ATTACHMENT H

SEPARATE PRICING OF REGULATION UP AND REGULATION DOWN

2.5.14 The Regulation Auction.

Bid Information. Each Scheduling Coordinator j shall submit the following information for each Generating Unit or System Unit i for each Settlement Period t of the following Trading Day

(a) bidder name/Identification Code;

(b) resource identification (name and Location Code);

(c) the date for which the bid applies;

(d) maximum operating level (MW);

(e) minimum operating level (MW);

(f) ramp rate (MW/Min) $Ramp_{ijt}$;

(g) the upward and downward range of generating capacity over which Generating Unit or System Unit i from Scheduling Coordinator j is willing to provide Regulation for Settlement Period t ($Cap_{ijt}max$ (MW) where $Cap_{ijt}max \leq$ Period $_{minutes}$ * $Ramp_{ijt}$ Period $_{minutess}$ is established by the ISO by giving Scheduling Coordinators twenty-four (24) hours advance notice, within a range from a minimum of 10 minutes to a maximum of 30 minutes.) Bidders shall offer upward and downward range for Regulation service;

(h) the bid price of the capacity reservation, stated separately for Regulation Up and Regulation Down ($CapRes_{ijt}$ ($/MW));

(i) the bid price of the Energy output from the reserved capacity ($EnBid_{ijt}$($/MWh));

Bid Evaluation. Based on the quantity and location of the system requirements, the ISO shall select Generating Units and System Units with the bids, which minimize the sum of the total bids of the Generating Units and System Units selected for Regulation Up or Regulation Down, subject to two constraints:

(a) the sum of the selected bid capacities must be greater than or equal to the required Regulation capacity; and

(b) each Generating Unit's or System Unit's bid capacity must be less than or equal to that Generating Unit's or System Units ramp rate times $Period_{minutes}$

The total bid for each Generating Unit or System Unit is calculated by multiplying the capacity reservation bid price by the bid capacity.

Thus, subject to any locational requirements, the ISO will accept winning Regulation bids in accordance with the following criteria:

$$\underset{i,j}{Min} \sum TotalBidi\,jt$$

Subject to

$$\sum_{i,j} Cap_{ijt} \geq Requirement_t \; and \; Cap_{ijt} \leq Cap_{ijtmax}$$

Where

$TotalBid_{ijt} = CapRes_{ijt} * Cap_{ijt}$

$Requirement_t$ = Amount of upward and downward movement capacity required

Price Determination. The price payable to Scheduling Coordinators for Regulation capacity made available for upward and downward movement in accordance with the ISO's Ancillary Services schedules shall, for each Generating Unit and System Unit concerned, be the zonal market clearing price as follows:

$PAGC_x = MCP_{xt}$

Where:

The zonal market clearing (MCP_{xt}) price is the highest priced winning Regulation capacity bid in Zone X based on the capacity reservation bid price i.e.

$MCP_{xt} = Max\ (CapRes_{ijt})$ in zone x for Settlement Period t

The ISO's auction does not compensate the Scheduling Coordinator for the minimum Energy output of Generating Units or System Units bidding to provide Regulation. Therefore, disposition of any minimum Energy associated with Regulation selected in the ISO's Ancillary Services markets is the responsibility of the Scheduling Coordinator selling the Regulation.

2.5.20.1 Ancillary Service Obligations. Each Scheduling Coordinator shall be assigned a share of the total Regulation, Spinning Reserve, Non-Spinning and Replacement Reserve requirements by the ISO. Any references in this Tariff to the Ancillary Service "Regulation" shall be read as referring to "Regulation Up" or "Regulation Down". The share assigned to each Scheduling Coordinator is described in Section 2.5.20 and in Section 2.5.28 as that Scheduling Coordinator's obligation. Each Scheduling Coordinator's Regulation obligation in each Zone shall be pro rata based upon the same proportion as the Scheduling Coordinator's metered hourly Demand bears to the total metered Demand 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 Schedules 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 Schedules shall be calculated as the sum of 5% of its scheduled Demand (except the Demand covered by firm purchases from outside the ISO Control Area) scheduled to be met by Generation from hydroelectric resources plus 7% of its scheduled Demand (except the Demand covered by firm purchases from outside the ISO Control Area) scheduled to be 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 shall be pro rata based upon the same proportion as the metered Demand of the Scheduling Coordinator bears to the total metered Demand in the Zone.

2.5.27.1 Regulation.

Regulation Up and Regulation Down payments shall be calculated separately. Quantities and prices for Regulation Down shall be calculated by substituting the Regulation Up quantities and prices in the relevant formulae.

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

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

EnQUnst$_{xt}$ = Uninstructed Imbalance Energy increase or decrease 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 Regulation Up shall be those determined in Section 2.5.14.

Adjustment: penalty described in Section 2.5.26.1.

PAGCUpDA$_{xt}$ = the market clearing price, PAGC, in Zone X for Regulation Up capacity in the Day-Ahead market for Settlement Period t.

Payments. Scheduling Coordinators for Generating Units providing Regulation Up capacity through the ISO auction shall receive the following payments for Regulation Up:

AGCUpPay$_{xt}$ *= AGCUpQDA*$_{xt}$ **PAGCUpDA*$_{xt}$ *- Adjustment*

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

EnQUnst$_{xt}$ ** Hourly Ex Post Price in Zone X*

2.5.28.1 Regulation. Regulation Up and Regulation Down charges shall be calculated separately. Quantities and rates for Regulation Down shall be calculated by substituting the Regulation Up quantities and rates in the relevant formulae. The user rate per unit of purchased Regulation service for each Settlement Period in the Day-Ahead Market for each Zone shall be calculated by dividing the total Regulation capacity payments by the ISO's total requirement for Regulation for that Settlement Period for that Zone which has not been self provided by Scheduling Coordinators. The ISO will calculate the user rate for Regulation Up in each Zone for each Settlement Period as:

RegRateUpDA ($/MWh) = AGCUpPayDA /AGCUpObligTotal

where:

AGCUpPayDA = Total Regulation Up payments for the Settlement Period in the Day-Ahead Market for the Zone ~~Day-Ahead~~.

AGCUpObligTotal = the total ISO Regulation Up requirement for the Settlement Period for the Zone less that which has been self provided by Scheduling Coordinators.

For each Settlement Period, each Scheduling Coordinator shall pay to the ISO a sum calculated as follows for each Zone:

*RegUpRateDA * AGCUpOblig*

where *AGCUpOblig* is the Scheduling Coordinator's obligation for Regulation Up in the Zone in the Settlement Period for which it has not self provided.

Regulation

The service provided by Generating Units equipped and operating with AGC which will enable such units to respond to the ISO's direct digital control signals in an upward and downward direction to match, on a real time basis, Demand and resources, consistent with established NERC and WSCC operating criteria. Regulation is used to control the power output of electric generators within a prescribed area in response to a change in system frequency, tieline loading, or the relation of these to each other so as to maintain the target system frequency and/or the established interchange with other areas within the predetermined limits. Regulation includes both the increase of output by a Generating Unit ("Regulation Up") and the decrease in output by a Generating Unit ("Regulation Down"). Regulation Up and Regulation Down are distinct capacity products, with separately stated requirements and Market Clearing Prices in each Settlement Period.

SABP APPENDIX C

ANCILLARY SERVICES CHARGES COMPUTATION

C 1 Purpose of charges

The Ancillary Services Charges reimburse the ISO for the costs of purchasing Ancillary Services in the Day-Ahead and Hour-Ahead Markets. Each Scheduling Coordinator that does not self provide Ancillary Services must purchase these services from the ISO. The ISO will in turn purchase these Ancillary Services from Scheduling Coordinators in the markets. Ancillary Services purchased and resold by the ISO includes Regulation, Spinning Reserve, Non-Spinning Reserve, and Replacement Reserve. Any references in this Appendix C to the Ancillary Service "Regulation" shall be read as referring to "Regulation Up" or "Regulation Down".

This Appendix C also addresses the payments by ISO to Scheduling Coordinators for the Dispatch of energy from Dispatched Ancillary Services Units and for the Dispatch of Supplemental Energy in the Real Time Market. The ISO recovers the costs of Real Time Dispatch of such energy through the Imbalance Energy charges described in Appendix D of this Protocol.

The reference to a Scheduling Coordinator by Zone refers to the Demand of that Scheduling Coordinator which is located in the Zone. A Generation Unit, Load, or System Resource located in another Control Area is considered to be located in the Zone in which its contract path enters the ISO Controlled Grid.

The ISO will purchase Ancillary Services for each Trading Interval in both the Day-Ahead and Hour-Ahead Markets. Separate payments will be calculated for each service for each Trading Interval and in each market for each Generating Unit, Load and System Resource. The ISO will then calculate a total payment for each Scheduling Coordinator for each Trading Interval for each service for each Zone in each market for all the Generating Units, Loads and System Resources that the Scheduling Coordinator represents. The ISO will charge Scheduling Coordinators for Ancillary Services, other than for energy, which they purchase from the ISO by calculating and applying charges to each Scheduling Coordinator for each Trading Interval for each service in each Zone in each market.

C 2.1.1 Day-Ahead Market

(a) *Regulation*. When the ISO purchases Regulation capacity in the Day-Ahead Market, Scheduling Coordinators for Generating Units that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit which provides Regulation capacity over a given Trading Interval will be the total quantity of Regulation capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. The required Regulation capacity is defined in the Ancillary Services Requirements Protocol. Regulation Up and Regulation Down payments shall be calculated separately. Quantities and rates for Regulation Down shall be calculated by substituting the Regulation Up quantities and prices in the relevant formulae. This payment for Scheduling Coordinator j for providing Regulation Up capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayDA_{ijxt} = AGCUpQDA_{ijxt} * PAGCUpDA_{xt}$$

~~$$AGCPayDA_{ijxt} = AGCQDA_{ijxt} * PAGCDA_{xt}$$~~

The total Regulation Up payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayTotalDA_{jxt} = \sum_{i} AGCUpPayDA_{ijxt}$$

~~$$AGCPayTotalDA_{jxt} = \sum_{i} AGCPayDA_{ijxt}$$~~

b) *Spinning Reserve*. When ISO purchases Spinning Reserve capacity in the Day-Ahead Market. Scheduling Coordinators for Generating Units that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit which provides Spinning Reserve capacity over a given Trading Interval will be the total quantity of Spinning Reserve capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. The required Spinning Reserve capacity is defined in the Ancillary Services Requirements Protocol. This payment for Scheduling Coordinator j for providing Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$SpinPayDA_{ijxt} = SpinQDA_{ijxt} * PSpinDA_{xt}$$

The total Spinning Reserve payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$SpinPayTotalDA_{jxt} = \sum_{i} SpinPayDA_{ixt}$$

c) *Non-Spinning Reserve*. When the ISO purchases Non-Spinning Reserve capacity in the Day-Ahead Market, Scheduling Coordinators for Generating Units and Loads that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit or Load which provides Non-Spinning Reserve capacity over a given Trading Interval will be the total quantity of Non-Spinning Reserve capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. The required Non-Spinning Reserve capacity is defined in the Ancillary Services Requirements Protocol. This payment for Scheduling Coordinator j for providing Non-Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$NonSpinPayDA_{ijxt} = NonSpinQDA_{ijxt} * PNonSpinDA_{xt}$$

The total Non-Spinning Reserve payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$NonSpinPayTotalDA_{jxt} = \sum_{i} NonSpinPayDA_{ijxt}$$

d) *Replacement Reserve*. When the ISO purchases Replacement Reserve capacity in the Day-Ahead Market, Scheduling Coordinators for Generating Units and Loads that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit or Load which provides Replacement Reserve capacity over a given Trading Interval will be the total quantity of Replacement Reserve capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. The required Replacement Reserve capacity is defined in the Ancillary Services Requirements Protocol. This payment for Scheduling Coordinator j for providing Replacement Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$ReplPayDA_{ijxt} = ReplQDA_{ijxt} * PReplDA_{xt}$$

The total Replacement Reserve payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$ReplPayTotalDA_{jxt} = \sum_{i} ReplPayDA_{ijxt}$$

C 2.1.2 Hour-Ahead Market

(a) *Regulation*. When the ISO purchases Regulation capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units that provide this capacity will receive payment for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit which provides Regulation capacity over the Trading Interval will be the total quantity of Regulation capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. The required Regulation capacity is defined in the Ancillary Services Requirements Protocol. Regulation Up and Regulation Down payments shall be calculated separately. Quantities and rates for Regulation Down shall be calculated by substituting the Regulation Up quantities and prices in the relevant formulae. This payment for Scheduling Coordinator j for providing Regulation Up capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayHA_{ijxt} = AGCUpQIHA_{ijxt} * PAGCUpHA_{xt}$$

When a Scheduling Coordinator buys back, in the Hour-Ahead Market, Regulation capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Regulation capacity bought back times the zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Regulation Up capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCUpReceiveHA_{ijxt} = AGCUpQDHA_{ijxt} * PAGCUpHA_{xt}$$

The total Regulation payment for the Trading Interval of the Hour-Ahead Market to each Scheduling Coordinator for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Regulation bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayTotalHA_{jxt} = \sum_i AGCUpPayHA_{ijxt} - \sum_i AGCUpReceiveHA_{ijxt}$$

$$AGCPayTotalHA_{jxt} = \sum_i AGCPayHA_{ijxt} - \sum_i AGCReceiveHA_{ijxt}$$

(b) *Spinning Reserve*. When the ISO purchases Spinning Reserve capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units that provide this capacity will receive payments for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit which provides Spinning Reserve capacity over the Trading Interval will be the total quantity of Spinning Reserve capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. This

payment for Scheduling Coordinator j for providing Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$SpinPayHA_{ijxt} = SpinQIHA_{ijxt} * PSpinHA_{xt}$

When a Scheduling Coordinator buys back in the Hour-Ahead Market Spinning Reserve capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Spinning Reserve capacity bought back times the zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$SpinReceiveHA_{ijxt} = SpinQDHA_{ijxt} * PSpinHA_{xt}$

The total Spinning Reserve payment to each Scheduling Coordinator for the Trading Interval of the Hour-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Spinning Reserve bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$SpinPayTotalHA_{jxt} = \sum_{i} SpinPayHA_{ijxt} - \sum_{i} SpinReceiveHA_{ijxt}$$

(c) *Non-Spinning Reserve*. When the ISO purchases Non-Spinning Reserve capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units and Loads that provide this capacity will receive payment for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit or Load which provides Non-Spinning Reserve capacity over the Trading Interval will be the total quantity of Non-Spinning Reserve capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. This payment for Scheduling Coordinator j for providing Non-Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$NonSpinPayHA_{ijxt} = NonSpinQIHA_{ijxt} * PNonSpinHA_{xt}$

When a Scheduling Coordinator buys back in the Hour-Ahead Market Non-Spinning Reserve capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Non-Spinning Reserve capacity bought back times the zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Non-Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$NonSpinReceiveHA_{ijxt} = SpinQDHA_{ijxt} * PNonSpinHA_{xt}$

The total Non-Spinning Reserve payment to each Scheduling Coordinator for the Trading Interval of the Hour-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Non-Spinning Reserve bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone.This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$NonSpinPayTotalHA_{jxt} = \sum_{i} NonSpinPayHA_{ijxt} - \sum_{i} NonSpinReceiveHA_{ijxt}$$

(d) *Replacement Reserve*. When the ISO purchases Replacement Reserve capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units and Loads that provide this capacity will receive payments for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit or Load which provides Replacement Reserve capacity over the Trading Interval will be the total quantity of Replacement Reserve capacity provided times the zonal Market Clearing Price for that Trading Interval in that Zone. This payment for Scheduling Coordinator j for providing Replacement Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$ReplPayHA_{ijxt} = ReplQIHA_{ijxt} * PReplHA_{xt}$$

When a Scheduling Coordinator buys back in the Hour-Ahead Market Replacement Reserve capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Replacement Reserve capacity bought back times the zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Replacement Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$ReplReceiveHA_{ijxt} = ReplQDHA_{ijxt} * PReplHA_{xt}$$

The total Replacement Reserve payment to each Scheduling Coordinator for the Trading Interval of the Hour-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Replacement Reserve bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$ReplPayTotalHA_{jxt} = \sum_{i} ReplPayHA_{ijxt} - \sum_{i} ReplReceiveHA_{ijxt}$$

C 2.2 ISO allocation of charges to Scheduling Coordinators

C 2.2.1 Day-Ahead Market

(a) *Regulation*. The ISO will charge the zonal cost of providing Regulation capacity that is not self provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Regulation user rate for the Trading Interval by the Scheduling Coordinator's Regulation obligation, for which it has not self provided, for the same period.

The zonal Regulation user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Regulation Capacity within the Zone, for the Trading Interval, by the total ISO Regulation obligation for the Trading Interval within the Zone. Regulation Up and Regulation Down payments shall be calculated separately. Quantities and rates for Regulation Down shall be calculated by substituting the Regulation Up quantities and prices in the relevant formulae. The Day-Ahead Regulation Up user rate in Zone x for Trading Interval t is calculated as follows:

$$AGCUpRateDA_{xt} = \frac{\sum_{j} AGCUpPayTotalDA_{jxt}}{AGCUpObligTotal_{xt}}$$

where,

$AGCUpPayTotalDA_{jxt}$ = Total Regulation Up payments for the Settlement Period t in the Day-Ahead Market for the Zone x.

The Regulation capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$AGCUpChgDA_{jxt} = AGCUpOblig_{jxt} * AGCUpRateDA_{xt}$$

(b) *Spinning Reserve*. The ISO will charge the zonal cost of providing Spinning Reserve capacity that is not self provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Spinning Reserve capacity user rate for the Trading Interval by the Scheduling Coordinator's Spinning Reserve obligation, for which it has not self provided, for the same period.

The zonal Spinning Reserve capacity user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Spinning Reserve capacity within the Zone, for the Trading Interval, by the total ISO Spinning Reserve obligation for the Trading Interval within the Zone. The Day-Ahead Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$SpinRateDA_{xt} = \frac{\sum_{j} SpinPayTotalDA_{jxt}}{SpinObligTotal_{xt}}$$

The Spinning Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$SpinChgDA_{jxt} = SpinOblig_{jxt} * SpinRateDA_{xt}$$

(c) *Non-Spinning Reserve.* The ISO will charge the zonal cost of providing Non-Spinning Reserve capacity that is not self provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Non-Spinning Reserve capacity user rate for the Trading Interval by the Scheduling Coordinator's Non-Spinning Reserve obligation, for which it has not self provided, for the same period.

The zonal Non-Spinning Reserve capacity user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Non-Spinning Reserve capacity within the Zone, for the Trading Interval, by the total ISO Non-Spinning Reserve obligation for the Trading Interval within the Zone. The Day-Ahead Non-Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$NonSpinRateDA_{xt} = \frac{\sum_{j} NonSpinPayTotalDA_{jxt}}{NonSpinObligTotal_{xt}}$$

The Non-Spinning Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$NonSpinChgDA_{jxt} = NonSpinOblig_{jxt} * NonSpinRateDA_{xt}$$

(d) *Replacement Reserve*. The ISO will charge the zonal cost of providing Replacement Reserve capacity that is not self provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Replacement Reserve user rate for the Trading Interval by the Scheduling Coordinator's Replacement Reserve obligation, for which it has not self provided, for the same period.

The zonal Replacement Reserve user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Replacement Reserve Capacity within the Zone, for the Trading Interval, by the total ISO Replacement Reserve obligation for the Trading Interval within the Zone. The Day-Ahead Replacement Reserve user rate in Zone x for Trading Interval t is calculated as follows:

$$ReplRateDA_{xt} = \frac{\sum_{j} ReplPayTotalDA_{jxt}}{ReplObligTotal_{xt}}$$

The Replacement Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$ReplChgDA_{jxt} = ReplOblig_{jxt} * ReplRateDA_{xt}$$

C 2.2.2 Hour-Ahead Market

(a) *Regulation.* The ISO will charge the zonal net cost of providing Regulation capacity that is not self provided by Scheduling Coordinators, in the Hour-Ahead Market through the application of a charge to each Scheduling Coordinator for the Trading Interval concerned. This charge will be computed by multiplying the Regulation user rate for the Trading Interval by the Scheduling Coordinator's Regulation obligation, for which it has not self provided, for the same period.

The zonal Regulation capacity user rate for the Hour-Ahead Market is calculated by dividing the total cost to the ISO of purchasing Regulation capacity within the Zone less any amounts payable to the ISO by Scheduling Coordinators for Regulation bought back from the ISO in the Hour-Ahead Market on behalf of resources located in the Zone, for the Trading Interval, by the total ISO Regulation capacity obligation for the Trading Interval within the Zone. Regulation Up and Down payments shall be calculated separately. Quantities and rates for Regulation Down shall be calculated by substituting the Regulation Up quantities and prices in the relevant formulae. The Hour-Ahead Regulation Up capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$AGCUpRateHA_{xt} = \frac{\sum_{j} AGCUpPayTotalHA_{jxt}}{AGCUpObligTotal_{xt}}$$

where,

$AGCUpPayTotalHA_{jxt}$ = Total Regulation Up payments for the Settlement Period t in the Hour-Ahead Market for the Zone x.

The Regulation capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$AGCUpChgHA_{jxt} = (AGCUpOblig_{jxt} * AGCUpRateHA_{xt})$

(b) *Spinning Reserve.* The ISO will charge the zonal net cost of providing Spinning Reserve capacity that is not self provided by Scheduling Coordinators, in the Hour-Ahead Market, through the application of a charge to each Scheduling Coordinator for the Trading Interval. This charge will be computed by multiplying the Spinning Reserve capacity user rate for the Trading Interval by the Scheduling Coordinator's Spinning Reserve obligation, for which it has not self provided, for the same period.

The zonal Spinning Reserve capacity user rate for the Hour-Ahead Market is calculated by dividing the total cost to ISO of purchasing Spinning Reserve capacity within the Zone less any amounts payable to the ISO by Scheduling Coordinators for Spinning Reserve bought back from the ISO in the Hour-Ahead Market on behalf of resources located in the Zone, for the Trading Interval, by the total ISO Spinning Reserve

obligation for the Trading Interval within the Zone. The Hour-Ahead Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$SpinRateHA_{xt} = \frac{\sum_{j} SpinPayTotalHA_{jxt}}{SpinObligTotal_{xt}}$$

The Spinning Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$SpinChgHA_{jxt} = (SpinOblig_{jxt} * SpinRateHA_{xt})$

(c) *Non-Spinning Reserve.* The ISO will charge the zonal net cost of providing Non-Spinning Reserve capacity that is not self provided by Scheduling Coordinators, in the Hour-Ahead Market, through the application of a charge to each Scheduling Coordinator for the Trading Interval. This charge will be computed by multiplying the Non-Spinning Reserve capacity user rate for the concerned Trading Interval by the Scheduling Coordinator's Non-Spinning Reserve obligation, for which it has not self provided, for the same period.

The zonal Non-Spinning Reserve capacity user rate for the Hour-Ahead Market is calculated by dividing the total cost to ISO of purchasing Non-Spinning Reserve capacity within the Zone less any amounts payable to the ISO by Scheduling Coordinators for Non-Spinning Reserve bought back from the ISO in the Hour-Ahead Market on behalf of resources in the Zone, for the Trading Interval, by the total ISO Non-Spinning Reserve obligation for the Trading Interval within the Zone. The Hour-Ahead Non-Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$NonSpinRateHA_{xt} = \frac{\sum_{j} NonSpinPayTotalHA_{jxt}}{NonSpinObligTotal_{xt}}$$

The Non-Spinning Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$NonSpinChgHA_{jxt} = (NonSpinOblig_{jxt} * NonSpinRateHA_{xt})$

(d) *Replacement Reserve*. The ISO will charge the zonal cost of providing Replacement Reserve capacity that is not self provided by Scheduling Coordinators, in the Hour-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Replacement Reserve user rate for the Trading Interval by the Scheduling Coordinator's Replacement Reserve obligation, for which it has not self provided, for the same period.

The zonal Replacement Reserve user rate for the Hour-Ahead Market is calculated by dividing the total cost to ISO of purchasing Replacement Reserve Capacity within the Zone less any amounts payable to the ISO by Scheduling Coordinators for Non-Spinning Reserve bought back from

the ISO in the Hour-Ahead Market on behalf of resources in the Zone, for the Trading Interval, by the total ISO Replacement Reserve obligation for the Trading Interval within the Zone. The Hour-Ahead Replacement Reserve user rate in Zone x for Trading Interval t is calculated as follows:

$$ReplRateHA_{xt} = \frac{\sum_{j} ReplPayTotalHA_{jxt}}{ReplObligTotal_{xt}}$$

The Replacement Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$ReplChgHA_{jxt} = ReplOblig_{jxt} * ReplRateHA_{xt}$$

C 3 Meaning of terms of formulae

C 3.1 AGCUpPayDA$_{ijxt}$ - $

The payment for Scheduling Coordinator j for providing Regulation Up capacity in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

C 3.2 AGCUpQDA$_{ijxt}$ – MW

The total quantity of Regulation Up capacity provided in the ISO Day-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

C 3.3 PAGCUpDA$_{xt}$ - $/MW

The Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those Units subject to the cap for Regulation Up capacity in the Day-Ahead Market for Trading Interval t in Zone x.

C 3.4 AGCUpPayTotalDA$_{jxt}$ - $

The total payment for Regulation Up capacity to Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

C 3.5 AGCUpPayHA$_{ijxt}$ - $

The payment for Scheduling Coordinator j for providing incremental (additional to Day-Ahead) Regulation Up capacity in the Hour-Ahead Market from a resource i in Zone x for Trading Interval t.

C 3.5.1 AGCUpReceiveHA$_{ijxt}$ - $

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead Regulation Up capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

C 3.6 AGCUpQIHA$_{ijxt}$ – MW

The total quantity of incremental (additional to Day-Ahead) Regulation Up capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

C 3.7 AGCUpQDHA$_{ijxt}$ – MW

The total quantity of decremental (less than Day-Ahead) Regulation Up capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

C 3.7.1 PAGCUpHA$_{xt}$ - $/MW

The Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for incremental (additional to Day-Ahead) Regulation Up capacity in the Hour-Ahead Market for Trading Interval t in Zone x. On buyback condition, MCP applies.

C 3.8 AGCUpPayTotalHA$_{jxt}$ - $

The total payment for incremental (additional to Day-Ahead) Regulation Up capacity to Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t, after deduction of payments from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Regulation Up capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

C 3.9 AGCUpRateDA$_{xt}$ - $/MW

The Day-Ahead Regulation Up capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

C 3.10 AGCUpObligTotal$_{xt}$ – MW

The net total Regulation Up obligation in Zone x for Trading Interval t as defined in the Ancillary Services Requirements Protocol. This net total equals the total obligation minus that self-provided.

C 3.11 AGCUpChgDA$_{jxt}$ - $

The Regulation Up charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

C 3.12 AGCUpOblig$_{jxt}$ – MW

The net Regulation Up obligation for Scheduling Coordinator j in Zone x for Trading Interval t as defined in the Ancillary Services Requirements Protocol. This net obligation equals the obligation minus that self-provided.

C 3.13 AGCUpRateHA$_{xt}$ - $/MW

The Hour-Ahead incremental (additional to Day-Ahead) Regulation Up capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

C 3.14 AGCUpChgHA$_{jxt}$ - $

The incremental (additional to Day-Ahead) Regulation Up charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t.

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