2.5.2.1   Determination of Ancillary Service Standards. The ISO shall set the

required standard for each Ancillary Service necessary to maintain the reliable operation of the

ISO Controlled Grid. Ancillary Services standards shall be based on WSCC Minimum

Operating Reliability Criteria (MORC) and ISO Controlled Grid reliability requirements. The ISO

Grid Operations Committee, in conjunction with the relevant reliability council (WSCC), shall

develop these Ancillary Services standards to determine reasonableness, cost effectiveness,

and adherence to national and WSCC standards. The standards developed by the ISO shall be

used as a basis for determining the quantity and type of each Ancillary Service which the ISO

requires to be available.

2.5.2.2 Time-frame For Revising Ancillary Service Standards. The ISO Technical Advisory

Committee shall periodically undertake a review of the ISO Controlled Grid operation to

determine any revision to the Ancillary Services standards to be used in the ISO Control Area.

At a minimum the ISO Grid Operations Committee shall conduct such reviews to accommodate

revisions to WSCC and NERC standards. The ISO 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 ISO will provide notice, via the ISO Home Page, of any temporary adjustments

to Ancillary Service standards by 6:00 p.m. two days ahead of the Trading Day to which the

adjustment will apply.

2.5.3   Quantities of Ancillary Services Required.

For each of the Ancillary Services, the ISO shall determine the quantity and location of the

Ancillary Service which is required and which must be under the direct Dispatch control of the

ISO on an hourly basis each day. The ISO shall determine the quantities it requires as follows:

2.5.3.1   Regulation Service. The ISO shall maintain sufficient Generating Units immediately responsive to AGC in order to provide sufficient Regulation service to allow the system to meet WSCC and NERC criteria.

2.5.3.2   Spinning And Non-Spinning Reserves. The ISO shall maintain minimum contingency Operating Reserve made up of Spinning Reserve and Non-Spinning Reserve in accordance with WSCC MORC criteria equal to (a) 5% of the Demand to be met by Generation from hydroelectric resources plus 7% of the Demand to be met by Generation from other resources, or (b) the single largest Contingency, if this is greater or (c) by reference to such more stringent criteria as the ISO may determine from time to time. When the level of Operating Reserve is determined by Demand, the ISO shall not maintain Operating Reserve with respect to Demand covered by firm purchases from outside the ISO Control Area. In addition, the ISO shall maintain Operating Reserve equal to the total amount of Interruptible Imports scheduled by Scheduling Coordinators for any hour. Such additional Operating Reserve must either be self-provided or purchased from the ISO by Scheduling Coordinators. To the extent such additional Operating Reserve is self-provided by a Scheduling Coordinator, it may consist entirely of Non-Spinning Reserve. To the extent that such additional Operating Reserve is not self-provided by a Scheduling Coordinator, the ISO will procure the necessary amounts of Operating Reserve, but not necessarily entirely from Non-Spinning Reserves.

2.5.3.3 Replacement Reserve. The ISO shall make its determination of the required quantity of Replacement Reserve based on:

(a)   historical analysis of the deviation between actual and Day-Ahead forecast Demand,

(b)   historical patterns of unplanned Generating Unit Outages,

(e)   such other factors affecting the ability of the ISO to maintain System Reliability

as the ISO may from time to time determine.

The ISO shall have discretion to determine the quantity of Replacement Reserve it

requires in each Zone.

2.5.3.4 Voltage Support.

The ISO 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 WSCC

and NERC criteria using a power flow study based on the quantity and location of

scheduled Demand. The ISO shall issue daily voltage schedules, which are required to

be maintained for ISO Controlled Grid reliability. All other Generating Units shall comply

with the power factor requirements set forth in contractual arrangements in effect on the

ISO 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 ISO specified voltage schedule at

the transmission interconnection points to the extent possible while operating within the

power factor range specified in their interconnection agreements or, for Regulatory Must-

Take Generation, 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 ISO

Operations Date that are unable to meet this operating power factor requirement may

apply to the ISO for an exemption. Prior to granting such an exemption, the ISO shall

require the Participating TO or UDC to whose system the relevant Generating Units are

interconnected to notify it of the existing contractual requirements for voltage support

established prior to the ISO Operations Date for such Generating

requirements continue to be met. If at any time the ISO's technical requirements are not being met, the ISO may withdraw the certificate for the Generating Unit, System Unit, Load or System Resource concerned.

2.5.6.1 Operating Characteristics Required to Provide Ancillary Services. Each Generating Unit, System Unit, Load or System Resource which a Scheduling Coordinator wishes to schedule or bid to provide Ancillary Services must comply with the requirements for the specific Ancillary Service in regard to the following:

(a)   ramp rate increase and decrease (MW/minute);

(b)   power factor (leading and lagging) as required by Section 2.5.3.4;

(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)   AGC capability, control scheme, and range; and

(f)   minimum length of time the resource can be available to provide the relevant Ancillary Service.

The ISO will differentiate the operating characteristics according to the Ancillary Service being provided.

2.5.6.2 Communication Equipment. Unless otherwise authorized by the ISO, all Scheduling Coordinators wishing to submit an Ancillary Service schedule or bid must have the capability to submit and receive information by direct computer link. In addition, they must provide the ISO with a telephone number, fax number or other approved voice communication system such as direct line access through which Dispatch instructions for each Generating Unit, System Unit, Load and System Resource may be given if necessary. The ISO will determine which method of communication is

based on ISO control signals received on dedicated communications links in accordance with

ISO standards and procedures posted on the ISO Home Page.

2.5.7.4.4   Scheduling Coordinators may utilize transmission service under Existing

Contracts to self-provide Regulation (consistent with the applicable ISO Protocols), from

resources located outside the ISO Control Area, where technically feasible, consistent with

WSCC standards

2.5.7.4.5   Scheduling Coordinators' bidding or self-provision of Ancillary Services

according to this section 2.5.7.4 shall be consistent with the ISO Protocols.

2.5.8   The Bidding Process.

The ISO shall operate a competitive Day-Ahead and Hour-Ahead market to procure

Ancillary Services. It shall purchase Ancillary Services capacity at least cost to End-Use

Customers consistent with maintaining system reliability. Any Scheduling Coordinator

representing Generating Units, System Units, Loads or external imports of System

Resources may bid into the ISO's Ancillary Services market provided that it is in

possession of a current certificate for the Generating Units, System Units, external

imports of System Resources or Loads concerned.

2.5.9   Provision of System Information to Scheduling Coordinators.

By 6:00 p.m. two days prior to the Trading Day, the ISO shall make available to

Scheduling Coordinators general system information including those items of

by the ISO and include the bid information for each service described in Sections 2.5.14 to

2.5.19 and such other information as the ISO may determine it requires to evaluate bids as

published from time to time in ISO Protocols. The ISO will verify and respond to submitted

bid data in accordance with Appendix E and the ISO Protocols. Bidders may submit new

bids on a daily basis (or hourly basis for the Hour-Ahead Market).

2.5.12   Bid Evaluation Rules.

Bid evaluation shall be based on the following principles:

(a)   the ISO shall not differentiate between bidders other than through price and

         capability to provide the service, and the required locational mix of services;

(b)   to minimize the costs to users of the ISO Controlled Grid, the ISO shall select the

         bidders with lowest bids for capacity which meet its technical requirements,

         including location and operating capability;

(c)   for the Day-Ahead Market, the Day-Ahead bids shall be evaluated independently

         for each of the 24 Settlement Periods of the following Trading Day;

(d)   for the Hour-Ahead Market, the ISO shall evaluate bids in the two hours preceding

         the hour of operation;

(e)   the ISO will procure sufficient Ancillary Services in the Day Ahead Market to meet

         its forecasted requirements, as known at the close of the Day-Ahead Market,

         except that the ISO may elect to procure a portion of such requirements in the

         Hour-Ahead Markets if the ISO first provides notice to Scheduling Coordinators of

         such action, including the approximate hourly

The ISO shall select Participating Generator's Generating Units which have been certified for Voltage Support to provide this additional Voltage Support. Subject to any locational requirements, the ISO 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.

metered Demand (excluding exports) served in each hour in that Zone. Each Scheduling

Coordinator's Operating Reserve obligation in each Zone shall be pro rata based upon the same

proportion as the ratio of the product of its percentage obligation based on metered output and

the sum of its metered Demand and firm exports bears to the total of such products for all

Scheduling Coordinators in the Zone. The Scheduling Coordinator's percentage obligation

based on metered output shall be calculated as the sum of 5% of its real time Demand (except

the Demand covered by firm purchases from outside the ISO Control Area) met by Generation

from hydroelectric resources plus 7% of its Demand (except the Demand covered by firm

purchases from outside the ISO Control Area) met by Generation from non-hydroelectric

resources in that Zone, plus 100% of any Interruptible Imports and on-demand obligations which

it schedules. Each Scheduling Coordinator's Replacement Reserve obligation in each Zone is

calculated as described in Section 2.5.28.4. Scheduling Coordinator obligations for each

Ancillary Service will be calculated based on the requirement for each Ancillary Service as the

ISO determines prior to the adjustment set forth in Section 2.5.3.6.

2.5.20.2 Right to Self Provide.

Each Scheduling Coordinator may choose to self provide all, or a portion, of its Regulation,

Operating Reserve, and Replacement Reserve obligation in each Zone. The ISO shall schedule

self provided Ancillary Services, Day-Ahead and Hour-Ahead, and Dispatch self provided

Ancillary Services in real time. To the extent that a Scheduling Coordinator self provides, the

2.5.20.7 Acceptance of Self Provided Ancillary Service Schedules. The ISO will refuse to accept self provided Ancillary Service schedules only to the extent that they fail to meet requirements contained in this ISO Tariff. In particular, self provided Ancillary Service schedules must satisfy the following conditions:

(a)   the Scheduling Coordinator has a current certificate of technical eligibility for the Generating Units, System Units, Loads or System Resources selected for the Ancillary Services in question;

(b)   to the extent not provided under (a), the Generating Units, System Units, Loads and System Resources have the instrumentation, communication and metering equipment necessary to permit the ISO to dispatch the offered Ancillary Services and verify that the services have been provided;

(c)   the scheduling information provided by the Scheduling Coordinator is deemed to be valid in accordance with Appendix E and the ISO Protocols; and

(d)   the Generating Units, System Units, Loads or System Resources meet the ISO's locational requirements for the Ancillary Services.

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2.5.22.4 Supplemental Energy Bids. In addition to the Generating Units, Loads and System Resources which have been scheduled to provide Ancillary Services in the Day-Ahead and Hour-Ahead markets, the ISO may Dispatch Generating Units, Loads or System Resources for which Scheduling Coordinators have submitted Supplemental Energy bids.

2.5.22.4.1   Timing of Supplemental Energy Bids.

Supplemental Energy bids must be submitted to the ISO no later than forty-five (45) minutes prior to the operating hour. Bids may also be submitted at any time after the Day-Ahead Market closes. These Supplemental Energy bids cannot be withdrawn after forty-five (45) minutes prior to the Settlement Period.   The ISO may dispatch the associated resource at any time during the Settlement Period.

2.5.22.4.2   Form of Supplemental Energy Bid Information.

Supplemental Energy bids must include the following:

(a)   Bidder name and identification;

(b)   Resource name, identification, and location;

example reduction in payments to Scheduling Coordinators, or suspension of the Scheduling

Coordinator's Ancillary Services certificate for the Generating Unit, Curtailable Demand or

System Resource concerned.

2.5.24   Pricing Imbalance Energy.

2.5.24.1 General Principles. Imbalance Energy shall be priced using the BEEP Interval Ex

Post Prices for Instructed Imbalance Energy per resource and the Hourly Ex Post Price for

Uninstructed Imbalance Energy. The Ex Post Prices shall be based on the bid of the marginal

Generating Units, System Units, Loads and System Resources dispatched by the ISO to reduce

Demand or to increase or decrease Energy output in each BEEP Interval.

The marginal Generating Unit, System Unit, Load or System Resource dispatched in

each BEEP Interval is

(a)   if generation output is increased, or Demand reduced, the Generating Unit, System

Unit, Load or System Resource with the highest bid that is accepted by the ISO's

BEEP Software for incremental Generation, or Demand reduction; or

(b)   if generation output is decreased, the Generating Unit, System Unit, Load or System

Resource with the lowest bid that is accepted by the ISO's BEEP Software for

decremental Generation.

When an Inter-Zonal Interface is operated at the capacity of the interface (whether due to scheduled uses of the interface, or decreases in the capacity of the interface), the marginal incremental or decremental bid prices in some Zones may differ from one another. In such cases, the ISO will determine separate Ex Post Prices for the Zones.

The ISO will respond to the Dispatch instructions issued by the BEEP Software to the extent practical in the time available and acting in accordance with Good Utility Practice. The ISO will record the reasons for any variation from the Dispatch instructions issued by the BEEP Software.

2.5.24.2 Determining Ex Post Prices.

2.23.2.1 BEEP Interval Ex Post Prices. For each BEEP Interval, the ISO will compute an updated dispatch price curve, using the Generating Units, System Units, Loads and System Resources dispatched according to the ISO's BEEP Software during that time period to meet Imbalance Energy requirements. For each BEEP Interval of the Settlement Period, BEEP will compute an incremental Ex Post Price and a decremental Ex Post Price. The incremental Ex Post Price will equal the highest price bid selected in the BEEP Interval. The decremental Ex Post Price will equal the lowest price bid selected in the BEEP Interval. The Ex Post Prices for each BEEP Interval will equal the marginal bid of the marginal Generating Unit, System Unit, Load, or System Resource as described in Section 2.5.23.1.

The BEEP Interval incremental Ex Post Price will be computed for each BEEP Interval i as

$PI_i = Max(EnBid_{ir})_{ti}$

The BEEP Interval decremental Ex Post Price will be computed for each BEEP Interval

as

$PD_i = Min(EnBid_r)_i$

Where

$EnBid_{ri}$ = Energy bid prices of the resource providing Ancillary Service Energy, or

Supplemental Energy.

In the event of Inter-Zonal Congestion, the ISO will develop a dispatch price curve, and the BEEP Interval Ex Post Prices for each Zone where congestion exists.

2.5.23.2.2   Hourly Ex Post Price Applicable to Uninstructed Deviations. The Hourly Ex Post Price applicable to Uninstructed Imbalance Energy in Settlement Period t in each zone will equal the Energy weighted average of the BEEP Interval Charges in each Zone, calculated as follows:

$$PHourExPostx = \frac{(\sum_{ji} |MWh_{jix}| * BIP_{ix})}{\sum_{ji} |MWh_{jix}|}$$

Where:

$PHourExPost_x$ = Hourly Ex Post Price in Zone x

BIP_{ix}= BEEP Interval Ex Post Price

J=the number of Scheduling Coordinators with instructed deviations

$IIEC_{jix}$= the Instructed Imbalance Energy Charges for Scheduling Coordinator j for the BEEP Interval i in Zone x.

$IMWH_{jix}$=the Instructed Imbalance Energy for Scheduling Coordinator j for the BEEP Interval i in Zone x.

If the ISO declares a System Emergency, e.g. during times of supply scarcity, and involuntary load shedding occurs during the real time Dispatch, the ISO shall set the Hourly Ex Post Price at the Administrative Price.

2.5.25 Verification of Performance of Ancillary Services.

Availability of both contracted and self provided Ancillary Services shall be verified by the ISO by unannounced testing of Generating Units, Loads and System Resources,

by auditing of response to ISO Dispatch instructions, and by analysis of the appropriate Meter

Data, or interchange schedules. Participating Generators, owners or operators of Loads,

operators of System Units or System Resources and Scheduling Coordinators shall notify the

ISO immediately whenever they become aware that an Ancillary Service is not available in any

way. All Participating Generators, owners or operators of Loads and operators of System Units

or System Resources shall check, monitor and/or test their system and related equipment

routinely to assure availability of the committed Ancillary Services. These requirements apply

whether the Ancillary Services are contracted or self provided. For a duration specified by the

ISO, the ISO may suspend the technical eligibility certificate of a Scheduling Coordinator for a

Generating Unit, System Unit, Load or System Resource, which repeatedly fails to perform.

The ISO shall develop measures to discourage repeated non-performance on the part of both

bidders and self providers.

The ISO shall monitor the performance of a MSS via a Metered Subsystem Regulation

Error (MSRE). The MSRE is obtained by comparing the sum of the metered power flows at the

MSS interface points to the sum of the MSS's power scheduled or instructed at these same

interface points. The ISO may bias the MSRE for purposes of testing or control of Ancillary

Services provided by the MSS. The MSRE shall incorporate this bias.

The MSRE shall be reported to the ISO on a real time basis, and checked at five

minute intervals to determine whether the MSS meets specified performance criteria.

Scheduling Coordinators for Generating Units shall receive the following payment for Energy output from Regulation:

$$\sum_i [(EnQUns_{tixt} * HourlyExPostPriceinZoneX) + REPA_{ixt}]$$

$[(R_{UPixt} * C_{UP}) + (R_{DNixt} * C_{DN})] * \max (\$20/MWh, P_{xt})$

$REPA_{ixt}$ =   the Regulation Energy Payment Adjustment for Generating Unit i in Zone X for Settlement Period t calculated as follows:

Where

R_{UPixt} =   the upward range of generating capacity for the provision of Regulation from Generating Unit i in Zone X included in the bid accepted by the ISO for Generating Unit i for Settlement Period t, weighted in proportion to the ISO's need for upward Regulation. The weighting factors will be specified within a range from 0-100 percent. The weighting factors will be set at the discretion of the ISO based on system conditions, and will be set at a level that will provide sufficient incentive to the market to supply upward Regulation for the ISO's purposes of satisfying WSCC criteria and NERC control performance standards. The ISO shall post the weighting factors consistent with the ISO Weighting Procedure, posted on the ISO website.

R_{DNixt} =   the downward range of generating capacity for the provision of Regulation for Generating Unit i in Zone X included in the bid accepted by the ISO for Generating Unit i for Settlement Period t, weighted in proportion to the ISO's need for downward Regulation. The weighting factors will be

specified within a range from 0-100 percent. The weighting factors

will be set at the discretion of the ISO based on system conditions,

and will be set at a level that will provide sufficient incentive to the

market to supply downward Regulation for the ISO's purposes of

satisfying WSCC criteria and NERC control performance standards.

The ISO shall post the weighting factors consistent with the ISO

Weighting Procedure, posted on the ISO website.

C_{UP} = 1

C_{DN} = 1

P_{xt} = the Hourly Ex Post Price for Zone X in Settlement Period t.

The ISO may modify the value of the constants C_{UP} or C_{DN} within a range of 0-1 either generally

in regard to all hours or specifically in regard to particular times of the day, after the ISO

Governing Board approves such modification, by a notice issued by the Chief Executive Officer

of the ISO and posted on the ISO Internet "Home Page," at http//www.caiso.com, or such other

Internet address as the ISO may publish from time to time, specifying the date and time from

which the modification shall take effect, which shall be not less than seven (7) days after the

Notice is issued.

REPA shall not be payable unless the Generating Unit is available and capable of being
controlled and monitored by the ISO Energy Management System over the full range of its
Scheduled Regulation capacity for the entire Settlement Period at least the ramp rates
(increase and decrease in MW/minute) stated in its bid. In addition, the total Energy available
(R_{UP} plus R_{DN}) may be adjusted to be only R_{UP} or only R_{DN}, a percentage of R_{UP} or R_{DN}, or the
sum of R_{UP} and R_{DN}, depending on the needs of the ISO for each direction of Regulation
service.

2.5.27.2   Spinning Reserve.

Quantities. The following quantity definitions shall be used for each Scheduling Coordinator in the Settlement process:

$SpinQDA_{xt}$ = the Scheduling Coordinator's total quantity of Spinning Reserve capacity in Zone X sold through the ISO auction, and scheduled Day-Ahead for Settlement Period t.

$EnQInst_{xt}$ = Instructed Imbalance Energy output in Zone X in real time Dispatch for Settlement Period t, determined in accordance with the ISO protocols.

Prices. The prices in the Settlement process for Spinning Reserve shall be those determined in Section 2.5.15.

$Adjustment$ = penalty described in Section 2.5.26.1, or rescinded capacity payments described in Section 2.5.26.2 or 2.5.26.3.

$PspDA_{xt}$ = market clearing price, Psp, in Zone X for Spinning Reserve capacity in the Day-Ahead Market for Settlement Period t.

Payments. Scheduling Coordinators for Generating Units, System Units, or System Resources providing Spinning Reserve capacity through the ISO auction shall receive the following payments for Spinning Reserve capacity:

$SpinPay_{xt} = SpinQDA_{xt} * PspDA_{xt} - Adjustment$

Scheduling Coordinators for Generating Units, System Units, or System Resources shall receive the following payments for Energy output from Spinning Reserve capacity:

$EnQInst_{xt} * BEEP\ Interval\ Ex\ Post\ Price_{xt}$