

# **Balancing Authority ACE Limit Proof-of-Concept Field Trial**

WECC Update Discussion  
May 24, 2010

Doug Hils – Duke Energy

Reliability-Based Control Standard Drafting Team

# Balancing Authority ACE Limit Proof-of-Concept Field Trial

## Western Interconnection Field Trial Participation

| Western Interconnection Balancing Authority Participants          | 2010 Frequency Bias | WECC Region | Reliability Coordinator | Start Date           |
|---|---------------------|-------------|-------------------------|----------------------|
| Alberta Electric System Operator (AESO)                           | -125                | NWPP        | WECC                    | March 1, 2010        |
| Arizona Public Service Company (AZPS)                             | -74.5               | AZNMSNV     | WECC                    | March 1, 2010        |
| Bonneville Power Administration (BPAT)                            | -157.3              | NWPP        | WECC                    | March 1, 2010        |
| <b>British Columbia Transmission Corporation (BCTC)</b>           | <b>-118</b>         | <b>NWPP</b> | <b>WECC</b>             | <b>April 1, 2010</b> |
| California Independent System Operator (CISO)                     | -485                | CAMX        | WECC                    | March 1, 2010        |
| El Paso Electric Company (EPE)                                    | -19                 | AZNMSNV     | WECC                    | March 1, 2010        |
| NaturEner Power Watch , LLC(GWA)                                  | -2.1                | NWPP        | WECC                    | March 1, 2010        |
| Idaho Power Company (IPCO)  | -40                 | NWPP        | WECC                    | March 1, 2010        |
| Los Angeles Department of Water and Power (LDWP)                  | -62.3               | CAMX        | WECC                    | March 1, 2010        |
| Nevada Power Company (NEVP)                                       | -62.29              | AZNMSNV     | WECC                    | March 1, 2010        |
| PacifiCorp East (PACE)  | -77                 | NWPP        | WECC                    | March 1, 2010        |
| PacifiCorp West (PACW)  | -45                 | NWPP        | WECC                    | March 1, 2010        |
| <b>Portland General Electric (PGE)</b>                            | <b>-50</b>          | <b>NWPP</b> | <b>WECC</b>             | <b>April 1, 2010</b> |
| Public Service Company of Colorado (PSCO)                         | -80                 | RMPA        | WECC                    | March 1, 2010        |
| Public Utility District No.1 of Chelan County(CHPD)               | -12                 | NWPP        | WECC                    | March 1, 2010        |
| <b>Public Utility District No.1 of Douglas County (DOPD)</b>      | <b>-7</b>           | <b>NWPP</b> | <b>WECC</b>             | <b>April 1, 2010</b> |
| Public Utility District No.2 of Grant County (GCPD)               | -25                 | NWPP        | WECC                    | March 1, 2010        |
| Seattle City Light (SCL)  | -40                 | NWPP        | WECC                    | March 1, 2010        |
| Sacramento Municipal Utility District (SMUD)                      | -45.18              | NWPP        | WECC                    | March 1, 2010        |
| Sierra Pacific Power Company (SPPC)                               | -20.04              | NWPP        | WECC                    | March 1, 2010        |
| Tucson Electric Power (TEPC)                                      | -30.4               | AZNMSNV     | WECC                    | March 1, 2010        |
| Turlock Irrigation District (TIDC)                                | -6.7                | NWPP        | WECC                    | March 1, 2010        |
| Western Area Power Administration – Rocky Mountain Region (WACM)  | -55                 | RMPA        | WECC                    | March 1, 2010        |
| Western Area Power Administration- Desert Southwest Region (WALC) | -54.8               | AZNMSNV     | WECC                    | March 1, 2010        |

# Balancing Authority ACE Limit Proof-of-Concept Field Trial

The Balancing Authority ACE Limit (BAAL) shall not be exceeded for more than 30 consecutive clock-minutes\*

| Num  | Max_MinCtLow | Max_MinCtHigh | Max_MinCtLow2 | Max_MinCtHigh2 | Max_LowLimitCt | Max_HighLimitCt |
|------|--------------|---------------|---------------|----------------|----------------|-----------------|
| BA05 | 26           | 30            | 58            | 30             | 58             | 35              |
| BA06 | 5            | 1             | 4             | 1              | 5              | 1               |
| BA07 | 21           | 22            | 29            | 33             | 29             | 33              |
| BA08 | 1            | 4             | 0             | 23             | 6              | 23              |
| BA09 | 4            | 1             | 4             | 4              | 4              | 4               |
| BA11 | 3            | 3             | 1             | 0              | 3              | 3               |
| BA12 | 7            | 5             | 3             | 1              | 7              | 5               |
| BA13 | 3            | 4             | 2             | 5              | 4              | 6               |
| BA14 | 5            | 6             | 1             | 0              | 5              | 6               |
| BA15 | 1            | 1             | 2             | 1              | 2              | 1               |
| BA16 | 1            | 1             | 1             | 1              | 16             | 19              |
| BA18 | 6            | 3             | 5             | 3              | 6              | 3               |
| BA19 | 10           | 4             | 13            | 10             | 13             | 10              |
| BA22 | 1            | 2             | 8             | 14             | 8              | 14              |
| BA23 | 2            | 6             | 6             | 5              | 6              | 6               |
| BA25 | 8            | 5             | 5             | 2              | 8              | 1               |
| BA26 | 13           | 9             | 21            | 38             | 21             | 38              |
| BA27 | 3            | 1             | 15            | 5              | 15             | 5               |
| BA28 | 9            | 17            | 12            | 27             | 12             | 27              |
| BA30 | 1            | 0             | 1             | 1              | 15             | 13              |
| BA31 | 12           | 7             | 26            | 25             | 26             | 25              |
| BA33 | 0            | 0             | 15            | 46             | 15             | 46              |
| BA34 | 10           | 9             | 22            | 26             | 22             | 26              |
| BA36 | 1            | 1             | 1             | 1              | 14             | 26              |

MinCtLow = Count of consecutive clock-minutes BAAL\_Low was exceeded  
 MinCtHigh = Count of consecutive clock-minutes BAAL\_High was exceeded  
 MinCtLow2 = Count of consecutive clock-minutes ATL\_Low was exceeded  
 MinCtHigh2 = Count of consecutive clock-minutes ATL\_High was exceeded

\*BAAL being exceeded for more than 30 consecutive clock-minutes would be a violation under the proposed BAL-007 standard.

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| BA11 | 3            | 3             | 1             | 0              | 3              | 3               |
| BA12 | 7            | 5             | 3             | 1              | 7              | 5               |
| BA13 | 3            | 4             | 2             | 5              | 4              | 6               |
| BA14 | 5            | 6             | 1             | 0              | 5              | 6               |
| BA15 | 1            | 1             | 2             | 1              | 2              | 1               |
| BA16 | 1            | 1             | 1             | 1              | 16             | 19              |
| BA18 | 6            | 3             | 5             | 3              | 6              | 3               |
| BA19 | 10           | 4             | 13            | 10             | 13             | 10              |
| BA22 | 1            | 2             | 8             | 14             | 8              | 14              |
| BA23 | 2            | 6             | 6             | 5              | 6              | 6               |
| BA25 | 8            | 5             | 5             | 2              | 8              | 1               |
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| BA33 | 0            | 0             | 15            | 46             | 15             | 46              |
| BA34 | 10           | 9             | 22            | 26             | 22             | 26              |
| BA36 | 1            | 1             | 1             | 1              | 14             | 26              |

BAAL Maximum Count

ATL 2xL10 Maximum Count

BAAL or ATL Maximum Count

MinCtLow = Count of consecutive clock-minutes BAAL\_Low was exceeded

MinCtHigh = Count of consecutive clock-minutes BAAL\_High was exceeded

MinCtLow2 = Count of consecutive clock-minutes ATL\_Low was exceeded

MinCtHigh2 = Count of consecutive clock-minutes ATL\_High was exceeded

\*BAAL being exceeded for more than 30 consecutive clock-minutes would be a violation under the proposed BAL-007 standard.

## Clock-Minute Frequency Below 59.932 Hz $FTL_{Low}$ or Above 60.068 Hz $FTL_{High}$

| DateTime      | TimeZone | FreqError | ActualFreq | SchedFreq |
|---------------|----------|-----------|------------|-----------|
| 4/4/10 15:41  | PDT      | -0.09030  | 59.909700  | 60.00     |
| 4/4/10 15:42  | PDT      | -0.08460  | 59.915400  | 60.00     |
| 4/4/10 15:43  | PDT      | -0.07340  | 59.926600  | 60.00     |
| 4/4/10 15:44  | PDT      | -0.06880  | 59.931200  | 60.00     |
| 4/13/10 6:04  | PDT      | -0.07330  | 59.926700  | 60.00     |
| 4/13/10 6:05  | PDT      | -0.08350  | 59.916500  | 60.00     |
| 4/13/10 6:06  | PDT      | -0.08250  | 59.917500  | 60.00     |
| 4/13/10 6:07  | PDT      | -0.06830  | 59.931700  | 60.00     |
| 4/17/10 2:54  | PDT      | -0.07240  | 59.907600  | 59.98     |
| 4/17/10 2:55  | PDT      | -0.05000  | 59.930000  | 59.98     |
| 4/17/10 2:56  | PDT      | -0.05250  | 59.927500  | 59.98     |
| 4/20/10 7:02  | PDT      | -0.07310  | 59.926900  | 60.00     |
| 4/26/10 19:18 | PDT      | -0.06860  | 59.931400  | 60.00     |
| 4/27/10 4:18  | PDT      | -0.07650  | 59.923500  | 60.00     |
| 4/27/10 4:19  | PDT      | -0.10390  | 59.896100  | 60.00     |
| 4/27/10 4:20  | PDT      | -0.09420  | 59.905800  | 60.00     |
| 4/27/10 4:21  | PDT      | -0.08570  | 59.914300  | 60.00     |
| 4/27/10 4:22  | PDT      | -0.07430  | 59.925700  | 60.00     |
| DateTime      | TimeZone | FreqError | ActualFreq | SchedFreq |
| 4/4/10 15:56  | PDT      | 0.07      | 60.07      | 60.00     |
| 4/4/10 15:57  | PDT      | 0.08      | 60.08      | 60.00     |
| 4/4/10 15:58  | PDT      | 0.07      | 60.07      | 60.00     |

### Generation loss events in April 2010:

- April 4 Event Earthquake in Southern California that cause several lines and some generation to trip.
- April 17 Event – 722 MW generation loss in the Northwest region
- April 26 Event – 670 MW generation loss in Southwest region
- April 27 Event – 727 MW generation loss in the Northwest region

Clock-Minute Average Frequency



Clock-minute Actual Frequency of Participants

**Clock-Minute Average Frequency**



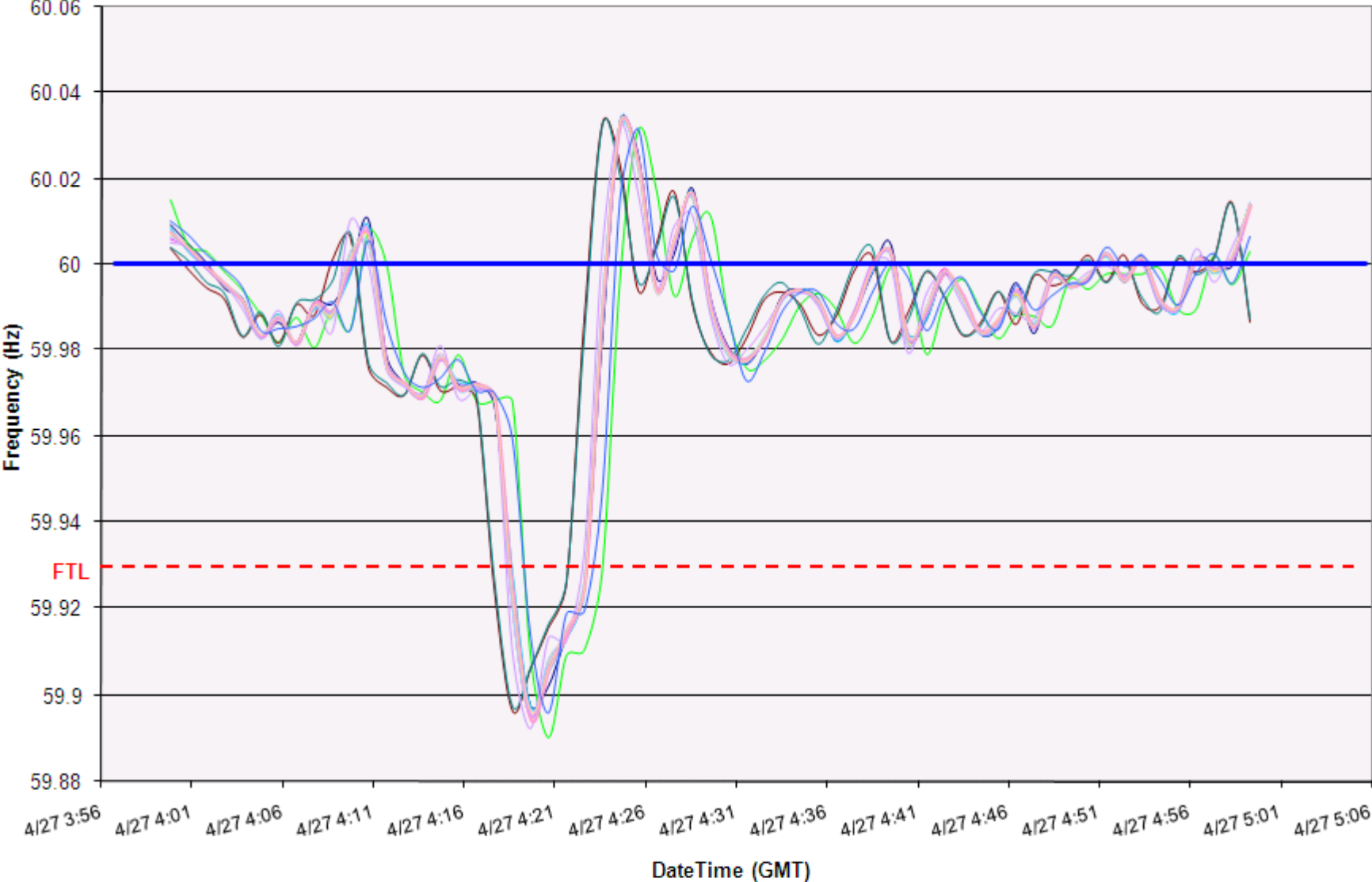
Clock-minute Actual Frequency of Participants

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Clock-minute Actual Frequency of Participants

**Clock-Minute Average Frequency**



Clock-minute Actual Frequency of Participants

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## Discussion

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