A. Introduction

1. Title: Automatic Time Error Correction

2. Number: BAL-004-WECC-023

3. Purpose: To maintain Interconnection frequency and to ensure that Time Error Corrections and Primary Inadvertent Interchange (PII) payback are effectively conducted in a manner that does not adversely affect the reliability of the Interconnection.

4. Applicability

4.1. Functional Entities

4.1.1 Balancing Authorities that operate synchronously in the Western Interconnection.

5. Effective Date: On the first day of the second quarter, after applicable regulatory approval has been received (or the Reliability Standard otherwise becomes effective the first day of the fourth quarter following NERC Board adoption where regulatory approval is not required).

6. Background:

In February 2003, the WECC Automatic Time Error Correction (ATEC) Procedure (Procedure) became effective for all Balancing Authorities in the Western Interconnection. The original intent of the Procedure was to minimize the number of Manual Time Error Corrections in the Western Interconnection. ATEC provides the added benefit of a superior approach over the current NERC Reliability Standard BAL-004-0—Time Error Correction for assigning costs and providing for the equitable payback of Inadvertent Interchange. In October 2006, the Procedure became a WECC Criterion. In May 2009, FERC issued Order No.723 that approved Regional Reliability Standard BAL-004-WECC-1—Automatic Time Error Correction, as submitted by NERC. In addition, the Commission directed WECC to develop several clarifying modifications to BAL-004-WECC-1 using the FERC-approved Process for Developing and Approving WECC Standards. The Effective Date of the BAL-004-WECC-1 standard was July 1, 2009. BAL-004-WECC-1 required Balancing Authorities within the Western Interconnection to maintain Interconnection frequency within a predefined frequency profile and to ensure that Time Error Corrections were effectively conducted in a manner that did not adversely affect the reliability of the Interconnection. In September 2009, WECC received WECC Standards/Regional Criterion Request Form (Request) WECC-0068, which was a request for modification of BAL-004-WECC-1. In July 2010, the chair of the WECC Operating Committee assigned the Request to the Performance Work Group (PWG) for development.
### B. Requirements and Measures

Following the conclusion of each month each

**R1.** Each Balancing Authority shall verify operate its system such that, following the conclusion of each month, the month-end absolute value of its On-Peak and Off-Peak, Accumulated Primary Inadvertent Interchange ($PI_{accum}$), as calculated by the monthly On-Peak period and the monthly Off-Peak period, are each individually less than or equal to: [Violation Risk Factor Medium] [Time Horizon: Operations Assessment]

1.1 For load-serving Balancing Authorities, 150% of the previous calendar year’s integrated hourly Peak Demand.

1.2 For generation-only Balancing Authorities, 150% of the previous calendar year’s integrated hourly peak generation.

[Violation Risk Factor Medium] [Time Horizon: Operations Assessment]

**M1.** Forms of acceptable evidence of compliance with Requirement R1 include but are not limited to any one of the following:

- Data, screen shots from the WECC Interchange Tool (WIT),
- Data, screen shots from the internal Balancing Authority tool, or
- Production of data from any other databases, spreadsheets, displays.

**M2.** Each Balancing Authority will have evidence that it operated its system such that, following the conclusion of each month, the month-end absolute value of its On-Peak and Off-Peak, Accumulated Primary Inadvertent Interchange ($PI_{accum}$), as calculated by the WECC Interchange Tool (WIT) or its successor electronic confirmation tool, meets all criteria stated in Requirement R1.

**R2.** Each Balancing Authority shall, upon discovery of an error in the calculation of $PI_{hourly}$, recalculate within 90 days, the value of $PI_{hourly}$ and adjust the $PI_{accum}$ from the time of the error. [Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]

**M2.** Forms of acceptable evidence of compliance with Requirement R2 include but are not limited to any one of the following:

- Data, screen shots from the WECC Interchange Tool (WIT) or its successor electronic confirmation tool,
- Data, screen shots from the internal Balancing Authority tool, or
- Production of data from any other databases, spreadsheets, displays.

**R3.** Each Balancing Authority shall keep its Automatic Time Error Correction (ATEC) in
service, with an allowable exception period of less than or equal to an accumulated 24 hours per calendar quarter for ATEC to be out of service. [Violation Risk Factor: Medium] [Time Horizon: Same-day Operations].

**M3.** Forms of acceptable evidence of compliance with Requirement R3 may include, but are not limited to:

- Dated archived files,
- Historical data,
- Other data that demonstrates the ATEC was out of service for less than 24 hours per calendar quarter.

**R4.** Each Balancing Authority shall compute each of the following by using the WECC Interchange Tool (WIT) or its successor electronic confirmation tool, no later than 50 minutes after each hour:

4.1. PII_{\text{hourly}},
4.2. PII_{\text{accum}},
4.3. Automatic Time Error Correction term (I_{\text{ATEC}}).

[Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]

**M4.** Forms of acceptable evidence of compliance with Requirement R4 include but are not limited to any one of the following:

- Data, screen shots from the WECC Interchange Tool (WIT) or its successor electronic confirmation tool, that demonstrate compliance,
- Data, screen shots from internal Balancing Authority tool that demonstrate compliance, or,
- Data from any other databases, spreadsheets, displays that demonstrate compliance.

**R5.** Each Balancing Authority shall be able to change its Automatic Generation Control operating mode between Flat Frequency (for blackout restoration); Flat Tie Line (for loss of frequency telemetry); Tie Line Bias; and Tie Line Bias plus Time Error Control (used in ATEC mode), to correspond to current operating conditions.

[Violation Risk Factor: Medium] [Time Horizon: Real-Time Operations]

**M5.** Forms of acceptable evidence of compliance with Requirement R5 include but are not limited to any one of the following:
• Screen shots from Energy Management System.

• Demonstration using an off-line system.

R6. Each Balancing Authority shall recalculate the PII\text{hourly} and PII\text{accum} for the On-Peak and Off-Peak periods whenever adjustments are made to hourly Inadvertent Interchange or $\Delta$TE. \textit{[Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]}

M6. Forms of acceptable evidence of compliance with Requirement R6 include but are not limited to any one of the following:

• Data, screen shots from the WECC Interchange Tool (\textit{WIT}) or its successor electronic confirmation tool, that demonstrate compliance;

• Data, screen shots from an internal Balancing Authority tool that demonstrate compliance with $\tau$ or $\iota$;

• Data from any other databases, spreadsheets, displays that demonstrate compliance.

R7. Each Balancing Authority shall make the same adjustment to the PII\text{accum} as it did for any month-end meter reading adjustments to Inadvertent Interchange. \textit{[Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]}

M7. Forms of acceptable evidence of compliance with Requirement R7 include but are not limited to any one of the following:

• Data, screen shots from the WECC Interchange Tool (\textit{WIT}) or its successor electronic confirmation tool, that demonstrate compliance;

• Data, screen shots from an internal Balancing Authority tool that demonstrate compliance;

• Production of data from any other databases, spreadsheets, displays that demonstrate compliance.

R8. Each Balancing Authority shall payback Inadvertent Interchange using ATEC rather than bilateral and unilateral payback. \textit{[Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]}

M8. Forms of acceptable evidence of compliance with Requirement R8 include but are not limited to historical On-Peak and Off-Peak Inadvertent Interchange data, data from the WECC Interchange Tool, and ACE data.
1. Compliance Monitoring Process

1.1 Compliance Enforcement Authority

The Regional Entity shall serve as the Compliance Enforcement Authority.

For entities that do not work for the Regional Entity, the Regional Entity shall serve as the Compliance Enforcement Authority.

For Reliability Coordinators and other functional entities that work for their Regional Entity, the ERO or a Regional Entity approved by the ERO and FERC or other applicable governmental authorities shall serve as the Compliance Enforcement Authority.
For responsible entities that are also Regional Entities, the ERO or a Regional Entity approved by the ERO and FERC or other applicable governmental authorities shall serve as the Compliance Enforcement Authority.

1.2 Compliance Monitoring and Assessment Processes:

Compliance Audits
Self-Certifications
Spot Checking

Compliance Investigations
Self-Reporting
Complaints

1.3 Evidence Retention
The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

Each Balancing Authority in the Western Interconnection shall retain the values of PI_hourly, PI_accum (On-Peak and Off-Peak), ΔTE and any month-end adjustments for the preceding calendar year (January – December), as well as the current calendar year.

Each Balancing Authority in the Western Interconnection shall retain the amount of time the Balancing Authority operated without ATEC for the preceding calendar year (January – December), as well as the current calendar year.

1.4 Additional Compliance Information
None
<table>
<thead>
<tr>
<th>R #</th>
<th>Time Horizon</th>
<th>VRF</th>
<th>Violation Severity Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Lower VSL</strong></td>
</tr>
<tr>
<td>R1</td>
<td>Operations Assessment</td>
<td>Medium</td>
<td>Following the conclusion of each month each Balancing Authority’s absolute value of $\text{PII}_{\text{accum}}$ for either the On-Peak period or Off-Peak period exceeded 150%, but was less than or equal to 160% of the previous calendar year’s Peak Demand or peak generation for generation-only Balancing Authorities.</td>
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<td></td>
<td><strong>Moderate VSL</strong></td>
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<td>Following the conclusion of each month each Balancing Authority’s absolute value of $\text{PII}_{\text{accum}}$ for either the On-Peak period or Off-Peak period exceeded 160%, but was less than or equal to 170% of the previous calendar year’s Peak Demand or peak generation for generation-only Balancing Authorities.</td>
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<td></td>
<td></td>
<td><strong>High VSL</strong></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Following the conclusion of each month each Balancing Authority’s absolute value of $\text{PII}_{\text{accum}}$ for either the On-Peak period or Off-Peak period exceeded 170%, but was less than or equal to 180% of the previous calendar year’s Peak Demand or peak generation for generation-only Balancing Authorities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Severe VSL</strong></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Following the conclusion of each month each Balancing Authority’s absolute value of $\text{PII}_{\text{accum}}$ for either the On-Peak period or Off-Peak period exceeded 180% of the previous calendar year’s Peak Demand or peak generation for generation-only Balancing Authorities.</td>
</tr>
</tbody>
</table>

<p>| R2  | Operations Assessment | Medium   | The Balancing Authority did not recalculate $\text{PII}<em>{\text{hourly}}$ and adjust the $\text{PII}</em>{\text{accum}}$ within 90 days of the discovery of the error; but made the required recalculations and adjustments within 120 days. |
|     |              |              | The Balancing Authority did not recalculate $\text{PII}<em>{\text{hourly}}$ and adjust the $\text{PII}</em>{\text{accum}}$ within 120 days of the discovery of the error; but made the required recalculations and adjustments within 150 days. |
|     |              |              | The Balancing Authority did not recalculate $\text{PII}<em>{\text{hourly}}$ and adjust the $\text{PII}</em>{\text{accum}}$ within 150 days of the discovery of the error; but made the required recalculations and adjustments within 180 days. |
|     |              |              | The Balancing Authority did not recalculate $\text{PII}<em>{\text{hourly}}$ and adjust $\text{PII}</em>{\text{accum}}$ within 180 days of the discovery of the error. |</p>
<table>
<thead>
<tr>
<th>R#</th>
<th>Time Horizon</th>
<th>VSL</th>
<th>Violation Severity Levels</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower VSL</td>
</tr>
<tr>
<td>R3</td>
<td>Real-Time Operations</td>
<td>Medium</td>
<td>The Balancing Authority operated during a calendar quarter without ATEC in service for more than an accumulated 24 hours, but less than or equal to 72 hours.</td>
</tr>
<tr>
<td>R4</td>
<td>Operations Assessment</td>
<td>Medium</td>
<td>The Balancing Authority did not compute $P_{I\text{hourly}}$, $P_{I\text{accum}}$, and $I_{ATEC}$ within 50 minutes, but made the required calculations in less than or equal to two hours.</td>
</tr>
<tr>
<td>R5</td>
<td>Real-Time Operations</td>
<td>Medium</td>
<td>N/A</td>
</tr>
<tr>
<td>R#</td>
<td>Time Horizon</td>
<td>VSL</td>
<td>Violation Severity Levels</td>
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<td></td>
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<td>Lower VSL</td>
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<tr>
<td>R6</td>
<td>Operations Assessment</td>
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<tr>
<td>R7</td>
<td>Operations Assessment</td>
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<td>R8</td>
<td>Time Horizon</td>
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</tr>
<tr>
<td>R8</td>
<td>Operations Assessment</td>
<td>Medium</td>
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Guidelines and Technical Basis

Background

In February 2003, the WECC Automatic Time Error Correction (ATEC) Procedure (Procedure) became effective for all Balancing Authorities in the Western Interconnection. The original intent of the Procedure was to minimize the number of Manual Time Error Corrections in the Western Interconnection. ATEC provides the added benefit of a superior approach over NERC Reliability Standard BAL-004-0 – Time Error Correction for assigning costs and providing for the equitable payback of Inadvertent Interchange. In October 2006, the Procedure became a WECC Criterion. In May 2009, FERC issued Order No.723 that approved Regional Reliability Standard BAL-004-WECC-1 - Automatic Time Error Correction, as submitted by NERC. In addition, the Commission directed WECC to develop several clarifying modifications to BAL-004-WECC-1 using the FERC-approved Process for Developing and Approving WECC Standards. The Effective Date of the BAL-004-WECC-1 standard was July 1, 2009. BAL-004-WECC-1 required Balancing Authorities within the Western Interconnection to maintain Interconnection frequency within a predefined frequency profile and to ensure that Time Error Corrections were effectively conducted in a manner that did not adversely affect the reliability of the Interconnection. In September 2009, WECC received WECC Standards/Regional Criterion Request Form (Request) WECC-0068, which was a request for modification of BAL-004-WECC-1. In July 2010, the chair of the WECC Operating Committee assigned the Request to the Performance Work Group (PWG) for development.

During development of this standard, text boxes were embedded within the standard to explain the rationale for various parts of the standard. Upon BOT approval, the text from the rationale text boxes was moved to this section.

Requirement R1:

Premise: Each Balancing Authority should ensure that the absolute value of its PIIaccum for both the On-Peak period and the Off-Peak period each individually does not exceed 150% of the previous year’s Peak Demand for load-serving Balancing Authorities and 150% of the previous year’s peak generation for generation-only Balancing Authorities. The Balancing Authority is required to take action to keep each PIIaccum period within the limit. For example, the Balancing Authorities actions may include:

- Identifying and correcting the source of any metering or accounting error(s) and recalculating the hourly Primary Inadvertent Interchange (PIIhourly) and the PIIaccum from the time of the error;
- Validating the implementation of ATEC; or
- Setting Lmax equal to L10, until the PIIaccum is below the limit in Requirement R1.

Justification: PIIaccum may grow from month-end adjustments and metering errors, even with the inclusion of IATEC in the ACE equation.

Goal: To limit the amount of PIIaccum that a Balancing Authority can have at the end of each month.

Requirement R2:

Premise: When a Balancing Authority finds an error in the calculation of its PII, the Balancing Authority needs time to correct the error and recalculate PII and PIIaccum.
**Justification**: The drafting team selected 90 days as a reasonable amount of time to correct an error and recalculate PII and PIIaccum, since recalculation of PII and PIIaccum is not a real-time operations reliability issue.

**Goal**: To promote the timely correction of errors in the calculation of PII and PIIaccum.

**Requirement R3:**
**Premise**: When a Balancing Authority is not participating in ATEC, payback of PIIaccum is delayed.

**Justification**: The limit of 24 hours per quarter discourages a Balancing Authority from withdrawing ATEC participation, for example, for economic gain during selected hours. If the limits were increased to 60 hours, a Balancing Authority could technically withdraw ATEC participation for one hour from Monday to Friday.

**Goal**: To promote fair and timely payback of PIIaccum balances.

**Requirement R4:**
**Premise**: PII\textsubscript{hourly}, PII\textsubscript{accum}, and I\textsubscript{ATEC} should be determined before the next scheduling hour begins.

**Justification**: To promote timely calculations 50 minutes was selected because it is before the next hour ramp begins and permits time to collect the data and resolve interchange metering values.

**Goal**: To promote the timely calculation of PII\textsubscript{hourly}, PII\textsubscript{accum}, and I\textsubscript{ATEC}.

**Requirement R5:**
**Premise**: The ACE equation, and hence the AGC mode, will contain any number of parameters based on system operating conditions. Various AGC modes are identified corresponding to those operating conditions, as well as the specific sets of parameters included in the ACE equation.

**Justification**: Changing to the proper operating mode, corresponding to current operating conditions, affords proper movement of generating units in response to those conditions. The addition of the ATEC term results in an additional AGC mode and a different set of parameters. The inability to correctly calculate the ATEC term would dictate that AGC not be operated in the ATEC mode.

**Goal**: To set the AGC mode and calculate ACE in a manner that corresponds to the system operating conditions and to accommodate changes in those conditions.

**Requirement R6:**
**Premise**: Hourly adjustments to hourly Inadvertent Interchange (II) require a recalculation of the corresponding hourly PII value, the corresponding PII\textsubscript{accum}, and all subsequent PII\textsubscript{accum} for every hour up to the current hour.

**Justification**: As PII\textsubscript{hourly} is corrected, then PII\textsubscript{accum} should be recalculated.
**Goal:** To promote accurate, fair and timely payback of accumulated PII balances.

**Requirement R7:**

**Premise:** Month-end meter-reading adjustments are made, for example, when a Balancing Authority performs monthly comparisons of recorded month-end Net Actual Interchange (NI_\text{A}) values derived from hourly Actual Interchange Telemetered Values against month-end Actual Interchange Register Meter readings.

**Justification:** Month-end adjustments to II_{\text{accum}} are applied as 100% PII_{\text{accum}}. 100% was chosen for simplicity to bilaterally assign PII_{\text{accum}} to both Balancing Authorities, since the effect of this metering error on system frequency is not easily determined over the course of a month.
**Goal**: To provide a mechanism by which corresponding month-end II adjustments can be applied to $PI_{accum}$, when such adjustments cannot be attributed to any one particular hour or series of hours.

**Requirement R8:**

**Premise**: ATEC includes automatic unilateral payback of Primary Inadvertent Interchange and Secondary Inadvertent Interchange.

**Justification**: Additional unilateral and bilateral exchanges disturb the balance and distribution between Primary Inadvertent Interchange and Secondary Inadvertent Interchange throughout the Interconnection; thereby stranding Secondary Inadvertent Interchange.

**Goal**: To not strand Secondary Inadvertent Interchange.

**Version History**

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Action</th>
<th>Change Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>February 4, 2003</td>
<td>Effective Date.</td>
<td>New</td>
</tr>
<tr>
<td>1</td>
<td>October 17, 2006</td>
<td>Created Standard from Procedure.</td>
<td>Errata</td>
</tr>
<tr>
<td>1</td>
<td>February 6, 2007</td>
<td>Changed the Standard Version from 0 to 1 in the Version History Table.</td>
<td>Errata</td>
</tr>
<tr>
<td>1</td>
<td>February 6, 2007</td>
<td>The upper limit bounds to the amount of Automatic Time Error Correction term was inadvertently omitted during the Standard Translation. The bound was added to the requirement R1.4.</td>
<td>Errata</td>
</tr>
<tr>
<td>1</td>
<td>February 6, 2007</td>
<td>The statement “The Time Monitor may declare offsets in 0.001-second increments” was moved from TEOffset to TDadj and offsets was corrected to adjustments.</td>
<td>Errata</td>
</tr>
<tr>
<td>1</td>
<td>February 6, 2007</td>
<td>The reference to seconds was deleted from the TE offset term.</td>
<td>Errata</td>
</tr>
<tr>
<td>1</td>
<td>June 19, 2007</td>
<td>The standard number BAL-STD-004-1 was changed to BAL-004-WECC-01 to be consistent with the NERC Regional Reliability Standard Numbering Convention.</td>
<td>Errata</td>
</tr>
<tr>
<td>2</td>
<td>December 19, 2012</td>
<td>Adopted by NERC Board of Trustees</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>October 16, 2013</td>
<td>A FERC Letter Order was issued on October 16, 2013, approving BAL-004-WECC-02. This standard will become enforceable on April 1, 2014.</td>
<td></td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Action</td>
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<tr>
<td>3</td>
<td>TBD</td>
<td>TBD</td>
<td>Five-year review. The project: 1) relocates the Background section to the preamble of the Guidance section, 2) adds On-Peak and Off-Peak parameters in Requirement R1/M1, 3) addresses WECC Interchange Tool software successors throughout, 4) conforms the document to current drafting conventions (R1/M1, R4/M4), and, 5) addresses non-substantive syntax and template concerns.</td>
</tr>
</tbody>
</table>