on the hour. A resource providing Non-Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move in accordance with the time delay and MW/minute capability stated in its Bid, and reach the amount of Non-Spinning Reserve capacity under the control of the CAISO scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO. For a Multi-Stage Generating Resource the range of Non-Spinning

capacity evaluated is the range for the applicable MSG Configuration.

8.9.12 [Not Used]

8.9.13 [Not Used]

8.9.14 [Not Used]

8.9.15 Consequences of Failure to Pass Performance Audit

8.9.15.1 Notification of Performance Audit Results

The CAISO shall give the Scheduling Coordinator for a provider of Ancillary Services written notice of the results of such audit. The CAISO will at the same time send a copy of the notice to the provider of Ancillary Services. For any Resource Adequacy Resource failing to pass a performance audit, the CAISO also will provide notification of the failure to the California Public Utilities Commission, Local Regulatory Authority, or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and the FERC.

8.9.15.2 Penalties for Failure to Pass Performance Audit

The Scheduling Coordinator for a provider of RUC Capacity or an Ancillary Service whose resource fails a performance audit shall be subject to the financial penalties provided for in the CAISO Tariff, including those in Section 8.10. In addition, the sanctions described in Section 8.9.16 shall apply.

8.9.16 Sanctions for Poor Performance

8.9.16.1 Warning Notice

If an Ancillary Service resource fails a compliance test or a performance audit, the CAISO will issue a warning notice to the Scheduling Coordinator for that resource and at the same time will send a copy of the notice to the owner and operator of the resource.

8.9.16.2 Scheduling Coordinator's Option to Test

On receipt of a warning notice the provider of the Ancillary Service may request the CAISO, through its Scheduling Coordinator, to test the capability of the Ancillary Service resource. The CAISO shall carry out such test as soon as practicable and the cost of such test shall be paid by the Scheduling Coordinator irrespective of the result of the test.

8.9.16.3 Duration of Warning Notice

A warning notice shall continue in effect until:

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- (a) the Ancillary Service resource is next tested by the CAISO whether such a test is called for by the Scheduling Coordinator under Section 8.9.16.2 or carried out by the CAISO under Section 8.10; or
- (b) the expiration of a period of six (6) calendar months from the date upon which the CAISO notified the Scheduling Coordinator that the Ancillary Service resource failed the test or the performance audit which gave rise to the issue of the warning notice, whichever is the earlier.

8.9.16.4 Second Failure

An Ancillary Service resource which fails a compliance test or a performance audit conducted during the period when a warning notice for that resource is in effect shall be disqualified immediately from providing the Ancillary Service concerned (whether the Ancillary Service is part of the CAISO's auction or is part of a self-provision arrangement), and shall not be permitted to submit a Bid to the CAISO to provide the Ancillary Service concerned (or be part of an Ancillary Service self-provision arrangement) until such time as it has successfully re-passed the approval and certification procedure described in the relevant Part of Appendix K. For any Resource Adequacy Resource failing a compliance test or performance audit during the periods when a warning notice for that resource is in effect, the CAISO will notify the California Public Utilities Commission or the relevant Local Regulatory Authority of the failure and disqualification or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and FERC.

8.10 Periodic Testing of Units

The CAISO shall periodically conduct unannounced tests of resources providing Ancillary Services. For Ancillary Services the unannounced tests will confirm the ability of such resources to meet the applicable Ancillary Service standard for performance and control. The CAISO may test resources in the manner described herein. The frequency of testing shall be within such time frames as are reasonable under all the circumstances. Scheduling Coordinators shall manage the resulting Energy output if notification of testing permits the Energy to be included in a Bid. If a resource fails to meet requirements in a test under this section, the CAISO shall notify the relevant Ancillary Service Provider or Scheduling Coordinator for the resource of such failure as soon as reasonably practicable after the completion of the test. Failure to

meet requirements shall lead to the penalties described in Section 8.10.7.

8.10.1 Regulation Up and Regulation Down Reserves

The CAISO shall continuously monitor the response of a resource to the CAISO's Regulation instructions in order to determine the resource is under direct control of CAISO's Automatic Generation Control system and complies with CAISO's Dispatch Instructions.

8.10.2 Spinning Reserve

The CAISO shall test the Spinning Reserve capability of a resource by issuing unannounced Dispatch Instructions requiring the resource to ramp up to its ten (10) minute capability. The CAISO shall measure the response of the resource to determine compliance with requirements. Such tests may not necessarily occur on the hour. The Scheduling Coordinator for the resource shall be paid pursuant to Section 11.5.6. For a Multi-Stage Generating Resource the range of Spinning capacity evaluated is the range for the applicable MSG Configuration.

8.10.3 Non-Spinning Reserve

The CAISO will test the Non-Spinning Reserve capability of a resource by issuing unannounced Dispatch Instructions requiring the resource to ramp to its certified capacity within ten (10) minutes. The CAISO shall measure the response of the resource or Load to determine compliance with requirements. The Scheduling Coordinator for the resource shall be paid pursuant to Section 11.5.6. For a Multi-Stage Generating Resource the range of Non-Spinning capacity evaluated is the range at the applicable MSG Configuration.

8.10.4 Voltage Support

The CAISO shall monitor a Generating Unit's response to Voltage Support instructions in order to determine compliance with Dispatch Instructions.

8.10.5 [Not Used]

8.10.6 [Not Used]

8.10.7 Penalties for Failure to Pass Tests

A resource that fails an availability test, as determined under criteria to be established by the CAISO, shall be deemed not to have been available to provide the Ancillary Service concerned or the relevant portion of that service for the entire period the resource was committed to provide the service, unless

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appropriate documentation (i.e., daily test records) confirming the availability of that service during the committed period(s) is presented to the CAISO. The “committed period” is defined as the total of all the hours/days the resource was scheduled by the CAISO to provide the Ancillary Service beginning from: (i) the last successful availability test; or (ii) the last time the resource actually provided Energy or reduced Demand as part of the Ancillary Service; whichever results in a shorter committed period. The Scheduling Coordinator for a resource that fails an availability test shall not be entitled to a payment for the Ancillary Service concerned for the committed period and adjustments to reflect this shall be made in the calculation of payments to the Scheduling Coordinator, provided that any such penalty shall be reduced to reflect any adjustment made over the duration of the committed period under Section 8.10.8 or Section 31.5.7.

System Units providing Ancillary Services to the CAISO are subject to the same testing, compensation, and penalties as are applied to individual resources providing provision of Ancillary Services.

If payments for a particular Ancillary Service in a particular Settlement Period would be rescinded under more than one provision of this Section 8.10.7, the total amount to be rescinded for a particular Ancillary Service in a particular Settlement Period shall not exceed the total payment due in that Settlement Period.

8.10.8 Rescission of Payments for Ancillary Service Capacity

If Ancillary Services capacity that receives an AS Award or Self-Provided Ancillary Services capacity provided from a resource is Undispatchable Capacity, Unavailable Capacity, or Undelivered Capacity during the relevant Settlement Interval, then payments will be rescinded as described in this Section 8.10.8 and settled in accordance with Section 11.10.9. If the CAISO determines that non-compliance of a resource, with an Operating Instruction or Dispatch Instruction from the CAISO, or with any other applicable technical standard under the CAISO Tariff, causes or exacerbates system conditions for which the WECC imposes a penalty on the CAISO, then the Scheduling Coordinator of such resource shall be assigned that portion of the WECC penalty which the CAISO reasonably determines is attributable to such non-compliance, in addition to any other penalties or sanctions applicable under the CAISO Tariff.

8.10.8.1 Rescission of Payments for Undispatchable Ancillary Service Capacity

The CAISO shall calculate the Real-Time ability of each resource to deliver Energy from Ancillary Services capacity or Self-Provided Ancillary Services capacity for each Settlement Interval based on its

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maximum operating capability, actual telemetered output, and Operational Ramp Rate as described in Section 30.10. To make this determination for Multi-Stage Generating Resources the CAISO shall use the MSG-Configuration-specific Maximum Operating Limit and Operational Ramp Rate. System Resources that are awarded Ancillary Services are required to electronically tag (E-Tag as prescribed by the WECC) the Ancillary Services capacity. If the amounts of Ancillary Services capacity in an electronic tag differ from the amounts of Ancillary Services capacity for the System Resource, the Undispatchable Capacity will equal the amount of the difference, and will be settled in accordance with the provisions of Section 11.10.9.1.

8.10.8.2 Rescission of Payments for Unavailable Ancillary Service Capacity

If the CAISO determines that a Scheduling Coordinator has supplied Uninstructed Imbalance Energy to the CAISO during a Settlement Interval from the capacity of a resource that is obligated to supply Spinning Reserve or Non-Spinning Reserve to the CAISO, payments to the Scheduling Coordinator for the Ancillary Service capacity used to supply Uninstructed Imbalance Energy shall be eliminated to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.2. For Multi-Stage Generating Resources that have supplied Uninstructed Imbalance Energy from capacity obligated to supply Spinning or Non-Spinning Reserves, the CAISO shall calculate the capacity for which payments will be rescinded at the Generating Unit level, as applicable, and will use the MSG Configuration-specific Maximum Operating Limit.

8.10.8.3 Rescission of Payments for Undeliverable Ancillary Service Capacity

For each Settlement Interval in which a resource fails to supply Energy from Spinning Reserve or Non-Spinning Reserve capacity in accordance with a Dispatch Instruction, or supplies only a portion of the Energy specified in the Dispatch Instruction, the capacity payment will be reduced to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.3.

8.10.8.4 Rescission of Ancillary Service Capacity Payments for Non-Generator Resources

For Non-Generator Resources, payment for Ancillary Service capacity will be rescinded, in accordance with the provisions of Section 11.10.9, to the extent the resource is unable as a result of its MWh constraint to generate Energy or consume Energy continuously to support its self-provision or award of

Ancillary Services.

8.10.8.5 [Not Used]

8.10.8.6 Rescission of Payments for Regulation Up and Regulation Down Capacity

Payment for Regulation Up and Regulation Down capacity will be rescinded, in accordance with the provisions of Section 11.10.9, if the resource providing Regulation Up and Regulation Down capacity: (i) is off Regulation or off Automatic Generation Control, (ii) is not running, (iii) is not providing sufficient Regulating Range, (iv) is generating outside the Regulating Range, (v) has a Regulating Range that overlaps with its Forbidden Operating Regions, or (vi) has telemetry equipment that is not available. In addition to these criteria, payment for Regulation Up and Regulation Down capacity to Non-Generator Resources will be rescinded, in accordance with the provisions of Section 11.10.9, to the extent the resource is unable as a result of its MWh constraint to generate Energy (or curtail Energy consumption) continuously to support its self-provision or award of Regulation Up or unable as a result of its MWh constraint to consume Energy (or increase Energy consumption) continuously to support its self-provision or award of Regulation Down, whether or not the resources use Regulation Energy Management.

8.10.8.7 Rescission of Payments for Resource and Transmission Constraints

If the CAISO determines that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity is not available during the RTM as a result of a resource constraint, then payments for that capacity will be rescinded in accordance with Section 11.10 or, in the case of Self-Provided Ancillary Services capacity, that capacity will not be compensated at the user rate as described in Sections 11.10.2, 11.10.3 and 11.10.4.

If the CAISO determines that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity is not available during the RTM as a result of a Transmission Constraint, then payments for that capacity will not be rescinded, except as provided in section 11.10.9.1 for System Resources or, in the case of Self-Provided Ancillary Services capacity, that capacity will continue to be compensated at the user rate as described in Sections 11.10.2, 11.10.3 and 11.10.4.

For purposes of applying this Section to Dynamic Resources or Pseudo-Tie resources, the CAISO shall treat a reduction in the Total Transfer Capability at an Intertie between the Day-Ahead Market and RTM that is registered in the CAISO's outage management system pursuant to Section 9 as a Transmission

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Constraint. For all other constraints that cause the CAISO to determine that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity from Dynamic Resource or Pseudo-Tie resources is not available, the CAISO shall treat these constraints as resource constraints.

8.11 Temporary Changes to Ancillary Service Penalties

8.11.1 Application and Termination

The temporary change, respecting Ancillary Services penalties, set out in Section 8.11.2 shall continue in effect until such time as the Chief Executive Officer of the CAISO issues a Notice of Full-Scale Operations, posted on the CAISO Website, at <http://www.CAISO.com>, or such other internet address as the CAISO may publish from time to time, specifying the date on which this Section 8.11 shall cease to apply, which date shall be not less than seven (7) days after the Notice of Full-Scale Operations is issued.

8.11.2 Exemption for Penalties Due to CAISO Software Limitations

For so long as this Section 8.11.2 remains in effect, Scheduling Coordinators shall not be liable for the penalties specified in Sections 8.10.7 and 8.10.8 if, as a result of limitations associated with the CAISO's Congestion Management software, the scheduled output of the resource from which the Scheduling Coordinator has committed to provide an Ancillary Service is adjusted by the CAISO to a level that conflicts with the Scheduling Coordinator's Ancillary Service capacity commitments, thereby resulting in a failed availability test.