Spinning Reserve and Non-Spinning Reserve

Charge # 111 Spinning Reserve due ISO

Charge # 112 Non-Spinning Reserve due ISO

Description

Spinning Reserve is the on-line reserve capacity that is synchronized to the grid system and ready to meet electric demand within 10 minutes of a dispatch instruction by the ISO. Spinning Reserve is needed to maintain system frequency stability during emergency operating conditions and unforeseen load swings.

Non-Spinning Reserve is off-line generation capacity that can be ramped to capacity and synchronized to the grid within 10 minutes of a dispatch instruction by the ISO, and that is capable of maintaining that output for at least two hours. Non-Spinning Reserve is needed to maintain system frequency stability during emergency conditions.

Requirement

The ISO's requirement for Spinning Reserve is 50% of the Operating Reserve (OR) requirement. This requirement is equal to 5% of the Demand to be met by generation from hydroelectric (hydro) resources, plus 7% of the Demand to be met by generation from other resources, plus 100% of any Interruptible Imports, or the single largest contingency (if the latter is greater).

The Operating Reserve requirement is computed for each SC in each Reserve Region. Individual import and export energy schedules and their firmness are taken into consideration. For instance, there is no Spinning Reserve requirement for Demand covered by firm purchases from outside the ISO Control Area. For SC to SC trades, the SC that is responsible for serving the load is responsible for providing the A/S Requirement.

The calculation for the OR requirement is as follows:

OR = max (OR1, OR2) + 100% of Non-Firm Imports:

Where:

OR1 = a percentage (5%) of hydro generation scheduled plus a percentage (7%) of generation from other sources. OR1 is computed separately for each SC based on its load and hydro generation schedules and then summed up over all SCs to determine the OR1 for each congestion zone, and the whole system.

OR2 = MW loss due to most severe contingency. OR2 is computed system-wide as the maximum of the following for each hour:

- Operator-entered value for each zone and for each hour
- Largest generating unit for each hour
- Largest net tie import to the ISO control area for each hour

Operating Reserve Calculation

The following example illustrates the OR obligation calculation for four SC's:

	Metered Load	Firm Exports	Firm Imports	Hydro Gen	Non Hydro Gen	Non-Firm Imports	Base Operating Reserve Require.	% Oper. Reserve Require.	Base Spin Oblig.
SC1	500 MW	100MW	400MW	50MW	150MW	0MW	13 MW	0.0541MW	10.81MW
SC2	300MW	0MW	100MW	0MW	200MW	0MW	14 MW	0.0582MW	14.55MW
SC3	3,100MW	0MW	50MW	0MW	3050MW	0MW	213.5 MW	0.88773MW	221.93MW
						Total:	**240. 5 MW**	**100 %**	

To illustrate the complete calculation for determining the Base Operating Reserve Obligation for Scheduling Coordinator *j* (SC1) within Region *x* for Settlement Period *t* the following equations are used:

(a)

BaseDemand1jxt = *MeteredLoadjxt* + *FirmExportjxt* — Base Demand 1 = 500 + 100 = 600
BaseDemand2jxt = BaseDemand1jxt – *FirmImportjxt* — Base Demand 2 = 600 – 400 = 200
BaseDemand3jxt = BaseDemand2jxt – *NonFirmImportjxt* — Base Demand 3 = 200 – 0 = 200
BaseDemand4jxt = BaseDemand3jxt – *MeteredHydroGenjxt* — Base Demand 4 = 200 – 50 = 150

(b)

0 MW 200 MW 50 MW
[(1) x (*NonFirmImportMWjxt*)] + [(.05) x (Max [0,Min [BaseDemand3jxt, *Metered Hydrogenjx t*]])] +
150 MW
[(.07) x (Max 0,BaseDemand4jxt])]

13 MW
= (BaseOpResReqMWjxt)

(c) 13 MW 240.5 MW 0.05405 MW
(BaseOpResReqMWjxt) / (ΣBaseOpResReqMWjxt) = OpResOblig%jxt

(d) 0.05405 MW 200 MW 10.81 MW
OpResOblig%jxt X AdjSpinTotalMWxt = BaseSpinOblgMWjxt

(e)
150 MW 25 MW 25 MW 200 MW
(SpinReqDAMWxt) + (SpinReqHAMWxt) + TotalEffectiveSelfProvideSpinMWxt = SpinTotalMWxt

Assume that ISO procures 175MW operating reserves and SC3 self provides 25MW.

NOTE: These equations are discussed in further detail later in this document.

Spinning and Non-Spinning Reserve Costs Allocation (Due ISO)

Spinning and Non-Spinning Reserves will be billed based on Metered Demand for each Scheduling Coordinator, by Region and hour, giving consideration to on demand obligation, inter-SC A/S trades and self-provision. The following equations depict the

allocation method for spinning reserve costs. Non-spinning reserve costs are allocated following the same logic. Similar equations can be used for non-spinning reserve.

Scheduling Coordinator *j* will have a payment obligation to the ISO for Spinning Reserve in Region *x* for Settlement Period *t* of SpinChargeTotal$_{jxt}$, calculated as follows:

(1) $SpinChargeTotalDA\$_{jxt} = SpinRateDA\$/MW \cdot hr_{xt} * NetSpinObligMW_{jxt}$

(2) $SpinChargeTotalHA\$_{jxt} = SpinRateHA\$/MW \cdot hr_{xt} * NetSpinObligMW_{jxt}$

Spin Rate Calculation

(3) $$\text{SpinRate\$/MW} \cdot \text{hr}_{\text{xt}} = \frac{\text{SpinPayTotalDA\$}_{\text{xt}} + \text{SpinPayTotal HA\$}_{xt}}{\left(\text{SpinReqDAMW}_{\text{xt}} + \text{Spin Re}\,qHAMW_{xt}\right)}$$

$\text{Spin}PayTotalPayDA\$_{xt}$ = Total payments by the ISO for Spinning Reserve **procured** (see explanation below for reasoning of referring to logical procured amounts for cost allocation, when we actually use **required** amounts for the purpose of calculations) in the Day Ahead Market in Region *x* for Settlement Period *t.* This is calculated by taking the total DA required amount in Region x for Settlement Period t and multiplying it by the Spin Market Clearing Price in Region x for Settlement Period t.

$\text{Spin}PayTotalPayHA\$_{xt}$ = Total payments by the ISO for Spinning Reserve **procured** (see explanation below for reasoning of referring to logical procured amounts for cost allocation, when we use **required** amounts for the purpose of calculations) in the Hour Ahead Market in Region *x* for Settlement Period *t.* This is calculated by taking the total HA required amount in Region x for Settlement Period t and multiplying it by the Spin Market Clearing Price in Region x for Settlement Period t.

$\text{SpinReq}DAMW_{xt}$ = MW of Spinning Reserve **procured** by the ISO in the Day Ahead Market in Region *x* for Settlement Period *t*. For the purpose of cost allocation we use the A/S **requirement as the logical procurement amount** due to Rational Buyer. Therefore, the equations represent these components to be required amounts, not procured.

$\text{SpinReqHAMW}_{\text{xt}}$ = Total MW of Spinning Reserve **procured** by the ISO in the Hour Ahead Market in Region *x* for Settlement Period *t*. For the purpose of cost allocation we use the A/S **requirement** and **not procurement amount** due to Rational Buyer. Therefore, the equations represent these components to be required amounts, not procured.

SC Obligations for Spinning Reserve

The following equations describe the ISO's Regional requirement for Spinning Reserve at the close of the Day Ahead and Hour Ahead Markets:

(4) $$\text{SpinTotalMW}_{\text{xt}} = \text{SpinReqDAMW}_{\text{xt}} + \text{Spin Re}\,q\text{HAMW}_{\text{xt}} + \text{TotalEffective SelfProvideSpinMW}_{\text{xt}}$$

Where:

$SpinTotalMW_{xt}$ is the amount of Spinning Reserve in Region x that is available to the ISO from net self-provision and through requirement (logical procurement) in the Day Ahead and Hour Ahead Markets.

$TotalEffectiveSelfProvideSpinMW_{xt}$ is the total self provision in Region x that is available to the ISO less any excess self provision from Uncertified Resources.

With respect to how we procure self provided A/S and how we allocate it to the market, any A/S that is provided above and beyond a SCs obligation that is used in the ISO market is paid for by SCs needing A/S to cover their obligation. What is used in the market is considered "Effective Self Provided" A/S. This is calculated by taking the Scheduled Self Provided A/S minus the Unqualified Self Provided A/S. The Unqualified is calculated by taking the Hour Ahead Self Provided A/S minus the Allowable Self Provided A/S.

- The Allowable Self Provision is the amount of self provision the ISO will accept based on its incremental needs.
- Scheduled SP - Allowable Self Provided A/S = Unqualified SP
- Scheduled SP - Unqualified SP = Effective Self Provided A/S

To determine a SC's obligation, let's define:

$$(5)\quad \text{OpResOblig\%}_{jxt} = \frac{\text{BaseOpResReqMW}_{jxt}}{\sum_{j} \text{BaseOpResReqMW}_{jxt}}$$

where $BaseOpResReqMW_{jxt}$ is the SC's operating reserve requirement determined according to the WSCC requirements less any on demand obligations. The way this percentage is calculated is the only significant difference between the cost allocation schemes for Regulation/Replacement Reserve and Spinning/Non-Spinning Reserves.

OpResOblig% does not change between the Day Ahead Market and Hour Ahead Market and it is used in allocating both Spinning and Non-Spinning Reserves costs. $BaseOpResReqMW_{jxt}$ defined by the following equations:

$$(6)\quad BaseDemand1_{jxt} = MeteredLoad_{jxt} + FirmExport_{jxt}$$

$$(7)\quad BaseDemand2_{jxt} = BaseDemand1_{jxt} - FirmImport_{jxt}$$

$$(8)\quad BaseDemand3_{jxt} = BaseDemand2_{jxt} - NonFirmImport_{jxt}$$

$$(9)\quad BaseDemand4_{jxt} = BaseDemand3_{jxt} - MeteredHydroGen_{jxt}$$

Where:

$MeteredLoad_{jxt}$ = SC's metered load in Region x over time interval t;
$FirmExport_{jxt}$ = SC's firm export from Region x over time interval t;
$FirmImport_{jxt}$ = SC's firm import to Region x over time interval t;
$NonFirmImport_{jxt}$ = SC's non-firm import to Region x over time interval t; and
$MeteredHydroGen_{jxt}$ = SC's metered hydro generation in Region x over time interval t.

The SC's reserve obligation has the following components:

- Obligation due to firm imports and nonfirm exports = 0;
- Obligation due to non-firm import (even when the demand is zero) = 100%*$NonFirmImport_{jxt}$;
- Obligation due to demand served by hydro = 5%*Max{0,Min($BaseDemand3_{jxt}$,$MeteredHydroGen_{jxt}$)}. The Max function is used because $BaseDemand3_{jxt}$ may be negative.

- Obligation due to demand served by thermal generation or other resources = 7%*Max(0,$BaseDemand4_{jxt}$). The Max function is used because $BaseDemand4_{jxt}$ may be negative.

Thus, the SC's total operating reserve requirement is:

$$\begin{aligned} &BaseOpResReqMW_{jxt} = \\ &100\% * NonFirmImport_{jxt} + \\ &5\% * Max\{0, Min(BaseDemand3_{jxt}, MeteredHydroGen_{jxt})\} \\ &7\% * Max(0, BaseDemand4_{jxt}) \end{aligned} \quad (10)$$

Let's further define:

$$\begin{aligned} &\text{NetSpinObligMW}_{jxt} = \\ &\text{BaseSpinObligMW}_{jxt} + \text{OnDemandSpinOblig}_{jxt} + \text{InterSCSpinSold}_{jxt} - \text{InterSCSpinBought}_{jxt} - \\ &\text{EffectiveSelfProvideSpinMW}_{jx} \end{aligned} \quad (11)$$

$$BaseSpinObligMW_{jxt} = OpResOblig\%_{jxt} * AdjSpinTotalMW_{xt} \quad (12)$$

$$\text{NetSpinObligMW}_{jxt} = \text{AdjSpinObligMW}_{jxt} - \text{EffectiveSelfProvideSpinMW}_{jxt} \quad (13)$$

$NetSpinObligMW_{jxt}$ is the MW amount of the SC's net spinning reserve obligation after applying his effective self provision.

$OnDemandSpinOblig_{jxt}$ is the SC's on demand obligation in the Region x.

$InterSCSpinSold_{jxt}$ and $InterSCSpinBought_{jxt}$ are the MW amounts of Spinning Reserve capacity that the SC has sold and bought through inter-SC trades.

$EffectiveSelfProvideSpinMW_{jxt}$ is the SC's effective self provision for spinning reserve. This quantity is equal to the SC's final HA self provision, which includes any self provision buy back amount, less any unqualified excess self provision.

$$\begin{aligned} &EffectiveSelfProvideSpinMW_{jxt} = \\ &SchedSelfProvideSpinHAMW_{jxt} - UnqualExcessSelfProvideSpinMW_{jxt} \end{aligned} \quad (14)$$

Where:

$SchedSelfProvideSpinHAMW_{jxt}$ = The total Self-Provided Spinning Reserve by SC *j* in Region *x* for Settlement Period *t* in the final Hour Ahead Schedules. This includes the contributions from both Certified and Uncertified Resources as well as any buy back amount.

$UnqualExcessSelfProvideSpinHAMW_{jxt}$ = The unqualified excess Self-Provided Spinning Reserve by SC *j* in Region *x* for Settlement Period *t* in the final Hour Ahead Schedules.

Cost Allocation to Zones

While the A/S costs are allocated to the SCs on a regional basis, the charge for a SC will further be broken down into zonal components according to the ratio of the SC's operating reserve requirements in the member zones. Thus, the DA and HA spinning reserve service charges for SC j in zone y over time period t are calculated as follows:

$$(15)\ ZonalSpinShare\%_{jzt} = \frac{BaseOpResReqMW_{jzt}}{\sum_{z \in x} BaseOpResReqMW_{jzt}}$$

$$(16)\ SpinChargeTotalDA\$_{jzt} = SpinChargeTotalDA\$_{jxt} * ZonalSpinShare\%_{jzt}$$

$$SpinChargeTotalHA\$_{jzt} = SpinChargeTotalHA\$_{jxt} * ZonalSpinShare\%_{jzt}$$

The following table contains the description of the base parameter components used in the settlement statement. The data fields can be cross-referenced to the ISO document Format Specification for Settlement Statement File, Version 10, May 12, 1999, Section 7.4.

REFERENCE GUIDE FOR EQUATION COMPONENTS	
Spinning Reserve	
SpinPayTotal $DAxt	Total Day Ahead Ancillary Service Procured Amount X Day Ahead MCP
SpinPayTotal $HAxt	Total Hour Ahead Ancillary Service Procured Amount X Hour Ahead MCP
SpinReqHAMWxt	Total Hour Ahead Ancillary Service Requirement Amount; for cost allocation we use requirements as the logical procurement amounts due to Rational Buyer
SpinReqDAMWxt	Total Day Ahead Ancillary Service Requirement Amount; for cost allocation we use requirements as the logical procurement amounts due to Rational Buyer
MeteredHydroGenjxt	Hydro Generation Quantity
NonFirmImportjxt	Non-Firm Import Quantity
FirmImportjxt	Firm Import Quantity
FirmExporttjxt	Firm Export Quantity
MeteredLoadjxt	Load Quantity
OnDemandSpinObligjxt	On demand obligation
InterSCSpinSoldjxt	Inter SC sold quantity
InterSCSpinBoughtjxt	Inter SC bought quantity
EffectiveSelfProivdeSpinObligMWjxt	Effective self provision
TotalEffectiveSelfProvideSpinMWxt	Total Effective Self Provision
TotalOnDemandSpinObligxt	Total On Demand Obligation
OpResOblig%jxt	Percent Obligation
TotalBaseOpResReqMWxt	Total measured quantity
Non Spinning Reserve	
NSPayTotal $DAxt	Total Day Ahead Ancillary Service Procured Amount X Day Ahead MCP
NSPayTotal $HAxt	Total Hour Ahead Ancillary Service Procured Amount X Hour Ahead MCP
NSReqHAMWxt	Total Day Ahead Ancillary Service Requirement Amount; for cost allocation we use requirements as the logical procurement amounts due to Rational Buyer
NSReqDAMWxt	Total Hour Ahead Ancillary Service Requirement Amount; for cost allocation we use requirements as the logical procurement amounts due to Rational Buyer

MeteredHydroGenjxt	Hydro Generation Quantity
NonFirmImportjxt	Non-Firm Import Quantity
FirmImportjxt	Firm Import Quantity
FirmExporttjxt	Firm Export Quantity
MeteredLoadjxt	Load Quantity
OnDemandSpinObligjxt	On Demand Obligation
InterSCNSSoldjxt	Inter SC sold quantity
InterSCNSBoughtjxt	Inter SC bought quantity
EffectiveSelfProivdeNSObligMWjxt	Effective self provision
TotalEffectiveSelfProvideNSMWxt	Total Effective Self Provision
TotalOnDemandNSObligxt	Total On Demand Obligation
OpResOblig%jxt	Percent Obligation
TotalBaseOpResReqMWxt	Total measured quantity

Example

Using the base parameter values included in the following table (Table 1) we will determine the Spinning Reserve charge due ISO. We will assume the sources of the energy and operating reserve requirement determined for SC1 included earlier in this section. An equation map is provided following Table 1 to better illustrate where the various components are placed within the derivation of the settlement amount.

TABLE 1

Charge Components; Where to find / How to verify

Charge Component	Example Values Given	Where to find / How to verify
SpinPayTotal $DAxt	$600	This can be found on OASIS Market Information under Ancillary (Final MCP, Day Ahead).
SpinPayTotal $HAxt	$75	This can be found on OASIS Market Information under Ancillary (Final MCP, Hour Ahead).
SpinReqDAMWxt	150	This can be found on OASIS under Ancillary, Market Goals, Day Ahead. Use ISO Total and add to the Self Provided value found at Day Ahead, Final Procurement Results. *
SpinReqHAMWxt	25	This can be found on OASIS under Ancillary, Market Goals, Hour Ahead. Use ISO Total and add to the Self Provided value found at Hour Ahead, Final Procurement Results. *
MeteredHydroGenjxt	50	Download this information from your final schedules off of Wenet.
NonFirmImportjxt	0	Download this information from your final schedules off of Wenet, however, adjustments for operating adjustments will show up in the Settlements file.
FirmImportjxt	400	Download this information from your final schedules off of Wenet, however, adjustments for operating adjustments will show up in the Settlements file.
FirmExporttjxt	100	Download this information from your final schedules off of Wenet however, adjustments for operating adjustments will show up in the Settlements file.

MeteredLoadjxt	500	Based on meter data you submitted to the ISO and will be shown on settlement statement.
InterSCSpinSoldjxt	0	Download this information from your final schedules off of Wenet.
InterSCSpinBoughtjxt	0	Download this information from your final schedules off of Wenet.
EffectiveSelfProivideSpinObligMWjxt	2	ISO will calculate this value and provide in the settlement statement.
TotalEffectiveSelfProvideSpinMWxt	3	ISO will calculate this value and provide in the settlement statement. This can also be found on OASIS under Ancillary, Final A/S Procurement Results, HA.
TotalOnDemandSpinObligxt	0	ISO will calculate this value and provide in the settlement statement.
OpResOblig%jxt	0.0541	ISO will calculate this value and provide in the settlement statement.
BaseOpResReqMWxt	13	This can be calculated using the provided formulas taking information from the SC scheduling information and from the meter data submitted to the ISO. ISO will also calculate this value and provide in the settlement statement.
TotalBaseOpResReqMWxt	240.5	This is based on meter data submitted by all SCs. This value is provided by the ISO in the settlement statement.

* To determine the DA and HA requirement, you must evaluate two OASIS screens:
  - *Market Goals (MW)*- to determine the total Non Self-Provided (NSP) amount
  - *Final Procurement Results*- to determine the total Self-Provided (SP) amount

For example, taking the summation of the Day Ahead NSP + Day Ahead SP or the Hour Ahead NSP + Hour Ahead SP will give you the requirement for SPIN. Do not use the Total MW value listed in the *Final Procurement Results* report in OASIS to determine this value. The value in the *Final Procurement Results* report gives you what was procured given rational buyer considerations, not what was required for that particular service.

For example:

For HE 12 on 3/1/02:

The Hour Ahead NSP = 382.72 MW (Market Goals (MW) (HA report))
The Hour Ahead SP= 547.10 MW (Final Procurement Results (HA report))

The summation of these two values, 382.72 MW + 547.10 MW = 929.82 MW; this is the HA A/S requirement for SPIN

Incremental Total HA Requirement must also be considered using the following components:

- DANSP requirement (from Market Goals (MW) (DA report))
- HANSP requirement (from Market Goals (MW) (HA report))
- DASP amount (from Final Procurement Results (DA report))
- HASP amount (from Final Procurement Results (HA report))

The equation is as follows:
DeltaNSP = HANSP - DANSP;
if negative, then equals 0 and Incremental Total HA Requirement equals 0; otherwise…

First calculate any Self Provided Buy Back (SPBB):
SPBB = DASP - HASP = Buy Back of Self Provision between DA and HA; if this value is negative then BBSP=0
DeltaNSP – (DASP – Additional HASP – Gross SPBB) = Incremental Total HA Requirement

For HE 12 on 3/1/02
DeltaNSP = 382.72 - 300.14 = 82.58 MW
SPBB = 549.10 - 547.10 = 2 MW

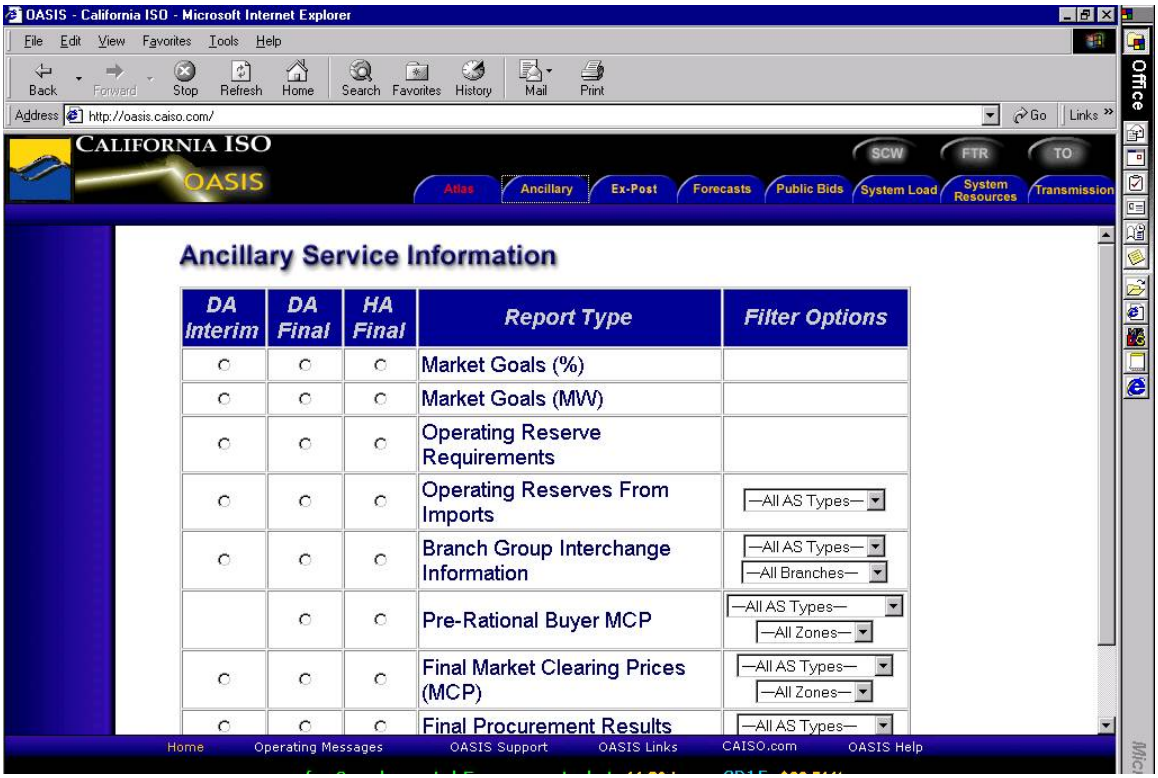
Therefore, Incremental Total HA Requirement = 82.58 - 2 = 80.58 MW for SPIN

Settlement Price Derivation

Price = [(DANSP * DAMCP) + (Incremental Total HA Req. *HAMCP)] / (DANSP + Inc. Tot HA Req)

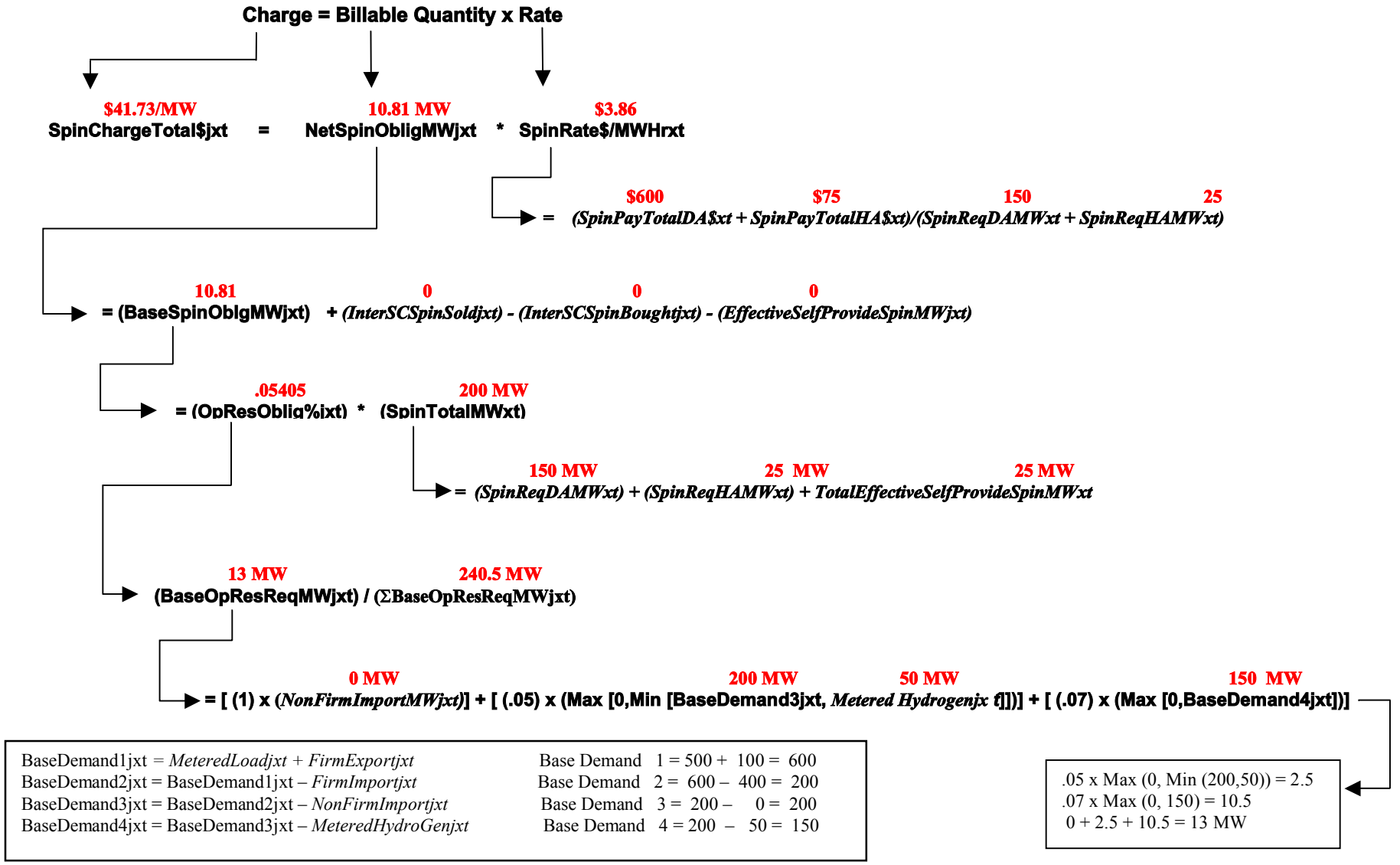
For HE 12 on 3/1/02:
Price = [(300.14 * 4.44) + (80.58 * .95) / (300.14 + 80.58) = $3.70

The OASIS page in which to find the information referenced in the table above appears as shown below and can be located at: http://oasis.caiso.com/



Using the charge equation map on the following page we will determine the charge calculation for SC1 using the example scenario presented on page 2 of this section.

SPIN AND NON-SPIN CHARGE EQUATION MAP



Base Parameters are indicated by the italicized text.
Refer to Table 1 for values to given variables.

Linking Settlement Statement File information to Equation Map

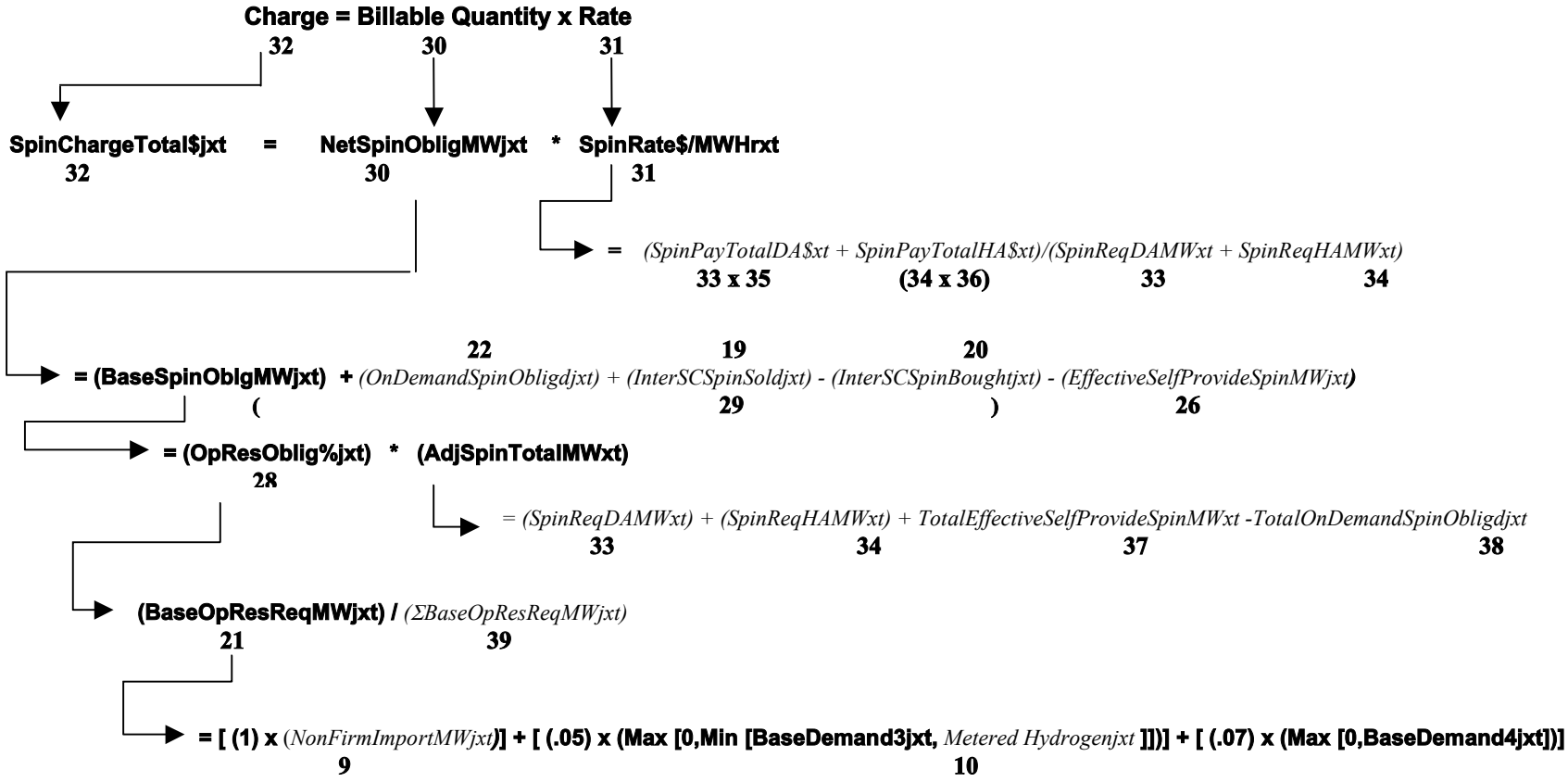
The following is a table from the California ISO Format Specification for Settlement File (located at http://www.caiso.com/docs/1998/12/23/19981223132139152 02.pdf) . The fields represent what is found in the settlement statement. The numbers to the left of the Field column represent the large bold numbers in the equation map on the following page.

	Field	Type	Max Field Length	Domain	Description
1.	Record Type	Varchar	1	'O'	Indicates the type of record
2.	Trading Date	Date			The trading date of the settlement
3.	Trading Hour	Number	2		The trading hour of the settlement
4.	Trading Minute	Number	2	0	The trading minute of the settlement (not currently used)
5.	Zone ID	Varchar	12		A congestion zone.
6.	Load Quantity	Number	11,2		SC's metered load in the zone.
7.	Firm Export Quantity	Number	11,2		SC's real-time firm intertie export schedules out of the zone.
8.	Firm Import Quantity	Number	11,2		SC's real-time firm intertie import schedules into the zone.
9.	Non-Firm Import Quantity	Number	11,2		SC's real-time non-firm intertie import schedules into the zone.
10.	Hydro Generation Quantity	Number	11,2		SC's metered hydro generation in the zone.
11.	Record Type	Varchar	1	'A'	Indicates the type of record
12.	Trading Date	Date			The trading date of the settlement
13.	Trading Hour	Number	2		The trading hour of the settlement
14.	Trading Minute	Number	2	0	The trading minute of the settlement (not currently used)
15.	Region ID	Varchar	12		The region to which the settlement applies
16.	Ancillary Service Type	Varchar	8	'SPIN', 'NSPIN', 'REG UP', 'REG DOWN'	Ancillary service type
17.	Day ahead self provision	Number	11,2		The amount of self provision in SC's day ahead schedule for a region and interval.
18.	Hour ahead self provision	Number	11,2		The amount of self provision in SC's hour ahead schedule for a region and interval.
19.	Inter SC sold quantity	Number	11,2		Amount of capacity SC sold through inter SC trades
20.	Inter SC bought quantity	Number	11,2		Amount of capacity SC bought through inter SC trades

	Field	Type	Max Field Length	Domain	Description
21.	Measured quantity	Number	11,2		Reg Up/Reg Down: SC's metered load in region. Spin/NSpin: SC's operating reserve requirement in region
22.	On demand obligation	Number	11,2		SC's on demand obligation for a region
23.	Scheduled self provision	Number	11,2		The maximum of the day ahead and hour ahead self provision
24.	Allowable self provision	Number	11,2		The amount of self provision ISO will accept based on its incremental needs.
25.	Unqualified self provision	Number	11,2		The difference between the scheduled self provision and the allowable self provision.
26.	Effective self provision	Number	11,2		The amount of self provision the SC will receive credit for
27.	Base obligation	Number	15,5		The amount of adjusted requirement allocated to the SC- percent obligation * total adjusted requirement
28.	Percent Obligation	Number	10,5		SC's measured quantity divided by the total measured quantity
29.	Adjusted obligation	Number	15,5		Base obligation + on demand obligation + inter SC sold quantity – inter SC bought quantity
30.	Net obligation	Number	11,2		The difference between adjusted obligation and effective self provision
31.	Price	Number	10,5		The total payments by the ISO for the ancillary service type procured in the day ahead and hour ahead markets divided by the total MW procured in both markets
32.	Settlement Amount	Number	11,2		Net obligation * price
33.*	Total Day Ahead Ancillary Service Procured Amount	Number	11,2		Total ancillary service amount (in MW) procured in the region in the day ahead market
34.*	Total Hour Ahead Ancillary Service Procured Amount	Number	11,2		Total additional ancillary service amount (in MW) procured in the region in the hour ahead market
35.	Day Ahead MCP	Number	10,5		Day ahead market clearing price for the region and service type
36.	Hour Ahead MCP	Number	10,5		Weighted average Hour ahead market clearing price of the zones in the region and service type.
37.	Total Effective Self Provision	Number	11,2		Total effective self provision for the region
38.	Total On Demand Obligation	Number	11,2		Total on demand obligation for the region
39.	Total measured quantity	Number	11,2		Reg Up/Reg Down: Total metered load in region. Spin/NSpin: Total operating reserve requirement in region

*** Lines 33 and 34 use values from the A/S requirement amounts for the purpose of cost allocation. This reason is due to the fact that when Rational Buyer scheme is used, the actual procurement amounts become distorted. The solution is to use the A/S *requirements* as the logical procurement amounts. Therefore, the equations will use the term of requirement. See note under Table 1 for more details.**

SPIN AND NON-SPIN CHARGE EQUATION MAP



6 7
BaseDemand1jxt = *MeteredLoadjxt* + *FirmExportjxt*
BaseDemand2jxt = BaseDemand1jxt – *FirmImportjxt* **8**
BaseDemand3jxt = BaseDemand2jxt – *NonFirmImportjxt* **9**
BaseDemand4jxt = BaseDemand3jxt – *MeteredHydroGenjxt* **10**

Base Parameters are indicated by the bold and italicized text.

Numbers in bold represent the field which the component can be found in the ISO Format Specification for Settlement Statement File (located at http://www.caiso.com/docs/1998/12/23/19981223132139152 02.pdf)