California ISO Your Link to Power	OPERATING PROCEDURE	Procedure No.	S-310
		Version No.	3.2
		Effective Date	7/27/09
Inadvertent Interchange ATEC Payback		**Distribution Restriction: NONE**	

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Purpose

Describes the CAISO process for Accumulated Inadvertent Interchange (AII) payback using the WECC Automatic Time Error Correction ATEC process consistent with BAL-004-WECC. The WECC ATEC process is used to help maintain Interconnection frequency and to ensure that Inadvertent payback and Time Error corrections are effectively conducted in a manner that does not adversely impact the reliability of the Interconnection.

Inadvertent Interchange is the difference between Net Actual (metered) Interchange (NAI) for all Balancing Authority Area (BA) Interconnections and Net Scheduled Interchange (NSI), for the operating hour. Primary Inadvertent Interchange (PII) results from a BA's inability to regulate precisely to scheduled Interchange throughout the operating hour. Secondary Inadvertent Interchange results from a BA's efforts to support Interconnection frequency, offsetting other BA's contributions to Primary Inadvertent Interchange.

NERC and WECC Standards mandate that Inadvertent Interchange be calculated and recorded on an hourly basis. Inadvertent Interchange is accumulated separately for off-peak and on-peak periods, and the running AII totals are continuously paid back using the WECC ATEC Inadvertent Interchange payback process.

1. Inadvertent Interchange ATEC Payback Process

The California ISO EMS/AGC system automatically processes Accumulated Inadvertent Interchange (AII) in real-time, using the WECC ATEC equation and PII payback process. Primary and Secondary Inadvertent Interchange is automatically "paid back" via the EMS AGC ATEC algorithm, using Primary Inadvertent Interchange adjustments, entered by the RT Scheduler to correct the running Accumulated Inadvertent Interchange totals, hourly. EMS/AGC uses this AII data to continuously "payback" any positive or negative accumulations, for both on and off-peak timeframes, consistent with the WECC ATEC equation.

$$ACE_{ATEC} = (NI_A - NI'_S) - 10B_i(F_A - F_S) - T_{0b} + I_{ME}$$

Where:

NI_A = Net Interchange Actual (MW).

F_A = Frequency Actual (Hz).

F_S = Frequency Scheduled (Normally 60 Hz).

B_i = Frequency Bias for the Balancing Authority's Area (MW / 0.1 Hz).

T_{0b} = Remaining Bilateral Payback for Inadvertent Interchange created prior to implementing automatic payback (MW).

I_{ME} = Meter Error Correction (MW).

$$NI'_S = NI_S - \frac{II_{Primary}^{on/off\ peak}}{(1-Y)*H}$$

NI_S = Net Interchange Scheduled (MW).

$Y = B_i / B_S$.

H = Number of Hours used to payback Inadvertent Interchange Energy. The WECC Performance Work Group has set the value of H to 3.

B_S = Frequency Bias for the Interconnection (MW / 0.1 Hz).

$II_{primary}^{on/off\ peak}$ = is the Balancing Authority's accumulated primary inadvertent interchange in MWh. An On-Peak and Off-Peak accumulation accounting is required.

Where:

$$II_{primary}^{on/off\ peak} = \textbf{last period's } II_{primary}^{on/off\ peak} + (1-Y) * (II_{actual} - B_i * \Delta TE/6)$$

II_{actual} is the hourly Inadvertent Interchange for the last hour.

ΔTE is the hourly change in system Time Error as distributed by the Interconnection Time Monitor.

Where:

$\Delta TE = TE_{end\ hour} - TE_{begin\ hour} - TD_{adj} - (t)*(TE\ offset)$

TD_{adj} is any operator adjustment to the control center Time Error to correct for differences with the time monitor.

t is the number of minutes of Manual Time Error Correction that occurred during the hour.

TE offset is 0.000 or +0.020 or -0.020.

Inadvertent Interchange is monitored each hour, normally by the Alhambra RT Scheduler using the CAISO Interchange Transaction System, the Control Area Scheduler (CAS) and the WECC Western Interchange Tool (WIT). RT Schedulers use the CAS Inadvertent Page (formerly Actuals and Dynamics) to calculate and record hourly Inadvertent or "NERC Inadvertent", Net Actual Interchange (NAI) – Net Scheduled Interchange (NSI). CAS calculates and is used to record "NERC" Inadvertent Interchange, for WECC/NERC reporting purposes, using hourly "checked out" NAI and NSI data from the WIT. The CAS Inadvertent page also displays key EMS WECC ATEC Inadvertent Interchange calculation data.

CAISO EMS Inadvertent Interchange ATEC payback is an automated process. However, it relies upon manual Primary Inadvertent Interchange (PII) Adjustments made by the RT Scheduler, to correct the running EMS Primary AII number, on and off-peak.

Manual PII Adjustments may also be required to account for any subsequently identified Hourly Intertie "Revenue" meter failures or for telemetry data errors, which contributed to the calculated hourly Inadvertent accumulation.

Similarly, the Folsom Generation Dispatcher is responsible for periodically correcting the EMS AGC calculation for any real-time 4-second "tie meter" deviations from the hourly revenue meter NAI.

To monitor/manage CAISO Inadvertent payback using the WECC ATEC process, RT Schedulers and Generation Dispatchers take the following steps:

Step	Real Time Scheduler Actions
1	**Monitor** the Raw CAISO Inadvertent Interchange quantity (NAI – NSI) as calculated and recorded by CAS <u>each hour</u>, to determine if there are any large II accumulations on the CAS "ISO Inadvertent" Line.
2	<table><tr><th>After…</th><th>Then…</th></tr><tr><td>The WIT NAI Checkout,</td><td>**Review** the ISO EMS Inadvertent "Primary II Adj." row (Magenta) on the Inadvertent summary page, each Operating hour</td></tr></table>
3	**Manually update** the EMS/AGC Accumulated II for either the on or off-peak PII periods, by adding the Primary II Adj. quantity to the running Accumulated Inadvertent Interchange number in EMS, using the "ATE Primary II Adjustment" data entry field on the "AGC:WECC Time Error Correction" Screen. ***Note:*** *The ISO WECC ATEC payback is presently limited by EMS staff to no more than 70 MWs per hour. EMS PII Adjustment quantities entered in excess of 70 MWs are spread out automatically by EMS, to be "paid back" over subsequent hours, accordingly.*
4	**Log** any Intertie Meter failures or telemetry data errors NOT reflected in the hourly NAI checkout numbers, so that the ATF Schedulers can adjust AII subsequently using an ATF Primary II Adjustment (See ATF AII Adjustments, Step # 7) **Next determine** if there were any obvious intertie meter failures or telemetry data errors that would have adversely impacted PII accumulations for the previous Operating Hour. ***Note:*** *Telemetry or intertie "revenue" meter failures can be confirmed with the adjacent BA, or with the Transmission Operator for each tie. <u>Hourly Tie meter data failures or errors should be a rare exception.</u>*

Step	Information
5	A Record of all hourly Primary II Adjustments, made by the RT Scheduler to the running EMS AII numbers in EMS/AGC, is automatically retained on the CAS Inadvertent page. EMS automatically confirms and documents these PII adjustments by publishing an acknowledgement of the PII Adjustment to CAS on either the "OnPeak Adjustment Made" or the "OffPeak Adjustment made" lines for the respective Operating hour/day. ***Note:*** *This CAS Inadvertent page serves as the official record of PII adjustments made to the CAISO AII numbers, both to EMS ATEC Inadvertent and to CAS/NERC Raw ACE Inadvertent accumulations.*
Step	**Generation Dispatcher Actions**
6	**Determine** if a Real Time (4-second) "meter adjustment" is warranted**.**
7	**Implement** any real-time intertie meter adjustments directly into the EMS AGC system using the "LFC Overview" screen. **Manually enter** the RT Meter II adjustment on the "Manual Meter Error Correction" line. This AGC field updates the IME factor in the ISO WECC ATEC EMS equation.
8	***Note:*** *Real-time intertie meter data failures or errors are infrequent. Manual IME adjustments by the Generation Dispatcher should ONLY be made in the event of a protracted, identified RT meter data failure that is significantly contributing to ISO Inadvertent in RT.*
9	**Log** any such RT intertie meter data error adjustments to the EMS/AGC ATEC calculation in SLIC.
10	**Operate** the ISO AGC in ATEC mode, limiting non-ATEC mode operation for maintenance and testing to a maximum of 24 hours per calendar quarter. **Notify** the Western Interconnection, via WECCNet, anytime the CAISO is not operating in ATEC mode.

2. After the Fact Accumulated Inadvertent Adjustments

Upon completion of the Real Time ATEC Inadvertent Payback process, After-the-Fact Scheduling Support personnel (ATF Schedulers) review EMS, CAS, WIT, SLIC and intertie Meter data to help assure accurate AII and PII WECC ATEC payback.

Should any subsequent ATF Inadvertent or intertie Meter data related issues arise, ATF Schedulers take the following steps:

Step	CAISO Scheduling Support - ATF Scheduler Actions
1	**Review** final checked out NAI and NSI using WIT and CAS to identify any discrepancies that may require subsequent ATF PII modifications**.**
2	**Review** SLIC logs for any intertie meter related PII Adjustments for prior operating day(s).
3	**Process** any corrections to ATF tags that may impact the CAISO Accumulated Inadvertent Interchange number.
4	**Process** any required ATF EMS/AGC PII Adjustments to correct CAISO AII numbers, for on and off-peak periods.
5	**Log** any ATF PII actions taken in SLIC with sufficient detail regarding the adjustments made to the ATF ATEC inadvertent payback PII Adjustments made to EMS/AGC AII and to the CAS AII numbers.
6	**NERC Inadvertent Reports** are submitted automatically by the WECC Western Interchange Tool (WIT), as the official record of checked out NSI and NAI between BAs, for the Western Interconnect. WIT submits Accumulated Inadvertent Interchange (AII) reports to the NERC "CERTS" system.

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If…	Then…
ATF Meter or Telemetry Data errors are discovered and confirmed with the adjacent BA After-the-Fact that would have adversely impacted PII accumulations for prior Operating Hours,	**Manually update** the EMS/AGC Accumulated II for any identified intertie meter failure or telemetry data error quantities, for either the on or off-peak periods, in the same manner as for the hourly Primary II Adj. **Log** all intertie meter related AII adjustments made to the EMS/AGC System with sufficient detail of the intertie meter failure or telemetry data error.
Note: *Telemetry or intertie "revenue" meter failures can be confirmed with the adjacent BA, or with the Transmission Operator for each tie. Hourly Tie meter data failures or errors should be infrequent.*	
Note *– Intertie meter failure of telemetry data corrections are directional and the sign convention used should offset the original error caused by the actual intertie meter data error.* ***Example:*** *An under-metered intertie net Import (NAI) would result in a positive AII error. Therefore, the corrected AII quantity should be negative (Import under-metered) and thus subtracted from the running AII total, to offset the initial AII error.*	

Supporting Information

Affected Parties

- WECC Interchange Authority
- WECC Balancing Authorities

Responsibilities

Real Time Scheduler	Monitor Inadvertent Interchange using CAS. Correct on and off-peak AII numbers in EMS and CAS for calculated hourly Primary II adjustments.
Generation Dispatcher	Determine the need and if necessary implement intertie meter error adjustments.
Scheduling ATF Scheduler	Validate final Accumulated Inadvertent Interchange, process any ATF PII adjustments, prepare and submit WECC/NERC AII. Adjust AII for any identified Tie meter data failures or errors that contributed to erroneous AII.

References

• **CAISO Operating Procedure**	S-311, Real-Time & After-the-Fact Check-Out Requirements
• **NERC Standards**	INT-001 bookmark R2.2, BAL-006
• **WECC Standards**	BAL-004-WECC bookmark R2

Policy

Primary Inadvertent Interchange is paid back during the time period it was accumulated (either off or on peak).

Primary Inadvertent Interchange accumulated on-peak is paid back during on-peak, and Primary Inadvertent Interchange accumulated off-peak is paid back during off-peak.

WECC ATEC PII payback actions are recorded using the CAS Inadvertent page, for each operating hour.

Definitions

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the CAISO Tariff shall have the same meaning wherever capitalized in this procedure. The following additional terms are capitalized in this Operating Procedure when used as defined below:

AII	Accumulated Inadvertent Interchange
ATEC	Automatic Time Error Correction
IME	Intertie Metering Error
NAI	Net Actual Interchange
NSI	Net Scheduled Interchange
PII	Primary Inadvertent Interchange
WIT	Western Interchange Tool

Version History

Version	Change	By	Date
	Drafted By	G. Van Pelt	3/29/98
	Revised By	Terry Meyers	8/99
	Reviewed	Mike McQuay	11/1/99
2.0	Eliminated the previous method of using the AGC Scheduling Display to establish payback and replaced with method of memo-tie schedule in BITS. Also added scheduling Notification Requirements & limits between non-adjacent Balancing Authorities to comply with WECC procedures.	Phil O'Donnell	9/19/01
2.1	Changed ISO1 to ZISO	Phil O'Donnell	6/26/02
2.2	Annual review - No changes	Phil O'Donnell	10/1/02
2.3	Annual review - No changes	Rich Littell	10/30/03
2.4	Annual review- with minor edits	Mike McQuay	10/5/04
2.5	Annual review- with minor edits	Bob Sullivan	1/1/06
2.6	Reformatted	Marilyn Lien	4/6/06
2.7	NERC compliance issues	Bob Sullivan	8/13/07
3.0	Re-written in conjunction with implementation of new WECC ATEC Inadvertent Payback Standard, BAL-004-WECC, effective July 1, 2009	Kyle Hoffman	7/1/09
3.1	Moved the RT Scheduler Time meter error PII correction section to ATF (#7)	Kyle Hoffman	7/2/09
3.2	Minor edits: Added record hourly inadvertent on page 3.	Kyle Hoffman	7/27/09

Technical Review

Reviewed By Content Expert	Signature	Date
Operations Support	Mike Peterson	07/27/09
Manager, Operations Compliance	Greg Tillitson*	07/01/09
Grid Operations	Bill Ellard*	07/01/09
Scheduling	Bob Sullivan*	07/01/09

Approval

Approved By	Signature	Date
Manager, Scheduling	Kyle T. Hoffman	07/27/09
Director of Grid Operations	Jim McIntosh*	07/01/09

*Signed previous version only, changes to this version were minor and did not require full signature approval