

TABLE ZS-1

## PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010 Summer Peak, Shoulder and E-W Bias Cases

| Planning Zone | Criteria Exceeded/Need  | 2010 Summer Peak Case |                          | 2010 Shoulder Case   |                          | 2010 E-W Bias Case   |                          | Facility Outage(s)  | Project or Mitigation   |
|---------------|---|-----------------------|--------------------------|----------------------|--------------------------|----------------------|--------------------------|---|---|
|               |   | % of Facility Rating  | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage |   |   |
| 1             | Petenwell, Big Pond, Necedah, Whistling Wings, ACEC Dellwood, Friendship, ACEC Friendship 69-kV buses |                       | 89.5 - 91.9%             |                      | --                       |                      | 90.8 - 91.6%             | Necedah Tap - Big Pond 69-kV line<br>Petenwell - Big Pond 69-kV line<br>Petenwell 138/69-kV transformer   | Redispatch generation or McKenna capacitor expansion                  |
| 1             | Petenwell, Council Creek 138-kV bus   |                       | 90.5 - 91.4%             |                      | --                       |                      | 91.3%                    | Saratoga - Petenwell 138-kV line  | Monroe County – Council Creek 161-kV line                             |
| 1             | Harrison 69-kV bus  |                       | --                       |                      | 105.0%                   |                      | --                       | System Intact   | Take Harrison 69-kV capacitor out of service                          |
| 1             | Whitcomb 115-kV bus   |                       | --                       |                      | --                       |                      | 105.5%                   | System Intact   | Take Badger 138-kV capacitor out of service                           |
| 1             | Caroline 115-kV bus   |                       | 105.1%                   |                      | 105.1%                   |                      | 105.6%                   | System Intact   | Take Badger 138-kV capacitor out of service                           |
| 1             | Coloma 69-kV bus  |                       | 91.9%                    |                      | --                       |                      | --                       | Chaffee Creek - Coloma Tap 69-kV line   |   |
| 1             | Metomen 138/69-kV transformer #31   | 93.0% - 100.2%        |                          | --                   |                          | --                   |                          | System Intact<br>North Randolph - Markesan Tap 69-kV line<br>North Fond du Lac - Rosendale 69-kV line<br>Sunset Point - Winneconne 69-kV line   | Metomen transformer replacement                                       |
| 1             | Petenwell 138/69-kV transformer #31   | 89.0%                 |                          | --                   |                          | --                   |                          | System Intact   |   |
| 1             | Whitcomb 115/69-kV transformer #31  | 91.0%                 |                          | --                   |                          | --                   |                          | System Intact   |   |
| 1             | Castle Rock - ACEC Quincy 69-kV Line  | 96.2%                 |                          | --                   |                          | --                   |                          | Petenwell - Big Pond 69-kV line<br>Petenwell 138/69-kV transformer #31<br>Necedah Tap - Big Pond 69-kV line   |   |
| 2             | Pine River - Straits 69-kV line<br>Straits - Evergreen 69-kV line<br>Straits - Evergreen 69-kV line   | --                    |                          | --                   |                          | 98.1 - 124.2%        |                          | Brevort - Lakehead 138-kV line<br>Lakehead - Hiawatha 138-kV line<br>Brevort - Straits 138-kV line<br>Pine River - Evergreen 69-kV line<br>Evergreen - Straits 69-kV line<br>ATC_B2_9902                                    | Rebuild Straits-Pine River 69-kV lines                                |
| 2             | Straits - McGulpin 138-kV line #3   | --                    |                          | --                   |                          | 100.2%               |                          | Straits - McGulpin 138-kV line #1   | Uprate Straits - McGulpin 138-kV line #3                              |
| 2             | Straits - McGulpin 138-kV line #1   | --                    |                          | --                   |                          | 100.3%               |                          | Straits - McGulpin 138-kV line #3   | Uprate Straits - McGulpin 138-kV line #1                              |
| 2             | Nordic - Mountain 69-kV line  | --                    |                          | 107.9%               |                          | --                   |                          | Chandler 138/69-kV transformer #1   | Uprate Nordic-Mountain 69-kV line                                     |
| 2             | Delta – Mead 69-kV line   | 99.0 - 157.1 %        |                          | 102.0 - 108.7%       |                          | 112.4 - 140.8%       |                          | System Intact<br>Chandler-Lakehead Tap 69-kV line<br>Lakehead Tap-Masonville 69-kV line<br>Masonville-Gladstone 69-kV line<br>Gladstone-North Bluff 69-kV line<br>North Bluff-Bay Tap 69-kV line<br>Bay Tap-Mead 69-kV line | Uprate Delta – Mead 69-kV line, Increase generation at Mead/Gladstone |
| 2             | Chandler – Delta 69-kV #1 line  | 106.5%                |                          | 117.1%               |                          | --                   |                          | Chandler-Delta 69-kV #2 line  | Uprate Chandler – Delta 69-kV #1 line                                 |

TABLE ZS-1

PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010 Summer Peak, Shoulder and E-W Bias Cases

| Planning Zone | Criteria Exceeded/Need   | 2010 Summer Peak Case |                          | 2010 Shoulder Case   |                          | 2010 E-W Bias Case   |                          | Facility Outage(s)   | Project or Mitigation   |
|---------------|--|-----------------------|--------------------------|----------------------|--------------------------|----------------------|--------------------------|--|---|
|               |  | % of Facility Rating  | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage |  |   |
| 2             | Chandler – Delta 69-kV #2 line   | 101.7%                |                          | 111.7%               |                          | --                   |                          | Chandler-Delta 69-kV #1 line   | Uprate Chandler – Delta 69-kV #2 line   |
| 2             | Atlantic – M38 69-kV line  | 117.5 - 118.1%        |                          | 95%                  |                          | 115.3 - 115.4%       |                          | Atlantic 138/69-kV transformer #1<br>Atlantic - M-38 138-kV line<br>ATC_B2_ATLAN (both of the above) | Uprate Atlantic – M38 69-kV line  |
| 2             | Chandler – Lakehead Tap 69-kV line<br>Masonville – Lakehead Tap 69-kV line<br>Masonville – Gladstone 69-kV line<br>Gladstone – North Bluff 69-kV line<br>North Bluff – Bay Tap 69-kV line<br>Mead – Bay Tap 69-kV line | 119.1 - 159.0%        |                          | 97.3 - 107.3%        |                          | 106.3 - 142.0%       |                          | Delta - Mead 69-kV line  | Uprate Chandler-Masonville, Masonville-Gladstone, Gladstone-North Bluff, North Bluff-Mead 69-kV lines |
| 2             | Lakota Road 69-kV bus  |                       | --                       |                      | --                       |                      | 105.4% - 118.5%          | System Intact<br>Conover - Lakota 69-kV line   | Adjust 138/69-kV transformer taps at Lakota Road  |
| 2             | Engadine, Straits, St. Ignace, Hiawatha, Manistique, Valley, Glen Jenks, Indian Lake, Evergreen 69-kV buses  |                       | --                       |                      | 105.2% - 105.5%          |                      | 105.1% - 105.8%          | System Intact  | Adjust 138/69-kV transformer taps at Indian Lake, Hiawatha, and Straits                               |
| 2             | WE-Greenstone, Barnum Tap, Barnum Sub, Humboldt Tap, Foundry, North Lake 69-kV buses   |                       | --                       |                      | 105.3 - 105.5%           |                      | --                       | System Intact  | Adjust 138/69-kV transformer taps at North Lake   |
| 2             | Munising, Alger, Alger Delta Hiawatha 69-kV buses  |                       | --                       |                      | 105.1 - 105.5%           |                      | --                       | System Intact  | Adjust 138/69-kV transformer taps at Munising   |
| 2             | Cornell Tap, Delta, Escanaba 1, Escanaba 2, Masonville, Mead, Gladstone, West Tap, West, Lakehead Tap, Lakehead, Bay Tap, Bay View, North Bluff, Cornell, Harris, Harris Tap 69-kV buses                               |                       | 90.5 - 91.9%             |                      | 88.3 - 91.5%             |                      | --                       | Chandler 138/69-kV transformer #1  | Increase local generation at Gladstone/Mead/Escanaba  |
| 2             | Engadine, Newberry, Newberry Hospital, Newberry Hospital Tap, Newberry Village, Louisiana Pacific, Roberts, Hulbert, Eckerman, Raco, Talentino, Talentino 6950, Goetzville, Brimley, DeTour 69-kV buses                |                       | 71.8 - 91.6%             |                      | --                       |                      | --                       | Hiawatha – Engadine 69-kV line   | Increase generation at Newberry, Dafter, DeTour, US Hydro, Edison Sault                               |
| 2             | Straits, Brevort, Lakehead, Hiawatha 138-kV buses  |                       | 89.3 - 91.1%             |                      | --                       |                      | --                       | Livingston – Emmett 138-kV line  | Increase generation at Newberry, Dafter, DeTour, US Hydro, Edison Sault                               |
| 2             | Atlantic 138-kV bus  |                       | 88.0%                    |                      | --                       |                      | 89.0%                    | Atlantic-M38 138-kV line   | Adjust 138/69-kV transformer taps at Atlantic   |

TABLE ZS-1

PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010 Summer Peak, Shoulder and E-W Bias Cases

| Planning Zone | Criteria Exceeded/Need                                | 2010 Summer Peak Case |                          | 2010 Shoulder Case   |                          | 2010 E-W Bias Case   |                          | Facility Outage(s)  | Project or Mitigation  |
|---------------|---|-----------------------|--------------------------|----------------------|--------------------------|----------------------|--------------------------|---|--|
|               |   | % of Facility Rating  | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage |   |  |
| 3             | No criteria limits exceeded or constraints            | --                    | --                       | --                   | --                       | --                   | --                       | System Intact   |  |
| 3             | Hubbard and Hustisford 138-kV buses                   |                       | 84.4 – 86.9%             |                      | 86.6 – 87.3%             |                      | 86.7 – 87.3%             | Rubicon – Hustisford 138-kV line<br>Hustisford – Hubbard 138 kV line  | Local Operating Steps  |
| 3             | Crawfish River 138-kV bus                             |                       | 91.4%                    |                      | --                       |                      | --                       | Jefferson – Crawfish River 138-kV line  | Increase Concord generation  |
| 3             | Verona - Sun Valley 69-kV line                        | 110.9%-101.3%         |                          | --                   |                          | 101.3%               |                          | Stoughton - Stoughton South 69-kV line<br>Kegonsa - Stoughton North 69-kV line<br>Kegonsa 138/69-kV transformer #31   | Y119 Verona-Oregon 69-kV line rebuild  |
| 3             | McCue - Harmony - Lamar 69-kV line                    | 98%-95.4%             |                          | --                   |                          | --                   |                          | Kegonsa - Stoughton North 69-kV line  | Y61 McCue - Lamar line uprate  |
| 3             | Fitchburg - Syene 69-kV line                          | 109.6%                |                          | --                   |                          | 98.8%                |                          | Royster - AGA Tap 69-kV line  | Uprate Fitchburg-Nine Springs line, uprate Pflaum - Royster line, install 2-16.33 MVAR 69 kV capacitor banks at Nine Springs and move the AGA load onto Femrite - Royster line |
| 3             | Royster - AGA Tap 69-kV line                          | 106.7%                |                          | --                   |                          | 96.6%                |                          | Fitchburg - Syene 69-kV line  | Uprate Fitchburg-Nine Springs line, uprate Pflaum - Royster line, install 2-16.33 MVAR 69 kV capacitor banks at Nine Springs and move the AGA load onto Femrite - Royster line |
| 3             | Verona 138-kV bus                                     |                       | 90.1%                    |                      | -                        |                      | 90.7%                    | Verona - Oak Ridge 138-kV line  | Adjust Verona 138/69-kV transformer setting  |
| 3             | Harmony, Lamar, Fulton and Saunders Creek 69-kV buses |                       | 87.8-91.9%               |                      | --                       |                      | 90.1-91.3%               | McCue - Harmony 69-kV line<br>Harmony - Lamar 69-kV line  | Lamar 2-16.33 MVAR 69-kV capacitor banks   |
| 3             | Huiskamp – Mendota - Ruskin 69-kV line                | --                    |                          | 101.6%-97.7%         |                          | --                   |                          | North Madison - Vienna 138-kV line<br>Vienna - Yahara River 138-kV line<br>Yahara River - American Center 138-kV line | Bypass the Mendota line switch as a short term solution; the 2011 Mendota Substation retirement project will remove the line switch limitation                                 |
| 3             | Paddock – Townline 138-kV line                        | --                    |                          | 97%-95.2%            |                          | --                   |                          | Blackhawk – Northwest Beloit Tap 138-kV line<br>Northwest Beloit Tap – Paddock 138-kV line                            | Increase Rock River generation   |
| 4             | Chalk Hills and Alger Delta Nathan 69-kV buses        |                       | 105.1 – 105.8%           |                      | --                       |                      | 106.4 – 107.1%           | System Intact   | Modeling Corrections   |
| 4             | Bell Plaine and Badger 115-kV buses                   |                       | 105.4%                   |                      | --                       |                      | 105.7%                   | System Intact   | Local Operating Steps  |
| 5             | Germantown 138-kV bus                                 |                       | --                       |                      | 95.8%                    |                      | --                       | System Intact   | Run Germantown generation  |
| 5             | Bain 345/138-kV transformer #5                        | 158.5%                |                          | 131.2%               |                          | 158.6%               |                          | Pleasant Prairie 345-kV 3-4 bus tie   | Reduce Pleasant Prairie #2 generation  |

**TABLE ZS-1**

**PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010 Summer Peak, Shoulder and E-W Bias Cases**

| Planning Zone | Criteria Exceeded/Need                            | 2010 Summer Peak Case |                          | 2010 Shoulder Case               |                          | 2010 E-W Bias Case   |                          | Facility Outage(s)   | Project or Mitigation  |
|---------------|---|-----------------------|--------------------------|----------------------------------|--------------------------|----------------------|--------------------------|--|--|
|               |   | % of Facility Rating  | % of Nominal bus voltage | % of Facility Rating             | % of Nominal bus voltage | % of Facility Rating | % of Nominal bus voltage |  |  |
| 5             | Albers – Bain 138-kV line                         | 96.4%                 |                          | --                               |                          | 101.6%               |                          | Bain-Kenosha 138-kV line   | Upgrade Bain – Albers 138-kV line  |
| 5             | Albers – Kenosha 138-kV line                      |                       |                          | 114.6%                           |                          | 106.3%               |                          | Albers – Bain 138-kV line  | Upgrade Albers – Kenosha 138-kV line                                       |
| 5             | Oak Creek8 – Elm Road 345/230-kV transformer #884 | 101.8%                |                          | --                               |                          | --                   |                          | Oak Creek 230-kV 6-7 bus tie   | Reduce Oak Creek generation on units 7 or 8.                               |
| 5             | Arcadian4- Waukesha1 138-kV line                  | 98.8%                 |                          | 105.1%                           |                          | 114.9%               |                          | Arcadian6 – Waukesha3 138-kV line  | Upgrade Arcadian – Waukesha 138-kV lines or investigate other alternatives |
| 5             | Arcadian 345/138-kV transformer #3                | 99.0%                 |                          | 95.1%                            |                          | 103.9%               |                          | Arcadian 345/138-kV transformer #1   | Replace Arcadian transformers or investigate other alternatives            |
| 5             | Arcadian 345/138-kV transformer #2                | --                    |                          | --                               |                          | 95.1%                |                          | Arcadian 345/138-kV transformer #1   | Replace Arcadian transformers or investigate other alternatives            |
| 5             | Hartford 138-kV bus                               |                       | 91.6%                    |                                  | --                       |                      | --                       | Hartford – St. Lawrence 138-kV line  | Increase Concord generation  |
| 5             | Oak Creek8 – Elm Road 345/230-kV transformer #884 | 95.8                  |                          | --                               |                          | --                   |                          | Oak Creek 230-kV 6-9 bus tie   | Reduce Oak Creek generation on 6, 7, or 8                                  |
| 5             | Harbor – Kansas 138-kV line                       | --                    |                          | 95.4%<br>96.3%<br>96.5%<br>99.3% |                          | --                   |                          | Montana – Dewey 138-kV line<br>Dewey 138-kV bus<br>Dewey – Norwich 138-kV line<br>Kansas – Norwich 138-kV line | Replace 138-kV underground segment of the Kansas – Harbor 183kV line       |
| 5             | Arcadian6 – Waukesha3 138-kV line                 | 97.9%                 |                          | 104.2%                           |                          | 114.0%               |                          | Arcadian4 - Waukesha1 138-kV line  | Upgrade Arcadian – Waukesha 138-kV lines or investigate other alternatives |