ZONE & STUDY RESULTS > Introduction

For system planning purposes, we have defined five planning zones representing distinct geographic areas within our overall service territory. Within each zone, we compile and assess the transmission system needs. This zone-level planning is one of four levels at which transmission system needs are assessed and potential solutions developed. ATC's five planning zones are shown in Figure ZS-17.

For each zone, we have compiled recent information on:

- demographics,
- future population and employment projections,
- environmental considerations,
- electricity demand and generation,
- transmission system issues,
- 2006 study results,
- 2010 study results and
- 2014 study results.

About the study results

For each zone, system performance criteria limits that are exceeded (overloads, low voltages, fault duties, etc.) are identified from the results of each base model and associated contingency models along with their causes. In addition, system constraints (known as transmission service/import limiters) also are identified. The identified needs and exceeded limits are categorized by ATC planning zone. Tables ZS-1 through ZS-3 list the combined limitations and instances where performance criteria limits are exceeded that were identified in the 2006, 2010 and 2014 analyses. The same information is shown graphically in Figures ZS-1 through ZS-15.

Note: The results for each zone in many cases are similar to the results presented in our Update to the 2004 10-Year Assessment issued in March 2005. Where new results or changes have been found, the new information is identified as such.

System constraints that limit our ability to approve transmission service requests, or that may cause interruption of transmission service already approved, are taken into consideration in developing solutions to limits and needs identified above. These system constraints may be lines, transformers or other equipment whose ratings could be exceeded. We monitor incidents where transmission service is interrupted or curtailed by system operators due to various system issues. These incidents are referred to as transmission loading relief incidents. A summary of transmission loading relief incidents that occurred on our system during 2004, 2003, 2002 and 2001 are provided in Tables ZS-4 through ZS-7, respectively. From a planning perspective, we are concerned about transmission loading relief incidents that occur repeatedly and/or those that cause firm transmission service to be interrupted or curtailed. As shown in all four tables, there are a number of chronic or severe limiters that warrant system reinforcements. The 2004 costs associated with generator redispatch to alleviate those limitations are shown in Figure ZS-16. These limitations were taken into account when developing alternative solutions for other needs identified in the analyses. Reporting of this information in the next 10-Year Assessment will need to be revised to accommodate the transition in part of the industry on April 1, 2005 to a locational marginal pricing (LMP) based market system. In this system, potential transmission equipment overloads are identified as constraints and are “bound” by the market. The binding of constraints results in the market-based redispatch of generation in order to alleviate high loading levels on transmission system equipment. Transmission loading relief events are less prevalent in this system and work in conjunction with bound constraints to protect the physical assets of the transmission system.

Alternative solutions or the primary (currently preferred) solution to the system performance criteria limits exceeded in the analyses are described for each zone. For limits exceeded in the 2006 model where the limit must be resolved near term and the preferred solution or a potential solution can reasonably be expected to be completed by 2010, such solutions are included in the 2010 model. For criteria limits exceeded in the 2006 analysis where the preferred or potential solutions require further verification or more analysis, such solutions are not included in the 2010 model, but the need is further investigated in the 2010 analysis. In instances where the need is further verified by the 2010 analyses, primary and alternative solutions are listed as part of the plan, with in-service dates based on reasonably likely completion dates. The same type of analyses was conducted for 2014, with planned and several proposed projects being included in the 2014 model.

The solutions ultimately selected to address the needs and limitations identified will reflect the input of transmission planning process stakeholders, including customers, state and local officials, the public, and coordination with other planning processes to the extent possible.

We continue to focus more attention on dealing with unexpected conditions. For instance, it is important to have appropriate reactive power reserves to manage system conditions that differ from the norm. While many capacitor bank installations are proposed in each zone to meet specific system needs, it should be noted that these additions also increase our flexibility to deal with extreme system conditions. See the reactive power analysis and multiple outage studies discussions for more information about the ability of the ATC system to manage unexpected conditions.

In the multiple outage studies section, we summarize the status of the studies that we have been conducting. This includes a summary of stability analyses completed, providing insights into current stability margins of major generating stations on our system.

TABLE ZS-1
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2006

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
1	Antigo, Aurora Street and Summit Lake 115-kV bus voltages		89 – 92%	Gardner Park-Blackbrook-Antigo 115-kV line outage	Load Serving
1	Gardner Park-Blackbrook 115-kV line	96%		Hilltop-Sherman Street 115-kV line outage	Load Serving
1	Gardner Park-Kelly 115-kV line	96%		Hilltop-Sherman Street 115-kV line outage	Load Serving
1	Weston-Sherman Street 115-kV line	96 – 104%		Weston-Morrison 115-kV line outage Morrison-Sherman Street 115-kV line outage	Load Serving
1	Weston-Morrison 115-kV line	100%		Weston-Sherman Street 115-kV line outage	Load Serving
1	Morrison-Sherman Street 115-kV line	109%		Weston-Sherman Street 115-kV line outage	Load Serving
1	Wien-Stratford 115-kV line	98 -104%		Arpin 138/115-kV Transformer outage Arpin – Powers Bluff 115-kV line outage Powers Bluff – Hume 115-kV line outage Arpin 345/138-kV transformer outage	Load Serving
1	Stratford-McMillan 115-kV line	95-96%		Arpin 138/115-kV Transformer outage Arpin – Powers Bluff 115-kV line outage	Load Serving
1	McMillan, Wildwood, Hume and Powers Bluff 115-kV bus voltages		91 – 92%	Arpin 138/115-kV Transformer outage Arpin – Powers Bluff 115-kV line outage	Load Serving
1	Sigel, Lakehead Vesper and Port Edwards 138-kV bus voltages		89 – 91%	Arpin 345/138-kV Transformer outage Arpin-Sigel 138-kV line outage Sigel-Lakehead Vesper 138-kV line outage	Load Serving
1	Port Edwards, Hollywood and Saratoga 138-kV bus voltages		91 – 92%	Arpin-Sigel 138-kV line outage	Load Serving
1	Wautoma, Sand Lake and Roeder 138-kV bus voltages		88 – 95%	Base Case Various contingencies	Load Serving
1	Metomen-Ripon 69-kV line	97%		Winneconne-Sunset Point 69-kV line outage	Load Serving
1	Metomen-Rosendale 69-kV line	96 – 120%		Various contingencies	Load Serving
1	North Fond du Lac-Rosendale 69-kV line	106%		Metomen 138/69-kV transformer	Load Serving
1	Ripon-Mackford Prairie 69-kV line	97%		Metomen-Ripon 69-kV line outage	Load Serving
1	Berlin area 69-kV bus voltages		88 – 92%	Various line outages	Load Serving
1	Council Creek and Petenwell 138-kV bus voltages		88 – 95%	Base Case Various contingencies	Load Serving
1	Council Creek 69-kV bus tie	100 – 106%		King-Eau Claire-Arpin 345-kV line outage Eau Claire-Arpin 345-kV line outage Hillsboro-Hillsboro tap 69-kV line outage	Load Serving
1	Necedah, Whistling Wings, Dellwood, Friendship, Houghton Rock 69-kV bus voltages		91 – 92%	Various outages	Load Serving
1	Hilltop, Mauston, Lyndon Station, Wisconsin Dells and Kilbourn 69-kV bus voltages		90-91%	Kilbourn 138/69-kV transformer	Load Serving
1	Neenah Creek, Glen and Winnebago 69-kV bus voltages		90 – 92%	Kilbourn 138/69-kV transformer	Load Serving
1	Whitcomb-Wittenberg 69-kV line	95 – 105%		Gardner Park-Blackbrook-Antigo-Aurora Street 115-kV outage Gardner Park-Blackbrook-Antigo 115-kV outage Blackbrook-Antigo 115-kV outage	Load Serving
1	Deer Trail-Polar tap 69-kV line	98%		Gardner Park-Blackbrook-Antigo 115-kV outage	Load Serving
1	Roslin, Endeavor and Lakehead Portage 69-kV bus voltages		89 – 91%	Portage-Lakehead Portage 69-kV line outage	Load Serving
2	Atlantic-Elevation Tap #1 69-kV	138%		Atlantic-Elevation Tap #2 69-kV line outage	Load Serving
2	Osceola-Elevation Tap #1 69-kV	110%		Atlantic-Elevation Tap #2 69-kV line outage	Load Serving

TABLE ZS-1 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2006

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
2	Atlantic-Elevation Tap #2 69-kV	106%		Atlantic-Elevation Tap #1 69-kV line outage	Load Serving
2	Atlantic-Elevation Tap #1 69-kV	106%		Osceola-Elevation Tap #2 69-kV line outage	Load Serving
2	Sawyer, Gwinn, Chatham, Forest Lake and Seney Tap 69-kV bus voltages		84-91%	Forsyth-Gwinn 69-kV line outage	Load Serving
2	Bruce Crossing, Watersmeet, Land O Lakes, Conover and Twin Lakes 69-kV bus voltages		84-89%	Mass-Bruce Crossing 69-kV line outage	Load Serving
2	L’Anse and M38 69-kV bus voltages		88-90%	M38 138/69-kV transformer outage	Load Serving
2	Seney Tap, Timber Products and Munising 69-kV bus voltages		87-92%	Forsyth-Munising 138-kV line outage	Load Serving
2	Atlantic, Stone Container, M38, Winona and Ontonagon 138-kV buses, L’Anse 69-kV and M38 69-kV bus voltages		89-90%	M38-Perch Lake 138-kV line outage	Load Serving
2	Seney Tap, Timber Products and Munising 69-kV bus voltages		90-92%	Munising 138/69-kV transformer outage	Load Serving
2	Stone Container, Ontonagon and Winona 138-kV bus voltages		90%	Winona-M38 138-kV line outage	Load Serving
2	Brevort, Hiawatha and Lakehead 138-kV bus voltages		90%	Brevort-Straits 138-kV line outage	Load Serving
2	Hiawatha and Lakehead 138-kV bus voltages		90%	Brevort-Lakehead 138-kV line outage	Load Serving
2	Stone Container and Ontonagon 138-kV bus voltages		91%	Winona-Ontonagon 138-kV line outage	Load Serving
3	North Beaver Dam, Fox Lake, East Beaver Dam 138-kV bus voltages		97%	Base Case due-tap settings at Columbia on the 345/138-kV transformers	Load Serving
3	Hillman 138/69-kV transformer	118%		Pilot Knob – Galena 69-kV line outage	Load Serving
3	North Monroe 138/69-kV transformer	95-108%		Kegonsa-Stoughton 69-kV line segments, Darlington-South Monroe 69-kV line segments, Darlington 138/69-kV transformer, Brodhead-Newark 69-kV line, Stoughton-Aaker Road 69-kV line, Paddock 138/69-kV transformer	Load Serving
3	Brodhead-Blacksmith and Brodhead-Newark 69-kV lines	105-115%		North Monroe 138/69-kV transformer, North Monroe-Idle Hour 69-kV line outage, Town Line Road-Albany 138-kV line	Load Serving
3	Turtle–Rock River 69-kV line	104%		Colley Road-Dickinson 138-kV line outage	Load Serving
3	Columbia 138/69-kV transformer	109%		Portage 138/69-kV transformer	Load Serving
3	Colley Road-Brick Church 69-kV line	115%		Colley Road-Brick Church 138-kV line	Load Serving
3	Rock River 138/69-kV transformer	98-103%		Colley Road-Brick Church 138-kV line, Black hawk 138/69-kV transformer	Load Serving
3	Colley Road 138/69-kV transformer	111-125%		Paddock-Shirland Ave 69-kV line, Paddock 138/69-kV transformer, Colley Road-Brick Church 138-kV line	Load Serving
3	Paddock 138/69-kV transformer	98%		Colley Road 138/69-kV transformer	Load Serving
3	Brick Church 138/69-kV transformer	97%		Brick Church-Williams Bay 138-kV line	Load Serving
3	McCue-Milton Lawns 69-kV line	98%		Janesville 138/69-kV transformer	Load Serving
3	North Stoughton-Kegonsa 69-kV line	98%		McCue-La Mar 69-kV line	Load Serving
3	Verona-Oregon 69-kV line	123%		Stoughton-Aaker Road 69-kV line	Load Serving
3	Blount-Ruskin 69-kV lines (both circuits)	103-128%		North Madison 138/69-kV transformer, Blount-Ruskin 69-kV adjacent line	Load Serving

TABLE ZS-1 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2006

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	Royster-Pflaum Tap 69-kV line	103%		Fitchburg-Nine Springs 69-kV line	Load Serving
3	Pheasant Branch-West Port 69-kV line	102%		West Middleton-Pheasant 69-kV line	Load Serving
3	Dane-North Madison 69-kV line	97%		American Center-Sycamore 138-kV line	Load Serving
3	Paddock-Shirland Ave 69-kV line	97-133%		Colley Road-Park Ave 69-kV line, Colley Road 138/69-kV transformer	Load Serving
3	Monticello, New Glarus, Belleville 69-kV buses		87-89%	North Monroe-Monticello 69-kV line	Load Serving
3	Reiner, Burke and Sprecher 69-kV buses		90-91%	Reiner Tap-Sycamore 69-kV line	Load Serving
3	Oregon and Brooklyn 69 buses		89%	Oregon-Aaker Road 69-kV line	Load Serving
3	Monroe, Idle Hour, South Monroe, Black Smith, Browntown, Jennings Road, Argyle (DPC) 69-kV buses		85-92%	North Monroe-Idle Hour Tap 69-kV line	Load Serving
3	Verona, Monroe, Idle Hour, South Monroe, New Glarus, Monticello, Black Smith, Browntown, Jennings Road, Argyle (DPC) 69-kV buses		85-92%	North Monroe 138/69-kV transformer	Load Serving
3	Muscoda, Avoca, Spring Green, Lone Rock, Arena 69-kV bus voltages		92%	Lone Rock-Spring Green 69-kV line	Load Serving
3	Aaker Road (Stoughton), Oregon, Brooklyn and Verona 69-kV buses		82-91%	Stoughton-Aaker Road 69-kV line outage	Load Serving
3	Brodhead Municipal, Orfordville, Footville, Bass Creek 69-kV buses		90-92%	Brodhead SS-Brodhead Muni 69-kV line	Load Serving
3	Concord 138-kV bus 6, Rubicon 138-kV buses		85-87%	Concord Bus 6 – 5 Bus tie outage	Load Serving
3	Eden, Lancaster, Wyoming Valley, 138-kV bus voltages		90-91%	Nelson Dewey-Eden 138-kV line segments	Load Serving
3	Brick Church, Dickinson 138-kV bus voltages		91%	Colley Road-Brick Church 138-kV line outage	Load Serving
3	Cambridge, London, Boxelder, Stonybrook, Friesland, East Beaver Dam, Academy, North Randolph, Fox Lake, North Beaver Dam, Lakehead Pumping 138-kV bus voltages		85-92%	Rockdale-Cambridge Tap 138-kV line outage	Load Serving
3	Kilbourn, Platte, Finnegan 69-kV buses		89%	Kilbourn 138/69-kV transformer	Load Serving
3	Rock Springs, Artesian, Nishan, Zobel, Lewiston, Loch Mirror Birchwood, Dell Creek 138-kV buses / Artesian, Loganville, Reedsburg, Lewiston 69-kV buses		88-92%	Kilbourn-Trienda 138-kV line segments	Load Serving
3	Rock Springs, Artesian, Nishan, Zobel, Troy, Kirkwood, Lake Delton 138-kV buses / Artesian, Loganville and Reedsburg 69-kV buses		90-92%	Trienda-Kirkwood 138-kV line segments	Load Serving
3	North Beaver Dam, Fox Lake and East Beaver Dam 138-kV bus voltages		82-95%	North Randolph – East Beaver Dam 138-kV line segments, Portage-Friesland 138-kV line segments, Rockdale-Boxelder 138-kV line segments	Load Serving
3	Pine River, Richland Center, Richland, Eagle (DPC) 69-kV bus voltages		89%	Lone Rock Phase Shifter, Lone Rock-Richland, Dayton-Richland Center Tap 69-kV line outage	Load Serving
4	Crivitz-High Falls 69-kV line	96%		Pioneer-Sandstone 69-kV line outage	Load Serving
4	Pioneer-Sandstone 69-kV line	101%		Crivitz-High Falls 69-kV line outage	Load Serving
4	Ellinwood 138/69-kV T1 transformer	99%		Fitzgerald-Sunset Point 138-kV line outage	Load Serving

TABLE ZS-1 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2006

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
4	Goodman 69-kV bus voltage		94%	Base Case	Load Serving
5	Pleasant Prairie-Bain 345-kV line	161%		Splitting Pleasant Prairie 345-kV bus sections 3 and 4	Load Serving
5	Bluemound 230-kV bus voltage		91%	Pleasant Prairie-Racine 345-kV line Outage	Load Serving
5	Pleasant Valley-Saukville 138-kV line	112%		Splitting Concord 5 and 6	Load Serving

TABLE ZS-2
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
1	Gardner Park-Kelly 115-kV line	96 - 103%		Maine-Hilltop 115-kV line outage Maine-Pine 115-kV line outage	Load Serving
1	Arpin 345/138-kV Transformer	102%		Arpin-Rocky Run 345-kV line outage	Off Peak Load Serving
1	Sigel-Arpin 138-kV line	104&		Arpin-Rocky Run 345-kV line outage	Off Peak Load Serving
1	Young Road-Sigel 138-kV line	109%		Arpin-Rocky Run 345-kV line outage	Off Peak Load Serving
1	Young Road-Lakehead Vesper 138-kV line	108%		Arpin-Rocky Run 345-kV line outage	Off Peak Load Serving
1	Sigel, Lakehead Vesper and Port Edwards 138-kV bus voltages		90 – 91%	Arpin-Sigel 138-kV line outage	Load Serving
1	Port Edwards, Hollywood and Saratoga 138-kV bus voltages		91 – 92%	Arpin-Sigel 138-kV line outage	Load Serving
1	Wautoma, Sand Lake and Roeder 138-kV bus voltages		90 – 95%	Base Case Various contingencies	Load Serving
1	Metomen-Ripon 69-kV line	98%		Winneconne-Sunset Point 69-kV line outage	Load Serving
1	Omro-Winneconne 69-kV line	98%		NW Ripon 69-kV line outage	Load Serving
1	Wautoma-Spring Lake 69-kV line	100 – 103%		NW Ripon 69-kV line outage Winneconne-Sunset Point 69-kV line outage	Load Serving
1	Berlin area 69-kV bus voltages		88 – 92%	Various contingencies	Load Serving
1	Council Creek 69-kV bus tie	95 – 124%		King-Eau Claire-Arpin 345-kV line outage Eau Claire-Arpin 345-kV line outage Hillsboro-Hillsboro tap 69-kV line outage	Network
1	Necedah, Whistling Wings, Dellwood, Friendship, Houghton Rock 69-kV bus voltages		91 – 92%	Petenwell 138/69-kV transformer outage Petenwell-Big Pond 69-kV line outage Big Pond-Necedah tap 69-kV line outage	Load Serving
1	Hilltop, Mauston, Lyndon Station, Wisconsin Dells and Kilbourn 69-kV bus voltages		90 - 91%	Kilbourn-Wisconsin Dells #2 line outage	Load Serving
1	Roslin, Endeavor and Lakehead Portage 69-kV bus voltages		88 – 91%	Portage-Lakehead Portage 69-kV line outage	Load Serving
2	Winona-Twin Lakes 69-kV	97%		Atlantic-M 38 69-kV line outage, Atlantic 138/69-kV transformer outage	Load Serving
2	Atlantic, Stone Container, M38, Winona and Ontonagon 138-kV buses and L'Anse 69-kV bus voltages		90-92%	M38-Perch Lake 138-kV line outage	Load Serving
2	L'Anse 69-kV bus voltage		91%	M38 138/69-kV transformer outage	Load Serving
2	Atlantic, Stone Container, M38, Winona and Ontonagon 138-kV buses and L'Anse 69-kV bus voltages		90-91%	M38-Perch Lake 138-kV line outage	Load Serving
2	L'Anse 69-kV bus voltage		92%	M38 138/69-kV transformer outage	Load Serving
2	Stone Container, Ontonagon and Winona 138-kV bus voltages		91-92%	Winona-M38 138-kV line outage	Load Serving
2	Land O' Lakes and Conover 69-kV bus voltages		91%	Conover 138/69-kV transformer outage	Load Serving
2	Winona-Twin Lakes-Portage Tap-Atlantic 69-kV line	160-98%		Atlantic 138/69-kV transformer outage, M38 138/69-kV transformer outage, Atlantic-M 38 138-kV line outage, M38-Perch Lake 138-kV line outage	Load Serving
2	Atlantic-Henry St Tap 69-kV line	127%		M38-Perch Lake 138-kV line outage	Load Serving

TABLE ZS-2 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
2	Atlantic 138/69-kV transformer	117-96%		M38 138/69-kV transformer outage, Atlantic-Portage Tap 69-kV line outage, Winona-Twin Lakes 69kV line outage, Winona-M38 138-kV line outage, Twin Lakes-Portage Tap 69-kV line outage, M38-Perch Lake 138-kV line outage	Load Serving
2	M38-Atlantic 69-kV line	115-98%		Atlantic 138/69-kV transformer outage, M38 138/69-kV transformer outage, Atlantic-M 38 138-kV line outage	Load Serving
2	Atlantic-Elevation Tap #2 69-kV line	115%		Atlantic-Elevation Tap #1 69-kV line outage	Load Serving
2	Hiawatha 69-138-kV transformer (reverse flow limitation)	96%		Straits 138/69-kV transformer outage	Load Serving
2	North Lake-M38 138-kV line	98%		M38-Perch Lake 138-kV line outage	Load Serving
2	Atlantic, Stone Container, Ontonagon, Winona, M38 and Indian Lake 138-kV buses and L'Anse and M38 69-kV bus voltages		91-95%	Base Case	Load Serving
2	Atlantic, L'Anse, Keweenaw, Keweenaw Tap, MTU, Osceola, Henry St, Henry St Tap, M38, Elevation #2, 1 Elevation Tap #2, Elevation #1, Elevation Tap #1, Portage, Portage Tap, Ontonagon, Twin Lakes, UPSCO, Winona, Lake Mine, Mass, Rockland Junction, Rockland, Victoria, Bruce Crossing, Toll Free, White Pine Village and White Pine Mine 69-kV buses and Atlantic, Stone Container, Ontonagon, Winona and M38 138-kV bus voltages		74-92%	M38-Perch Lake 138-kV line outage	Load Serving
2	Keweenaw, Keweenaw Tap, MTU, Osceola, Henry St, Henry St Tap, Elevation #2, 1 Elevation Tap #2, Elevation #1, Elevation Tap #1, Portage, Atlantic, Portage Tap, L'Anse, M38 and Twin Lakes 69-kV buses and Stone Container, Ontonagon, Winona and M38 138-kV bus voltages		77-91%	Atlantic-M 38 138-kV line outage	Load Serving
2	Keweenaw, Keweenaw Tap, MTU, Osceola, Henry St, Henry St Tap, Elevation #2, Elevation Tap #2, Elevation #1, Elevation Tap #1, Portage, Atlantic, Portage Tap, L'Anse, M38 and Twin Lakes 69-kV buses and Stone Container, Ontonagon, Winona and M38 138-kV bus voltages		77-92%	Atlantic 138/69-kV transformer outage	Load Serving
2	L'Anse, M38, Keweenaw, Keweenaw Tap, MTU, Osceola, Henry St and Henry St Tap 69-kV buses and Atlantic, Stone Container, Ontonagon, Winona and M38 138-kV bus voltages		80-92%	M38 138/69-kV transformer outage	Load Serving
2	Sawyer, Gwinn, Chatham, Forest Lake, Seney Tap, Timber Products, Alger 69-kV buses and Munising 69 and 138-kV bus voltages		80-92%	Forsyth-Gwinn 69-kV line outage	Load Serving
2	Stone Container and Ontonagon 138-kV bus voltages		87-91%	Ontonagon-UPSCO Tap 138-kV line outage, Victoria-Rockland Junction 69-kV line outage, Rockland Junction-UPSCO Tap 69-kV line outage, Winona-Ontonagon 138-kV line outage	Load Serving
2	Stone Container, Ontonagon and Winona 138-kV buses and Ontonagon 69-kV bus voltages		87-92%	Winona-M38 138-kV line outage	Load Serving
2	Seney Tap, Timber Products, Munising and Alger 69-kV bus voltages		87-91%	Forsyth-Munising 138-kV line outage	Load Serving
2	Newberry Village, Louis Pacific, Newberry, Newberry Hospital, Roberts and Hulbert		89-92%	Engadine-Newberry 69-kV line outage, Hiawatha-Engadine 69-kV line outage	Load Serving

TABLE ZS-2 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
2	Seney Tap, Timber Products, Alger and Munising 69-kV bus voltages		89-91%	Munising 138/69-kV transformer outage	Load Serving
2	Keweenaw, Keweenaw Tap, Elevation #1, Elevation Tap #1 and Osceola 69-kV bus voltages		90-91%	Atlantic-Elevation Tap #1 69-kV line outage	Load Serving
2	Atlantic, Stone Container, Winona, Ontonagon and M38 138-kV buses and L'Anse and M38 69-kV bus voltages		89-92%	Presque Isle-Perch Lake 138-kV line outage	Load Serving
2	Brevort, Lakehead and Hiawatha 138-kV bus voltages		91%	Straits-Brevort 138-kV line outage	Load Serving
2	L'Anse 69-kV bus voltage		90%	Atlantic-M38 69-kV line outage	Load Serving
2	Newberry Village, Louis Pacific, Newberry Hospital and Roberts 69-kV bus voltages		91-92%	Newberry-Newberry Tap 69-kV line outage	Load Serving
2	Lakehead and Hiawatha 138-kV bus voltages		91%	Brevort-Lakehead 138-kV line outage	Load Serving
2	L'Anse, M38, Keweenaw, Keweenaw Tap, MTU and Osceola 69-kV buses and Atlantic, Stone Container, Ontonagon, Winona and M38 138-kV bus voltages		87-92%	Northlake-M38 138-kV line outage	Load Serving
2	Land O Lakes 69-kV bus voltage		92%	Conover-Land O Lakes 69-kV line outage	Load Serving
3	Richland Center 69-kV bus voltage		94.5%	Base case	Load Serving
3	North Monroe Transformer	97-100%		Darlington-Gratiot 69-kV line outage, Paddock-Brodhead Switching Station 69-kV line outage and Darlington 138/69-kV transformer	Load Serving
3	Brodhead Switching Station-South Monroe 69-kV line	100-105%		North Monroe-South Monroe 69-kV line outage and North Monroe 138/69-kV transformer	Load Serving
3	Paddock-Brodhead Switching Station 69-kV line	100-112%		Albany-Townline Road 138-kV, Rockdale-Wempletown 345-kV, North Monroe-South Monroe 69-kV, McCue-LaMar 69-kV line outages and North Monroe 138/69-kV transformer	Load Serving
3	Monroe, South Monroe, Idle Hour, Browntown and Blacksmith 69-kV bus voltages		88-91%	North Monroe-Idle Hour Tap 69-kV line outage	Load Serving
3	Brodhead Muni 69-kV bus voltages		91%	Brodhead Switching Station-Brodhead Muni 69-kV line outage	Load Serving
3	Evansville, RCEC Center 69-kV bus voltages		91%	Evansville-Sheepskin 69-kV line outage	Load Serving
3	Colley Road-Brick Church 69-kV line	95-116%		Brick Church 138/69-kV transformer outage	Load Serving
3	Colley Road 138/69-kV transformer	101%		Northwest Beloit-Shirland Ave 69-kV line outage	Load Serving
3	Northwest Beloit-Shaw 69-kV line	101-108%		Colley Road 138/69-kV transformer outage	Load Serving
3	Brick Church 138/69-kV transformer	104%		North Lake Geneva 138/69-kV transformer outage	Load Serving
3	McCue 138/69-kV transformer	106%		Janesville 138/69-kV transformer outage	Load Serving
3	McCue-Milton Lawns 69-kV line	97%		Janesville 138/69-kV transformer outage	Load Serving
3	Lancaster 69-kV bus, Eden, Spring Green, Troy, Lancaster, Wyoming Valley 138-kV bus voltages		80-91%	Nelson Dewey-Lancaster 138-kV line outage	Load Serving

TABLE ZS-2 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	Pine River, Richland Center, Lone Rock 69-kV bus voltages		80-92%	Lone Rock-Richland Center 69-kV line segment outages, Lone Rock Phase Shifter, Spring Green-Lone Rock 69-kV line outage	Load Serving
3	Boscobel, Blue River, Muscoda, Avoca 69-kV bus voltages		87-92%	Spring Green 138/69-kV transformer outage, Spring Green-Lone Rock and Lone Rock-Avoca 69-kV line outages	Load Serving
3	Colorado-Sun Prairie South 69-kV line	105%		Reiner Road-Burke Tap 69-kV line outage and Reiner 138/69-kV transformer outage	Load Serving
3	Burke 69-kV bus voltage		90%	Reiner Road-Burke Tap 69-kV line outage and Reiner 138/69-kV transformer outage	Load Serving
3	Columbia 138/69-kV transformer	98-107%		North Madison-De Forest 69-kV line outage, Portage 138/69-kV transformer outage	Load Serving
3	Lodi and Okee 69-kV bus voltages		92%	Dane-Lodi Tap 69-kV line outage	Load Serving
3	Pheasant Branch-Westport, West Port-Waunakee 69-kV lines	96-126%		North Madison-Sycamore 138-kV, North Madison-West Middleton 138-kV, West Middleton-Pheasant Branch 69-kV, Waunakee-Ruskin 69-kV line segment outages	Load Serving
3	Blount-Ruskin 69-kV lines	97%		Waunakee-Waunakee Tap 69-kV line outage	Load Serving
3	Fitchburg-South Nine Springs 69-kV line	108%		Royster-Pflaum Tap 69-kV line outage	Load Serving
3	Nine Springs, LCI, Pflaum 69-kV bus voltages		91%	Royster-Pflaum Tap 69-kV line outage	Load Serving
3	Platte, Finnegan, Reedsburg, Kilbourn, Lewiston and Loganville 69-kV buses; Dell Creek, East Wisconsin Dells, Artesian, Zobel, Nishan, Birchwood, Lewiston and Kilbourn 138-kV bus voltages		89-92%	Kilbourn-Trienda 138-kV line segment outages	Load Serving
3	Hillman-Belmont and Darlington-Rock Branch 69-kV line	102-135%		Nelson Dewey-Eden 138-kV line segment outages	Load Serving
3	Columbia 345/138-kV 200 MVA transformers	107%		Columbia 345/138-kV 200 MVA transformer outage	Load Serving
3	Fox Lake, North Beaver Dam and East Beaver Dam 138-kV buses; Alto, Third Street, North Beaver Dam and North Fox Lake 69-kV bus voltages		90-92%	North Randolph-North Beaver Dam 138-kV line outage	Load Serving
3	North Beaver Dam-Waupun 69-kV line	105-120%		Alto Tap-Koch Tap 69-kV line outage	Load Serving
3	Royster-Sycamore 69-kV line	95%		Femrite 138/69-kV transformer outage	Load Serving
4	Canal 138/69-kV transformer #1	99%		Canal 138/69-kV transformer #2 outage	Load Serving
4	Canal 138/69-kV transformer #2	98%		Canal 138/69-kV transformer #1 outage	Load Serving
4	Crivitz-High Falls 69-kV line	99%		Pioneer-Sandstone 69-kV line outage	Load Serving
4	Pioneer-Sandstone 69-kV line	103%		Crivitz-High Falls 69-kV line outage	Load Serving
4	Sunset Point-Pearl Avenue 69-kV line	106%		Ellinwood-Twelfth Ave 69-kV line outage	Load Serving
4	Melissa-Tayco 138-kV line	102%		Butte Des Mortes bus tie outage	Load Serving
4	Kaukauna Central Tap-Melissa 138-kV line	95%		Butte Des Mortes bus tie outage	Load Serving

TABLE ZS-2 (continued)
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2010

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
4	West Marinette 138/69-kV transformer #1	105-108%		Wells St-Roosevelt Rd 69-kV line outage Roosevelt 138/69-kV transformer outage	Load Serving
4	West Marinette 138/69-kV transformer #2	95- 98%		Wells St-Roosevelt Rd 69-kV line outage Roosevelt 138/69-kV transformer outage	Load Serving
4	Roosevelt Road 138/69-kV transformer	95%		W. Marinette 138/69-kV transformer #2 outage	Load Serving
4	Ellinwood 138/69-kV transformer #1	103%		Fitzgerald-Sunset Point 138-kV line outage	Load Serving
4	Northgate-20th Street 138-kV line	97%		Edgewater-Huebner 138-kV line outage	Load Serving
4	Egg Harbor 69-kV bus voltage		95%	Base Case	Load Serving
4	Sister Bay 69-kV bus voltage		90-93%	Base Case Canal-Dunn Rd 69-kV line outage First Ave-Sawyer 69-kV line outage	Load Serving
4	Canal 138-kV bus voltage		91%	Canal-East Krok 138-kV line outage	Load Serving
5	Bain transformer #5	99 – 162%		Splitting Pleasant Prairie 345-kV bus between bus sections 2 and 3 or 3 and 4	Load Serving
5	Bain – Kenosha 138-kV line	107-120%		Various contingencies	Load Serving
5	Albers – Bain 138-kV line	100%		Bain – Kenosha 138-kV line outage	Load Serving
5	Oak Creek 230-kV bus tie 59	94–113%		Various contingencies	Load Serving
5	Oak Creek 230-138-kV transformer	94-121%		Various contingencies	Load Serving
5	Harbor–Ramsey 138-kV line	93–110%		Various contingencies	Load Serving
5	Bluemound–Brookdale 138-kV line	99%		Bluemound – 96th St line outage	Load Serving
5	Racine–Oak Creek 345-kV line	101 %		Arcadian – Oak Creek 345-kV line outage	Load Serving
5	Oak Creek–Pennsylvania 138-kV line	93-101%		Various contingencies	Load Serving
5	Oak Creek–Ramsey 138-kV line	93-109%		Various contingencies	Load Serving
5	Allerton–Oak Creek 138-kV line	95%		Oak Creek – Pennsylvania 138-kV line outage	Load Serving

TABLE ZS-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2014

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
1	Bunker Hill-Blackbrook 115-kV line	103%		Gardner Park-Blackbrook 115-kV line outage	Load Serving
1	Antigo and Aurora St. 115-kV bus voltages		90 -92%	Gardner Park-Blackbrook 115-kV line outage Gardner Park-Blackbrook-Antigo 115-kV line outage	Load Serving
1	Gardner Park-Blackbrook 115-kV line	101 - 102%		Maine-Pine 115-kV line outage Maine-Hilltop 115-kV line outage	Load Serving
1	Rocky Run-Plover 115-kV line	99%		Rocky Run-Whiting Ave. 115-kV line outage	Load Serving
1	Hollywood-Port Edwards 138-kV line	98 – 105%		Sigel-Arpin 138-kV line outage Arpin 345/138-kV transformer outage	Load Serving
1	Hollywood-Saratoga 138-kV line	101 - 108%		Sigel-Arpin 138-kV line outage Arpin 345/138-kV transformer outage	Load Serving
1	Sigel, Lakehead Vesper & Port Edwards 138-kV bus voltages		89 – 90%	Arpin-Sigel 138-kV line outage	Load Serving
1	Port Edwards, Hollywood & Saratoga 138-kV bus voltages		90 – 91%	Arpin-Sigel 138-kV line outage	Load Serving
1	Council Creek 138/69-kV transformer	103 – 105%		King-Eau Claire-Arpin 345-kV line outages Eau Claire-Arpin 345-kV line outage	Network
1	Hilltop, Mauston, Lyndon Station, Wisconsin Dells and Kilbourn 69-kV bus voltages		84 – 91%	Kilbourn-Wisconsin Dells #2 69-kV line outage	Load Serving
1	Necedah, Whistling Wings, Dellwood, Friendship, Houghton Rock 69-kV bus voltages		87 – 92%	Big Pond-Necedah tap 69-kV line outage Necedah tap-Whistling Wings tap 69-kV line outage	Load Serving
1	Wautoma, Sand Lake and Roeder 138-kV bus voltages		90 – 95%	Base Case Various contingencies	Load Serving
1	Metomen 138/69-kV transformer	95 – 115%		Various contingencies	Load Serving
1	Metomen-Ripon 69-kV line	95 – 111%		Various contingencies	Load Serving
1	Winneconne-Sunset 69-kV line	99%		Ripon-NW Ripon Tap 69-kV line outage	Load Serving
1	Berlin area 69-kV bus voltages		88 – 92%	Various contingencies	Load Serving
1	Whitcomb 115/69-kV transformer	95 – 96%		Gardner Park-Blackbrook 115-kV line outage Gardner Park-Blackbrook-Antigo 115-kV line outage	Load Serving
1	Coloma and Coloma Tap 69-kV bus voltages		91 – 92%	Chaffee Creek-Coloma 69-kV line outage	Load Serving
2	Atlantic 138/69-kV transformer	134-98%		M38 138/69-kV transformer outage M38-Winona 138-kV line outage Winona-Twin Lakes 69-kV line outage Atlantic-M38 69-kV line outage Atlantic-Portage Tap 69-kV line outage Portage Tap-Twin Lakes 69-kV line outage	Load Serving
2	M38 138/69-kV transformer	108%		Atlantic 138/69-kV transformer outage Atlantic-M38 138-kV line outage	Load Serving
2	Atlantic-Henry Street 69-kV line	95%		Base case	Base Case
2	Hiawatha, Lakehead, Brevort and Straits 138-kV bus voltages		92%	Livingston-Emmit Co 138-kV line outage	Load Serving
2	Atlantic 138-kV bus voltage		91-92%	M38-Perch Lake 138-kV line outage	Load Serving
2	Newberry Village 69-kV bus voltage		92%	Engadine-Newberry 69-kV line outage	Load Serving
2	Seney Tap 69-kV bus voltage		92%	Munising 138/69-kV transformer outage Forsyth-Munising 138-kV line outage	Load Serving
2	Brevort 138-kV bus voltage		92%	Straits-Brevort 138-kV line outage	Load Serving

TABLE ZS-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2014 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	Oregon-Stoughton 69-kV line	97-107%		Sugar River (Montrose)-Verona 69-kV line outage	Load Serving
3	Stagecoach-Timberlane Tap 69-kV line	97%		Sugar River-Verona 69-kV line and Spring Green 138/69-kV transformer outage	Load Serving
3	North Stoughton-Kegonsa 69-kV line	100-114%		Sugar River-Verona, McCue-Karmony, Stoughton-Sheepskin 69-kV line outages	Load Serving
3	Verona, Aaker Road, Brooklyn, North Stoughton, Oregon 69-kV bus voltages		87-91%	Sugar River-Verona, Stoughton-Aaker Road, Kegonsa-North Stoughton 69-kV line and Sugar River 138/69-kV transformer outages	Load Serving
3	Sugar River-Verona 69-kV line	96-124%		West Middleton-Timberlane Tap and Stoughton-Aaker Road 69-kV line outages	Load Serving
3	North Monroe-Idle Hour 69-kV line	96-109%		Darlington 138/69-kV transformer, Brodhead-South Monroe 69-kV line outages	Load Serving
3	Hooterville 69-kV bus voltage		91%	Eden 138/69-kV transformer outage	Load Serving
3	Darlington-Rock Branch 69-kV line	116%		Eden 138/69-kV transformer outage	Load Serving
3	Brodhead Switching Station-South Monroe 69-kV line	98 - 127%		North Monroe-South Monroe 69-kV line and North Monroe-Albany 138-kV line outages	Load Serving
3	Bird Tap-Sun Prairie 69-kV line	98 - 104%		Reiner Road-Burke Tap 69-kV line and Reiner Road 138/69-kV transformer outages	Load Serving
3	Burke 69-kV bus voltage		89%	Reiner Road 138/69-kV transformer outage	Load Serving
3	Token Creek-Yahara River 69-kV line	126%		Reiner Road 138/69-kV transformer outage	Load Serving
3	Colley Road-Park Street Tap 69-kV line	100%		Northwest Beloit-Shirland Ave 69-kV line outage	Load Serving
3	Kilbourn 47 MVA 138/69-kV transformer	98%		Kilbourn 100 MVA transformer outage	Load Serving
3	Colley Road 138/69-kV transformer	98%		Northwest Beloit-Shirland Ave 69-kV line outage	Load Serving
3	Northwest Beloit-Shaw 69-kV line	101 - 108%		Colley Road 138/69-kV transformer outage	Load Serving
3	Academy-Fall River 69-kV line	101%		Columbia-Manley Sands 69-kV line outage	Load Serving
3	Columbia 138/69-kV transformer	100%		Portage 138/69-kV transformer outage	Load Serving
3	Portage 138/69-kV transformer	102%		Columbia 138/69-kV transformer outage	Load Serving
3	North Beaver Dam-Waupun 69-kV line	96 - 118%		South Fond du Lac-Waupun 69-kV line segment outage	Load Serving
3	Hillman-Potosi 138-kV line	96%		Nelson Dewey-Lancaster 138-kV line outage	Load Serving
3	Stagecoach-Black Earth 69-kV line	102%		Eden-Wyoming Valley 138-kV line outage	Load Serving
3	Portage-Trienda 138-kV circuits	112%		adjacent Portage-Trienda 138-kV circuit outage	Load Serving
3	Columbia-Portage 138-kV circuits	100%		adjacent Columbia-Portage 138-kV circuit outage	Load Serving
3	Columbia 345/138-kV 200 MVA transformers	99%		Columbia 345/138-kV 400 MVA transformer outage	Load Serving
3	North Fox Lake, Alto, Waupun, Koch Oil 69-kV bus voltages		90 - 92%	South Fond Du Lac-North Beaver Dam 69-kV line segment outage	Load Serving

TABLE ZS-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2014 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	Columbia-North Madison 345-kV Circuit #1	102%		adjacent Columbia-North Madison 345-kV circuit outage	Load Serving
3	Lodi and Okee 69-kV bus voltages		91%	Dane-Lodi Tap 69-kV line outage	Load Serving
3	Royster-Sycamore 69-kV line	95%		Femrite 138/69-kV transformer outage	Load Serving
3	Platte, Finnegan, Reedsburg, Kilbourn, Lewiston and Loganville 69-kV buses; Dell Creek, East Wisconsin Dells, Artesian, Zobel, Nishan, Birchwood, Lewiston and Kilbourn 138-kV buses		92%	Kilbourn-Trienda 138-kV line segment outage	Load Serving
3	Pine River, Richland Center, Lone Rock 69-kV buses		87 - 90%	Lone Rock-Richland Center, Richland Center-Dayton, Lone Rock Phase Shifter outage	Load Serving
3	Brick Church-Katzenberg 69-kV line	98 - 122%		North Lake Geneva-South Lake Geneva 69-kV line, North Lake Geneva 138/69-kV transformer outages	Load Serving
3	Brick Church-North Lake Geneva 69-kV line	98 - 110%		North Lake Geneva and Brick Church 138/69-kV transformer outages	Load Serving
3	North Lake Geneva 138/69-kV transformer	105%		Brick Church 138/69-kV transformer outage	Load Serving
3	McCue 138/69-kV transformer	102%		Janesville 138/69-kV transformer outage	Load Serving
3	McCue-Milton Lawns 69-kV line	116%		Janesville 138/69-kV transformer outage	Load Serving
3	Janesville 138/69-kV transformer	97%		McCue 138/69-kV transformer outage	Load Serving
3	Janesville-Park View 69-kV line	103%		McCue 138/69-kV transformer outage	Load Serving
3	Spring Green, Arena, Mazomanie bus voltages		92%	Spring Green-Arena 69-kV line, the Spring Green 138/69-kV transformer outages	Load Serving
3	West Middleton-Black Earth 69-kV line	95 - 105%		Spring Green 138/69-kV transformer outage	Load Serving
4	Egg Harbor 69-kV bus voltage		91 - 93%	Base Case First Avenue-Sawyer 69-kV line outage Canal-Dunn Road 69-kV line outage Canal-East Krok 138-kV line outage	Load Serving
4	Sister Bay 69-kV bus voltage		88 - 91%	Base Case Various contingencies	Load Serving
4	Quarry Run, Woodenshoe 138-kV bus voltages		92%	Quarry Run-Neevin 138-kV line outage	Load Serving
4	Dyckesville, Ontario, Rosiere, Scottwood, 138-kV bus voltages		90 - 92%	Highway V-Ontario 138-kV line outage	Load Serving
4	Canal 138-kV bus voltage		89 - 91%	Highway V-Ontario 138-kV line outage Canal-East Krok 138-kV line outage	Load Serving
4	South Sheboygan Falls 138/69-kV transformer	102%		North Mullet River-Mullet River 69-kV line outage Mullet River 138/69-kV transformer outage	Load Serving
4	North Mullet River- Mullet River 69-kV line	100 - 120%		Northside Tap-Sheboygan Falls 69-kV line outage South Sheboygan Falls-Bemis Tap 69-kV line outage South Sheboygan Falls 138/69-kV transformer outage Monroe-Bemis Tap 69-kV line outage	Load Serving
4	Adams Street-Sheboygan Falls 69-kV line	106%		South Sheboygan Falls-Bemis Tap 69-kV line outage South Sheboygan Falls 138/69-kV transformer outage	Load Serving
4	Sheboygan-Edgewater 69-kV line	99%		South Sheboygan Falls-Edgewater 138-kV line outage	Load Serving

TABLE ZS-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2014 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
4	Edgewater 345/138-kV transformer #2	98%		Edgewater 345/138-kV #1 outage	Load Serving
4	Edgewater-Huebner 138-kV line	95%		Edgewater-Sauktrail 138-kV line outage	Load Serving
4	Edgewater-Sauktrail 138-kV line	96%		Edgewater-Huebner 138-kV line outage	Load Serving
4	Northgate-20th Street 138-kV line	106 - 119%		Edgewater-Huebner 138-kV line outage Lodestar-Huebner 138-kV line outage	Load Serving
4	Edgewater-Washington Street 69-kV line	109%		Edgewater-Nicolet 69-kV line outage	Load Serving
4	Washington Street-Riverside 69-kV line	109%		Edgewater-Nicolet 69-kV line outage	Load Serving
4	Edgewater-Nicolet 69-kV line	117%		Erdman-32nd St 69-kV line outage	Load Serving
4	Pulliam-Danz 69-kV line	97%		Pulliam-Van Buren 69-kV line outage	Load Serving
4	Canal-Dunn Road 69-kV line	101%		1st Avenue-Sawyer 69-kV line outage	Load Serving
4	1st Avenue-Dunn Road 69-kV line	106%		Canal-Dunn Road 69-kV line outage	Load Serving
4	Canal 138/69-kV transformer #2	111%		Canal 138/69-kV transformer #1 outage	Load Serving
4	Canal 138/69-kV transformer #1	111%		Canal 138/69-kV transformer #2 outage	Load Serving
4	Tecumseh 138/69-kV transformer	98%		Glenview-Gravesville 69-kV line outage	Load Serving
4	Glenview 138/69-kV transformer #1	96%		Glenview 138/69-kV transformer #2 outage	Load Serving
4	Glenview 138/69-kV transformer #2	96%		Glenview 138/69-kV transformer #1 outage	Load Serving
4	Sunset Point-Pearl Ave 69-kV line	108%		Ellinwood-Twelfth Avenue 69-kV line outage	Load Serving
4	Ellinwood 138/69-kV transformer #1	99 - 107%		Fitzgerald-Sunset Point 138-kV line outage Ellinwood 138/69-kV transformer #2 outage	Load Serving
4	Sunset Point 138/69-kV transformer #2	96%		Sunset Point 138/69-kV transformer #1 outage	Load Serving
4	Sunset Point 138/69-kV transformer #1	96%		Sunset Point 138/69-kV transformer #2 outage	Load Serving
4	Melissa-Tayco 138-kV line	100 - 120%		Butte Des Mortes 138-kV bus tie outage North Appleton-High Point 138-kV line outage Butte Des Mortes-High Point 138-kV line outage	Load Serving
4	Kaukauna Central Tap-Melissa 138-kV line	111%		Butte Des Mortes 138-kV bus tie outage	Load Serving
4	Butte Des Mortes 138-kV bus tie	96%		Fitzgerald 345/138-kV transformer outage	Load Serving
5	Albers – Kenosha 138-kV line	100%		Bain – Kenosha 138-kV line outage	Load Serving

Table ZS-4 Summary of Transmission Loading Relief Incidents - 2004					
Limiting Element	**Anticipated Element Outage**	**# of Level 3**	**# of Level 4**	**# of Level 5**	**Total Declarations at 3, 4 or 5***
Albers-Paris 138-kV	Wempletown-Paddock 345-kV	26	3		29
Arpin 345/138-kV transformer	Arpin-Rocky Run 345-kV	2			2
Badger-Caroline 115-kV	North Appleton-Rocky Run 345-kV		1		1
Butler-Granville 138-kV	Arcadian-Granville 345-kV	2	1		3
Butler-Granville 138-kV	Bluemound-Tosa 138-kV	1	3		4
Center-Fiebrantz 138-kV	Arcadian-Granville 345-kV		1		1
Columbia 345/138-kV transformer	Columbia-North Madison 345-kV		1		1
Eau Claire-Arpin 345-kV		10			10
Eau Claire-Arpin 345-kV	Wempletown-Paddock 345-kV	1			1
Ellinwood 138/69 kV transformer	Fitzgerald-Sunset Point 138-kV	4	4		8
Fitchburg-Wingra 69 kV	West Middleton-Blackhawk 69 kV		1		1
Fitzgerald-Sunset Point 138-kV	Edgewater-Saukville 345-kV	3	5		8
Fitzgerald 345/138-kV transformer	Edgewater-Saukville 345-kV	1			1
Highway V-Preble 138-kV	DePere-Glory Road 138-kV		2		2
Highway V-Preble 138-kV	Lost Dauphin-Red Maple 138-kV	9	20		29
Highway V-Preble 138-kV	North Appleton-Mason Street 138-kV		1		1
Highway V-Preble 138-kV	North Appleton-White Clay 138-kV		9		9
Kenosha-Albers 138-kV	Wempletown-Paddock 345-kV	2			2
Mukwonago-Merrill Hills 138-kV	Waukesha-Merrill Hills 138-kV		2		2
Mukwonago-Merrill Hills 138-kV	Rockdale-Lakehead Cambridge-Jefferson 138-kV		3		3
North Appleton-Rocky Run 345-kV		6			6
Oak Creek 345/230-kV transformer	Oak Creek banks T851/T895	2	22		24
Paddock 345/138-kV transformer	Paddock-Rockdale 345-kV	8			8
Paris-Burlington 138-kV	Wempletown-Paddock 345-kV	2			2
Pleasant Prairie-Racine 345-kV	Wempletown-Paddock 345-kV	5			5
Pulliam4-Stiles 138-kV	Pulliam5-Stiles 138-kV		2		2
Rhinelander area voltages			1		1
Rockdale 345/138-kV transformer #2	Rockdale 345/138-kV transformer #3	1			1
Rocky Run-Northpoint 115-kV	Weston-Rocky Run 345-kV	4	5		9
Rocky Run-Weston 115-kV	Weston-Rocky Run 345-kV	1	2		3

Table ZS-4 Summary of Transmission Loading Relief Incidents – 2004 (continued)					
Limiting Element	**Anticipated Element Outage**	**# of Level 3**	**# of Level 4**	**# of Level 5**	**Total Declarations at 3, 4 or 5***
Rocky Run-Weston 345-kV		2	5		7
Rosebush 138/69 kV transformer			1		1
Stiles-Amberg 138 & Stiles-Crivitz 138-kV	Morgan-Plains 345-kV	8	142	4	154
Stiles-Pioneer 138-kV	White Clay-Morgan 138-kV	6	13		19
Stiles-Pioneer 138-kV	North Appleton-White Clay 138-kV		7		7
Wempletown-Paddock 345-kV		4			4
White Clay-Morgan 138-kV	Stiles-Sherwood 138-kV		4		4
White Clay-Morgan 138-kV	Pulliam-Stiles 138-kV	3	19		22
Whitewater-Mukwonago 138-kV	Rockdale-Jefferson 138-kV		1		1

Note: * -Sum of number of declarations is based on determining the highest service limitation level for a given occurrence so that each is counted once

Level 3: non-firm transmission service curttailments

Level 4: transmission system reconfiguration/redispatch

Level 5: firm transmission service curttailments/redispatch

Table ZS-5 Summary of Transmission Loading Relief Incidents - 2003					
Limiting Element	**Anticipated Element Outage**	**# of Level 3**	**# of Level 4**	**# of Level 5**	**Total Declarations at 3, 4 or 5***
Albers-Paris 138-kV	Wempletown-Paddock 345-kV	52	13		65
Albers-Paris 138-kV	Pleasant Prairie-Racine 345-kV		3		3
Badger-Caroline 115-kV	North Appleton-Rocky Run 345-kV		2		2
Center-Cornell 138-kV	Arcadian-Granville 345-kV		1		1
Christiana-Kegonsa 138-kV	Christiana-Fitchburg 138-kV		2		2
DePere-Glory Road 138-kV	Kewaunee-East Krok 138-kV		4		4
Eau Claire-Arpin 345-kV		5			5
Fiebrantz-Center 138-kV	Arcadian-Granville 345-kV		1		1
Forest Junction-Kaukauna 138-kV	City Limits-Butte Des Morts 138-kV		1		1
Forest Junction-Rockland 138-kV	Kewaunee-East Krok 138-kV	1			1
Forest Junction-Rockland 138-kV	North Appleton-White Clay 138-kV	1			1
Granville-Swan 138-kV	Saukville 345/138-kV transformer		1		1
Green Lake-Roeder 138-kV	North Appleton-Rocky Run 345-kV	1			1
Highway V-Preble 138-kV	Lost Dauphin-Red Maple 138-kV	12	10		22
Highway V-Preble 138-kV	North Appleton-White Clay 138-kV	2	8		10
Kenosha-Albers 138-kV	Wempletown-Paddock 345-kV		1		1
Lost Dauphin-Highway V 138-kV	DePere-Glory Road 138-kV		1		1
Lost Dauphin-Red Maple 138-kV	Kewaunee-East Krok 138-kV		4		4
Manistique-Hiawatha 69 kV			7		7
Mukwonago-Merrill Hills 138-kV	Merrill Hills-Waukesha 138-kV	1			1
North Appleton-Rocky Run 345-kV		4			4
N. Appleton-White Clay 138-kV	Stiles-Pulliam 138-kV	4	4		8
North Lake Geneva-Sugar Creek 138-kV			1		1
Paddock 345/138-kV transformer		1			1
Paddock 345/138-kV transformer	Paddock-Rockdale 345-kV	38			38
Paddock-Townline 138-kV	Paddock-Rockdale 345-kV	3	1		4
Paris-Burlington 138-kV	Wempletown-Paddock 345-kV	1			1
Paris-St Martins 138-kV		1			1
Perch Lake-M38 138-kV	Cedar-M38 138-kV		1		1
Pleasant Prairie-Racine 345-kV	Wempletown-Paddock 345-kV	2			2
Pleasant Valley-St. Lawrence 138-kV	Jefferson-Lakehead 138-kV		1		1
Pulliam4-Stiles 138-kV	Pulliam5-Stiles 138-kV	1	1		2

Limiting Element	Anticipated Element Outage	# of Level 3	# of Level 4	# of Level 5	Total Declarations at 3, 4 or 5*
Rhinelander area voltages			27		27
Rockdale 345/138-kV transformer #2	Rockdale 345/138-kV transformer #3	7	7		14
Rockdale 345/138-kV transformer	Paddock 345/138-kV transformer	2	1		3
Rock River-Janesville 138-kV	Paddock-Rockdale 345-kV	2			2
Rocky Run-Northpoint 115-kV	Weston-Rocky Run 345-kV	6	17		23
Russell-Rockdale 138-kV	Paddock-Rockdale 345-kV	5	1		6
Stiles-Amberg 138 & Stiles-Crivitz 138-kV	Morgan-Plains 345-kV	1	148	4	153
Stiles4-Pulliam 138-kV	Stiles5-Pulliam 138-kV	1	11		12
Stiles-Pulliam 138-kV	Morgan White Clay 138		1		1
Stiles-Amberg 138-kV	Morgan-Plains 345-kV		1		1
Stiles-Pioneer 138-kV	Morgan-White Clay 138-kV	2	16		18
Stiles-Pioneer 138-kV	North Appleton-White Clay 138	8	12		20
Straits 138/69 kV transformer	Hiawatha-Straits 138-kV		1		1
Wempletown-Paddock 345-kV		2			2
White Clay-Morgan 138-kV	Pulliam-Stiles 138-kV		3	1	4
Weston-Kelly 115-kV		1			1

Table ZS-5 *Summary of Transmission Loading Relief Incidents – 2003 (continued)*

Note: * -Sum of number of declarations is based on determining the highest service limitation level for a given occurrence so that each is counted once

Level 3: non-firm transmission service curttailments

Level 4: transmission system reconfiguration/redispatch

Level 5: firm transmission service curttailments/redispatch

Table ZS-6 Summary of Transmission Loading Relief Incidents - 2002					
Limiting Element	**Anticipated Element Outage**	**# of Level 3**	**# of Level 4**	**# of Level 5**	**Total Declarations at 3, 4 or 5***
Albers-Paris 138-kV	Wempletown-Paddock 345-kV	24			24
Amberg-Plains 138-kV	Plains-Morgan 345-kV		1		1
Blackhawk-Colley Road 138-kV	Paddock-Rockdale 345-kV	5			5
Blackhawk-Colley Road 138-kV	Paddock-Rock River 138-kV	21	1		22
Butler-Granville 345-kV	Arcadian-Granville 345-kV	3			3
Christiana-Kegonsa 138-kV	Christiana-Fitchburg 138-kV	2	1		3
Eau Claire-Arpin 345-kV		54		4	58
Granville-Swan 138-kV	Saukville 345/138-kV transformer	1			1
Hillman-Darlington 138-kV	Wempletown-Paddock 345-kV	1			1
Janesville-Rock River 138-kV	Paddock-Rockdale 345-kV		1		1
Kewaunee 345/138-kV transformer	Kewaunee-North Appleton 345-kV	33	60		93
Kewaunee 345/138-kV transformer			2		2
Manistique-Hiawatha 69 kV			148		148
Mukwonago-St. Martins 138-kV	Wempletown-Paddock 345-kV	1			1
Mass-Bruce Crossing 69 kV	M38-Cedar 138-kV		1		1
N. Appleton-Lost Dauphin 138-kV	Kewaunee 345/138-kV transformer	28	37		65
N.Appleton 345/138 transformer #1	N. Appleton 345/138-kV transformer #2		2		2
N. Appleton 345/138-kV transformer #1	N. Appleton 345/138-kV transformer #3		1		1
N. Appleton-White Clay 138-kV	Stiles-Pulliam 138-kV	1			1
Nelson-Dewey transformer	Wempletown-Paddock 345-kV	1			1
Paddock 345/138-kV transformer	Paddock-Rockdale 345-kV	98			98
Paris-Burlington 138-kV	Wempletown-Paddock 345-kV	2			2
Paris-St Martins 138-kV			1		1
Pleasant Prairie-Racine 345-kV	Wempletown-Paddock 345-kV	2			2
Rhinelander area voltages	Aurora-Black Brook 115-kV		21		21
Rockdale 345/138-kV transformer	Paddock 345/138-kV transformer	8	2	1	11
Rock River-Janesville 138-kV	Paddock-Rockdale 345-kV	2			2
Rocky Run-Northpoint 115-kV	Weston-Rocky Run 345-kV	2	17		19
Rocky Run-Northpoint 115-kV	Rocky Run-N. Appleton 345-kV		1		1
Russell-Rockdale 138-kV	Paddock-Rockdale 345-kV	12	4		16
Russell-Rockdale 138-kV	King-Eau Claire-Arpin 345-kV		1		1

Table ZS-6 Summary of Transmission Loading Relief Incidents – 2002 (continued)					
Limiting Element	**Anticipated Element Outage**	**# of Level 3**	**# of Level 4**	**# of Level 5**	**Total Declarations at 3, 4 or 5***
Stiles-Amberg 138 and Stiles-Crivitz 138-kV	Morgan-Plains 345-kV	2	96		98
Stiles-Amberg 138-kV	Morgan-Plains 345-kV	1	10		11
Stiles-Pioneer 138-kV	N.Appleton-White Clay 138-kV	16	30		46
Whitewater-Mukwonago 138-kV	Cherry Valley-Silver Lake 345-kV		1		1
Whitewater-Mukwonago 138-kV	Rockdale-Jefferson 138-kV		2		2
Valley-Haymarket 138-kV	Granville-Arcadian 345-kV	1			1
W. Marinette-Menominee 69 kV	Pioneer-W. Marinette 138-kV		1		1
Weston-Kelly 115-kV			1		1
Weston-Rocky Run 115-kV	Weston-Rocky Run 345-kV	1	1		2

Note: * -Sum of number of declarations is based on determining the highest service limitation level for a given occurrence so that each is counted once

Level 3: non-firm transmission service curttailments

Level 4: transmission system reconfiguration/redispatch
Level 5: firm transmission service curttailments/redispatch

Table ZS-7 Summary of Transmission Loading Relief Incidents - 2001					
Limiting Element	**Anticipated Element Outage**	**# of Level 3**	**# of Level 4**	**# of Level 5**	**Total Declarations at 3, 4 or 5***
Albers - Paris 138-kV	Wempletown - Paddock 345-kV	20	1		21
Albers - Paris 138-kV		1			1
Blackhawk - Colley Road 138-kV	Paddock - Rock River 138-kV	8	1	3	12
Butler - Granville 345-kV	Arcadian - Granville 345-kV	1			1
Christiana - Kegonsa 138-kV	Christiana - Fitchburg 138-kV	1			1
Eau Claire - Arpin 345-kV		5	5		10
Ellington - Hintz 138-kV	North Appleton - Rocky Run 345-kV	1			1
Green Lake - Roeder 138-kV	North Appleton - Rocky Run 345-kV	1		8	9
Kewaunee 345/138-kV Transformer	Point Beach - North Appleton 345-kV			5	5
Kewaunee 345/138-kV Transformer		2			2
Manistique - Hiawatha 69kV		2	203		205
Mukwonago - Whitewater 138-kV	South Fond du Lac - Columbia 345-kV	1	1		2
North Appleton - Apple Hills 138-kV	North Appleton - Ellington 138-kV	1			1
North Appleton - Lost Dauphin 138-kV	Kewaunee 345/138-kV Transformer	35	5	6	46
North Appleton - Lost Dauphin 138-kV	North Appleton - White Clay 138-kV		2		2
North Appleton - White Clay 138-kV	Stiles - Pulliam 138-kV	1			1
North Appleton 345/138-kV Transformer #1	North Appleton 345/138-kV Transformer #3		2		2
Paddock - Blackhawk 138-kV	Paddock - Rock River 138-kV	4			4
Paddock 345/138kV Transformer	Paddock - Rockdale 345-kV	22			22
Pleasant Prairie - Racine 345kV	Wempletown - Paddock 345-kV	1			1
Rockdale 345/138-kV Transformer #1	Rockdale 345/138-kV Transformer #2	1			1
Rockdale 345/138-kV Transformer #2	Paddock 345/138-kV Transformer	1			1
Rockdale 345/138-kV Transformer #2	Rockdale 345/138-kV Transformer #1	1			1
Rocky Run - North Appleton 345-kV		6			6
Russell - Rockdale 138-kV	Paddock - Rockdale 345-kV	8			8
Stiles - Amberg 138-kV	Morgan - Plains 345-kV	14	67	4	85
Stiles - Pioneer 138-kV	North Appleton - White Clay 138-kV	7	2	1	10
Wempletown - Paddock 345kV		7			7

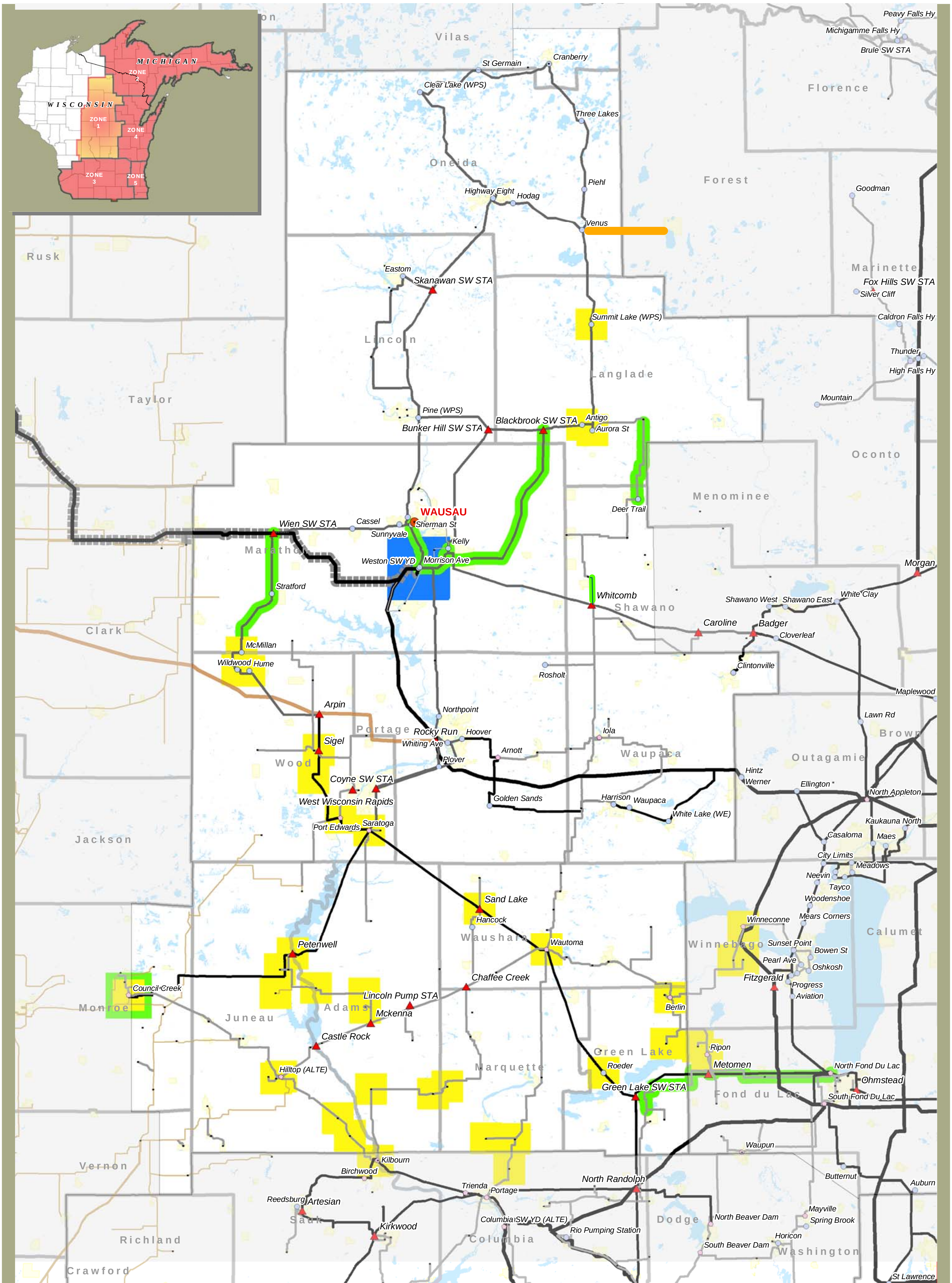
Note: * -Sum of number of declarations is based on determining the highest service limitation level for a given occurrence so that each is counted once

Level 3: non-firm transmission service curttailments

Level 4: transmission system reconfiguration/redispatch

Level 5: firm transmission service curttailments/redispatch

Figure ZS-1



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2005-2006

PLANNING ZONE 1

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

- Approximately 8900 miles of transmission lines
- 98 wholly owned substations
- 358 jointly owned substations
- Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth
Transmission Service Limiter

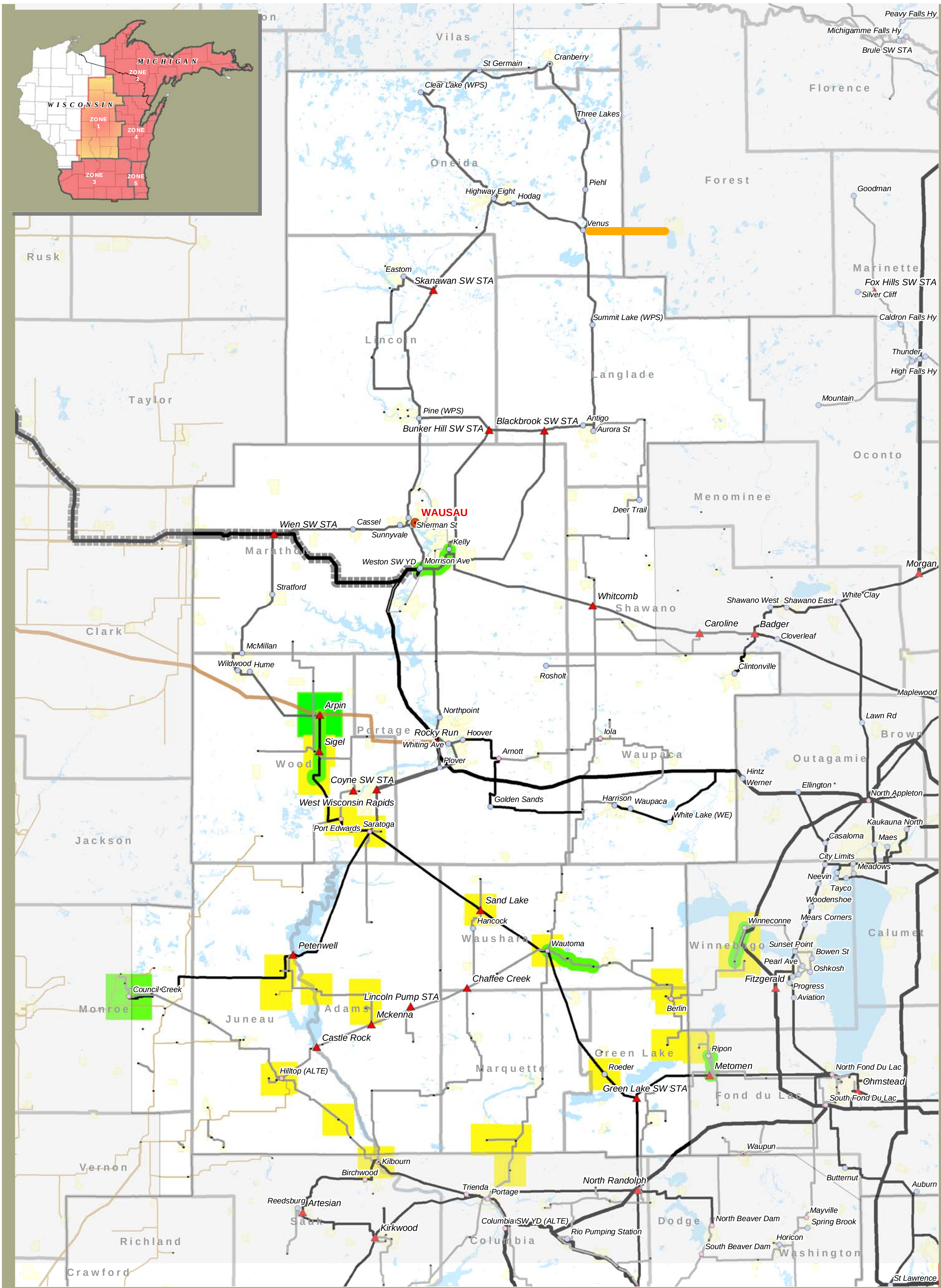
Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
Future Arrowhead-Gardner Park 345 kV line

ATC Office Location
Generation
Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Figure ZS-2



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2007-2010

PLANNING ZONE 1

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- 358 jointly owned substations
- Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth
Transmission Service Limiter

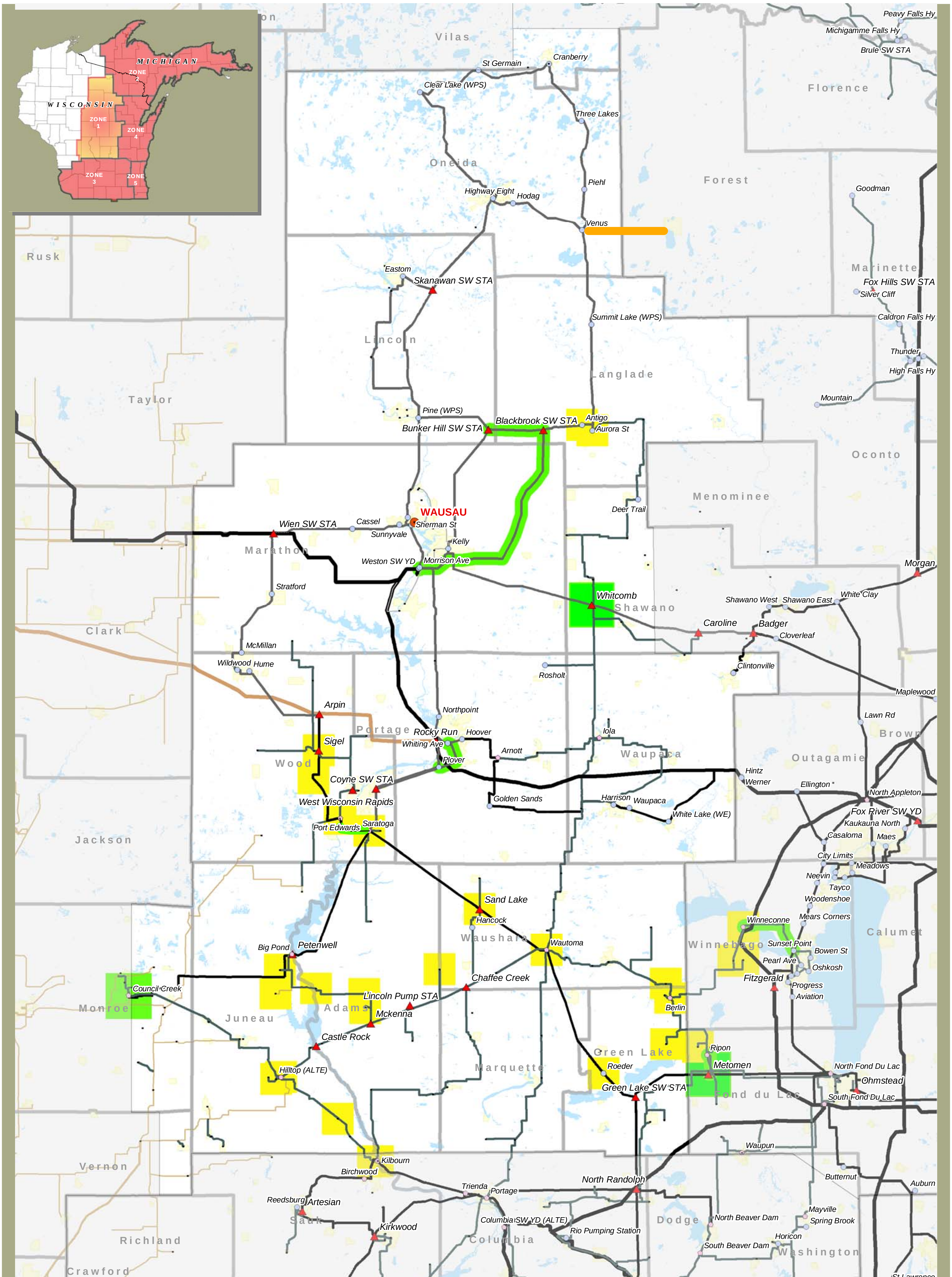
Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
Future Arrowhead-Gardner Park 345 kV line

ATC Office Location
Generation
Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Figure ZS-3



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2011-2014

PLANNING ZONE 1

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

* Approximately 8900 miles of transmission lines
* 98 wholly owned substations
* 358 jointly owned substations
* Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI

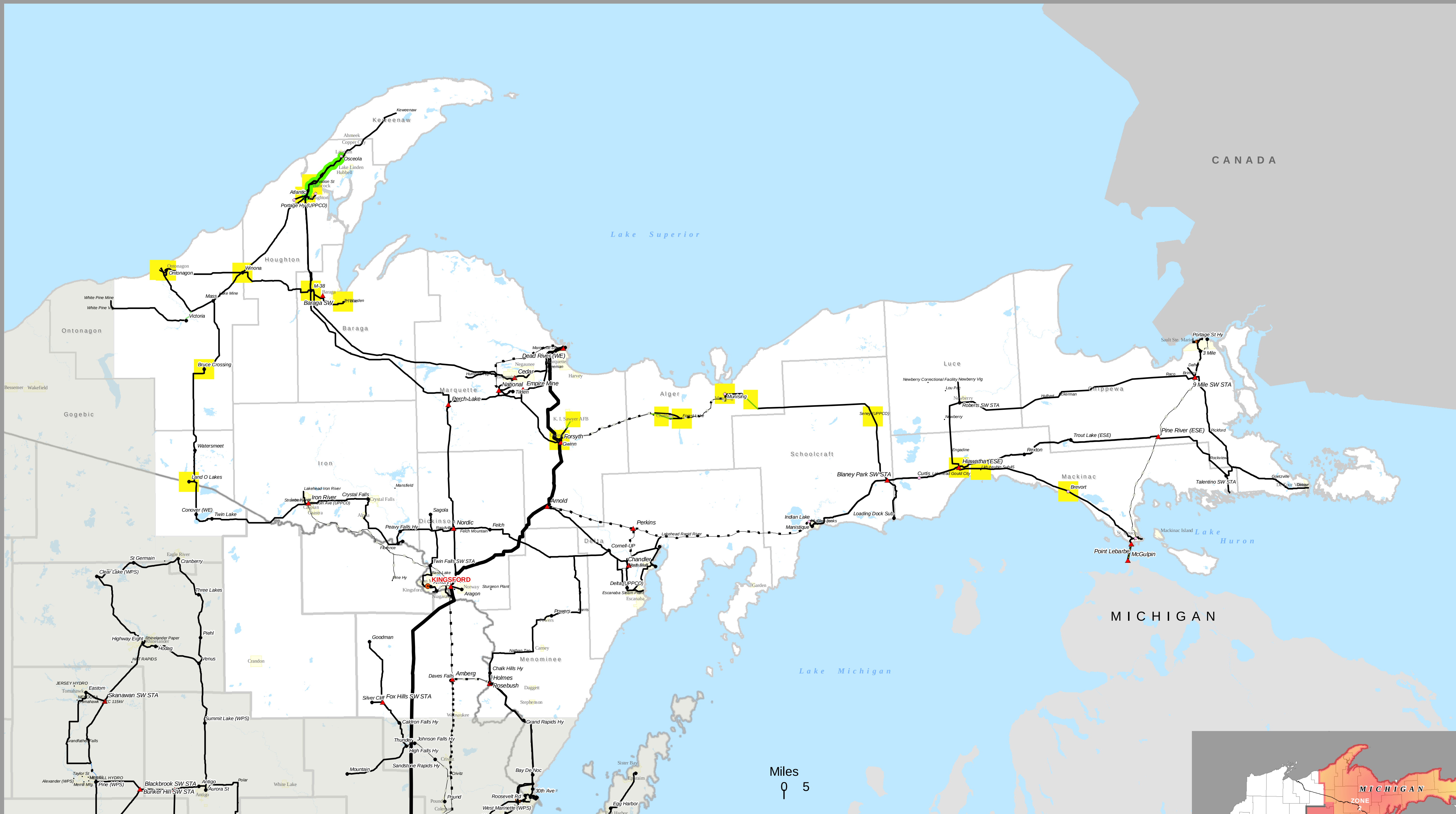
Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth

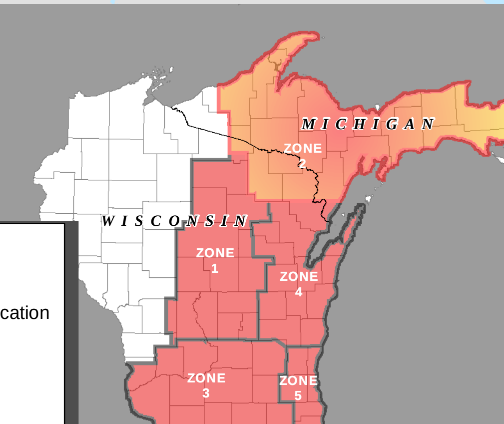
Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Figure ZS-4





AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2005-2006

PLANNING ZONE 2

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI*

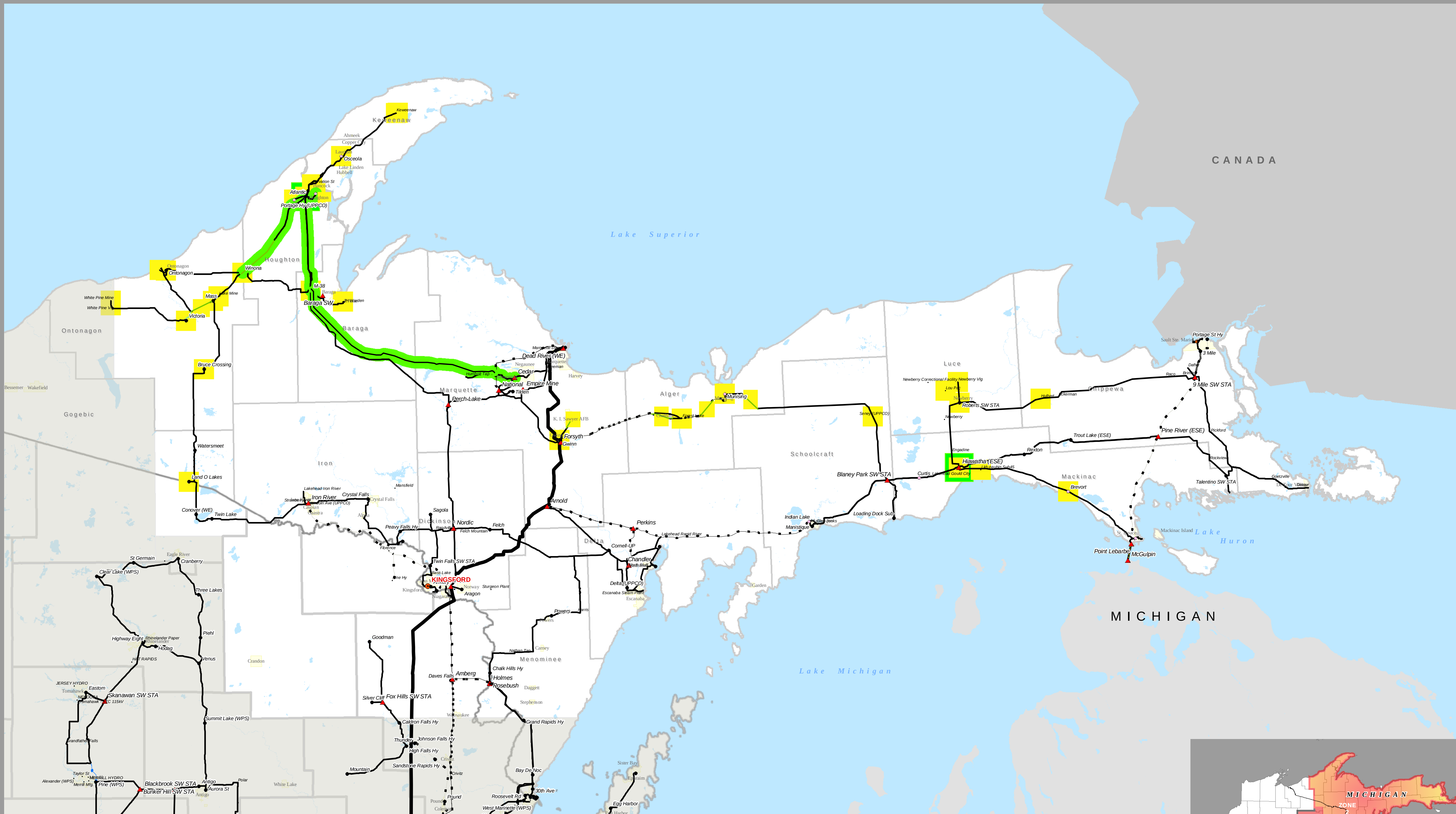
Low Voltages
Overloaded Facility
Transmission Service Limiter

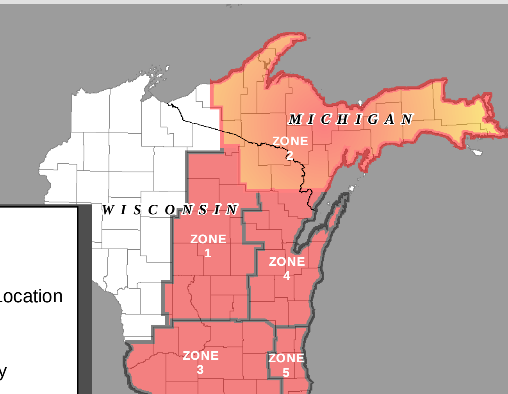
Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Figure ZS-5





AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2007-2010

PLANNING ZONE 2

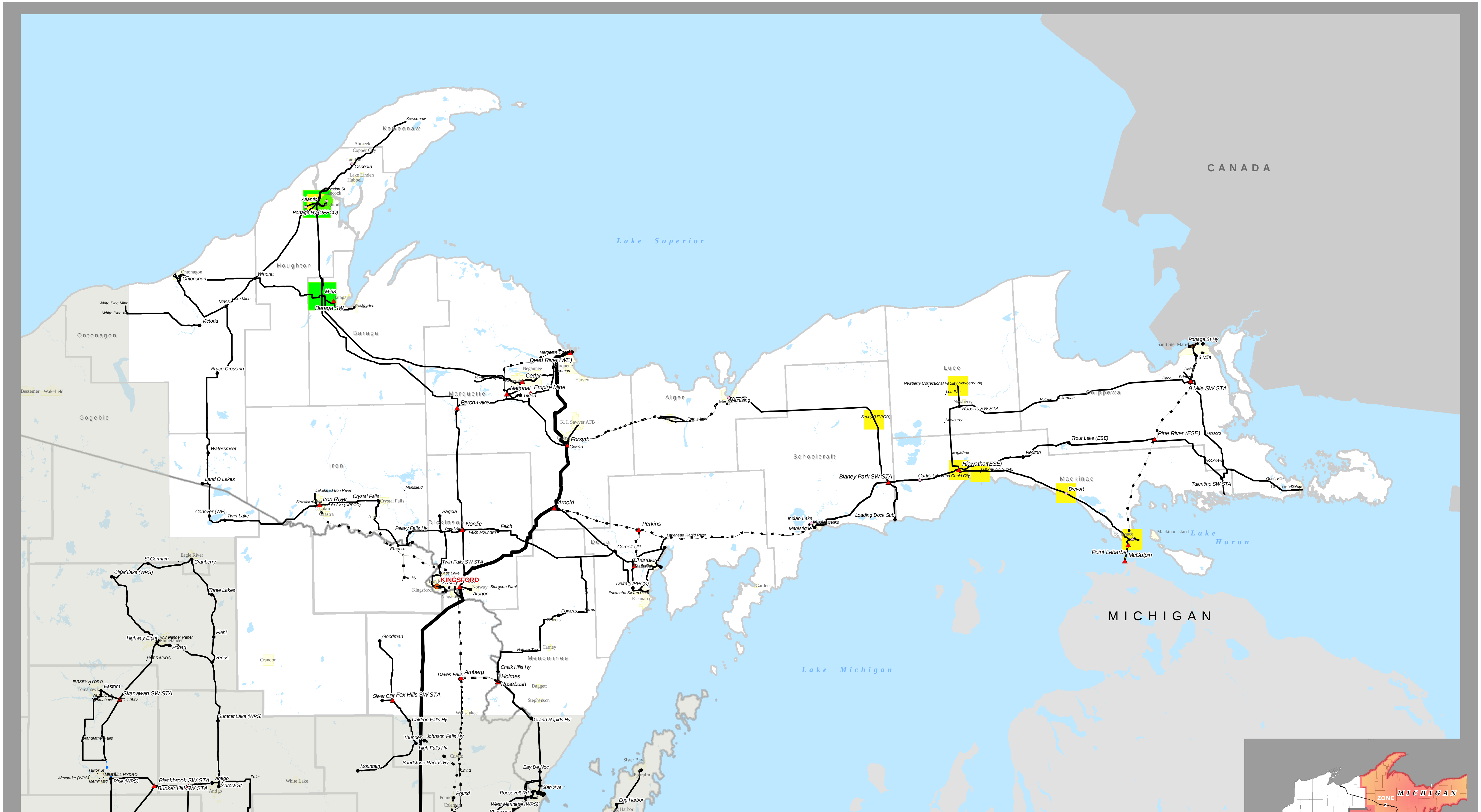
Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

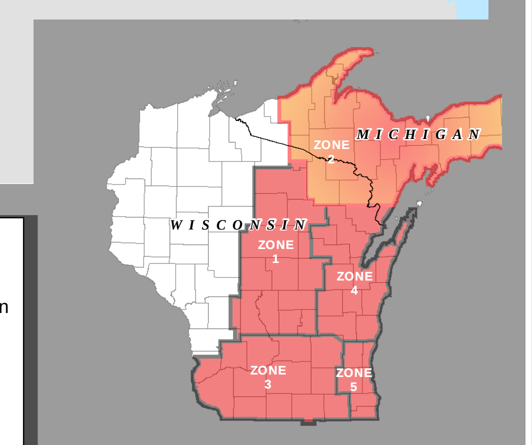
* Approximately 8900 miles of transmission lines
* 98 wholly owned substations
* 358 jointly owned substations
* ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

Low Voltages
Overloaded Facility

Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility





AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2011-2014

PLANNING ZONE 2

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties.
Facilities include:

* Approximately 8900 miles of transmission lines
* 98 wholly owned substations
* 358 jointly owned substations
* ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

Low Voltages
Overloaded Facility

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility

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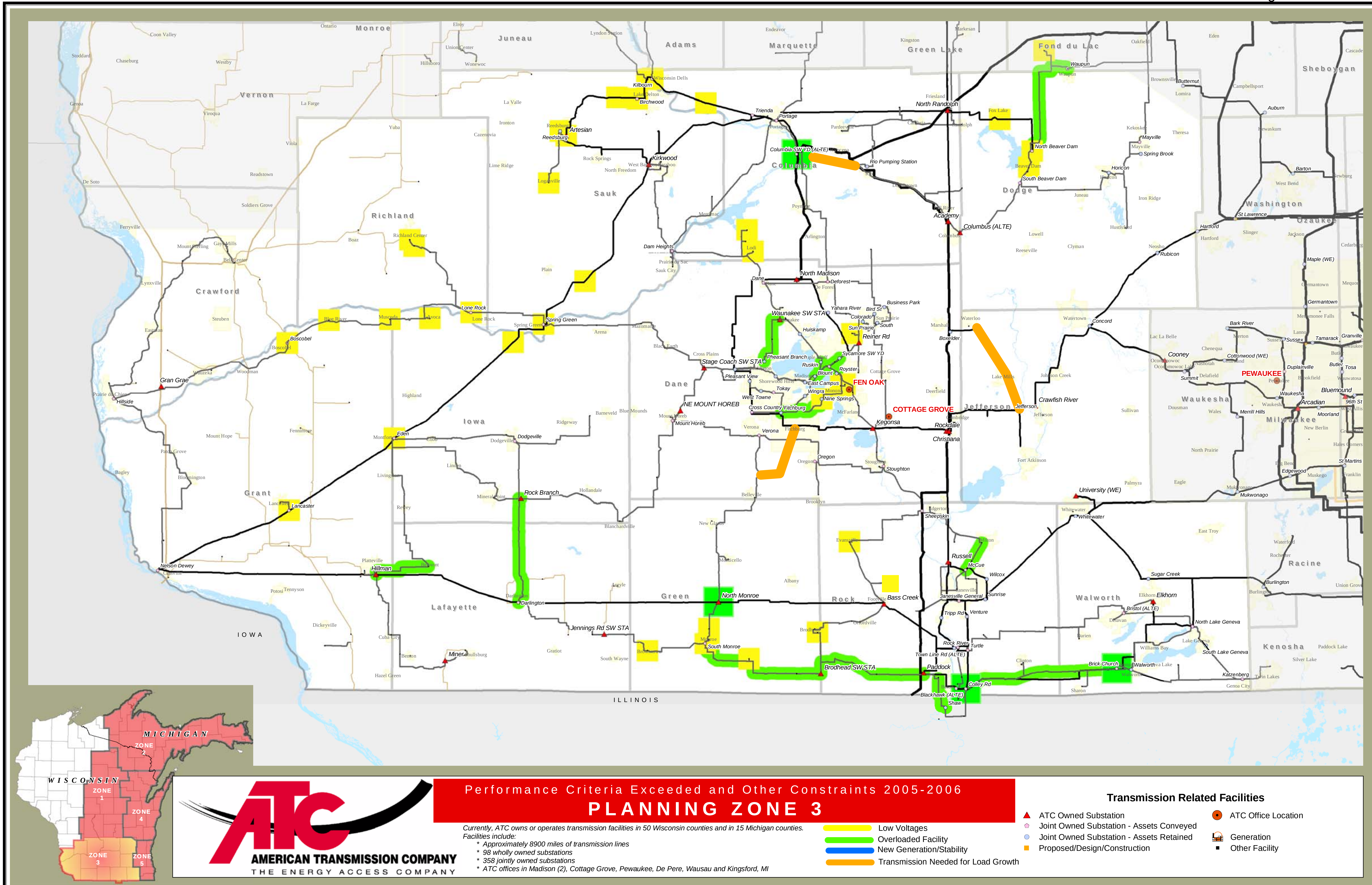
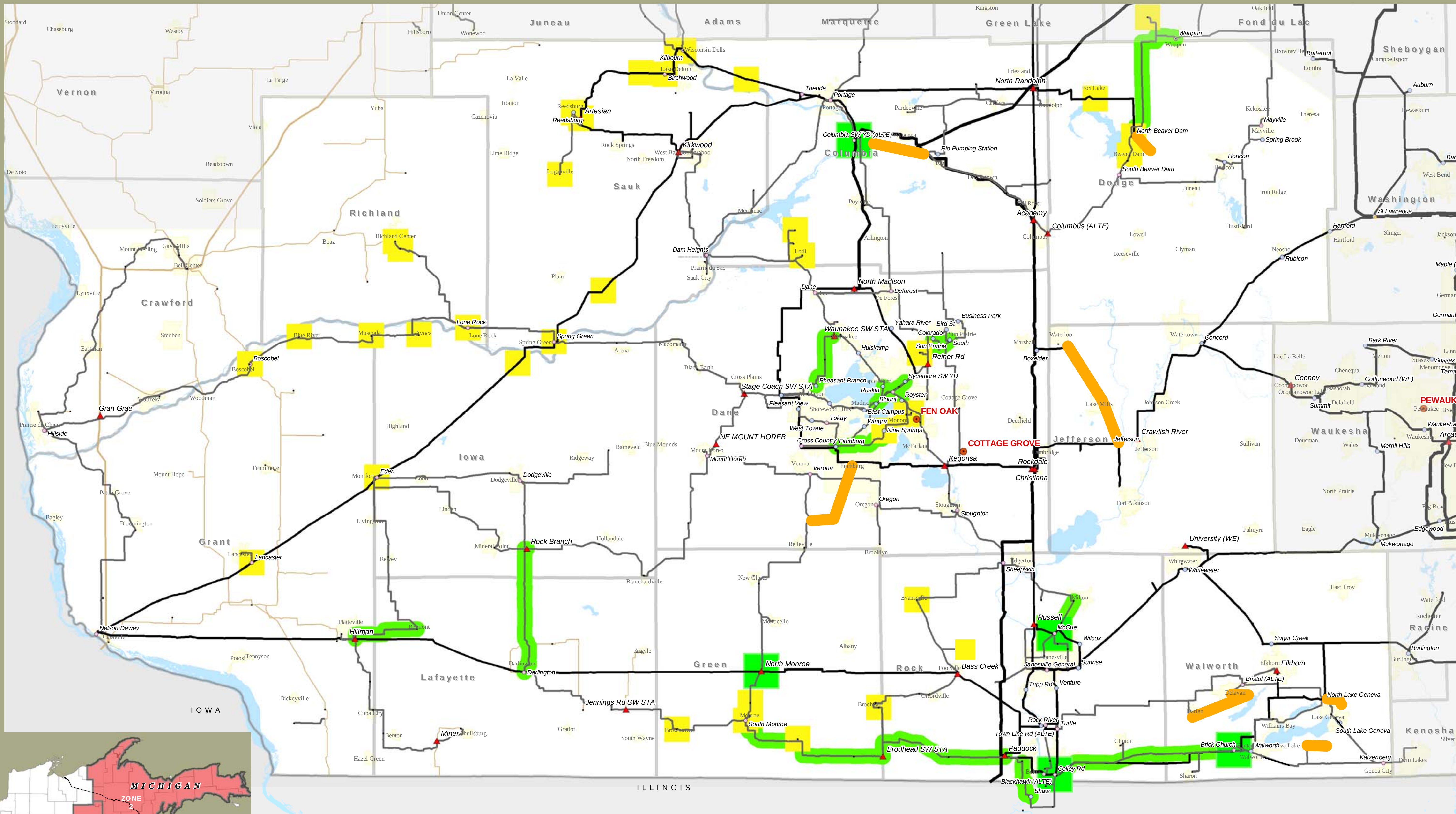
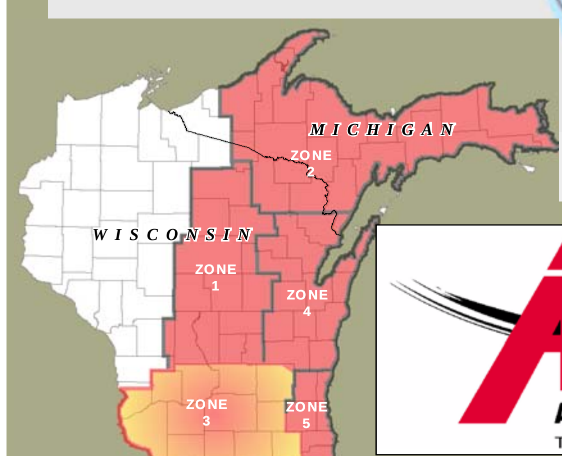
Figure ZS-7



Zone3 11x17.mxd Modified: Jul 18, 2003

Figure ZS-8





AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Exceeded and Other Constraints 2007-2010

PLANNING ZONE 3

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:
- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI*

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth

Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility

Zone3 11x17.mxd Modified: Jul 18, 2003

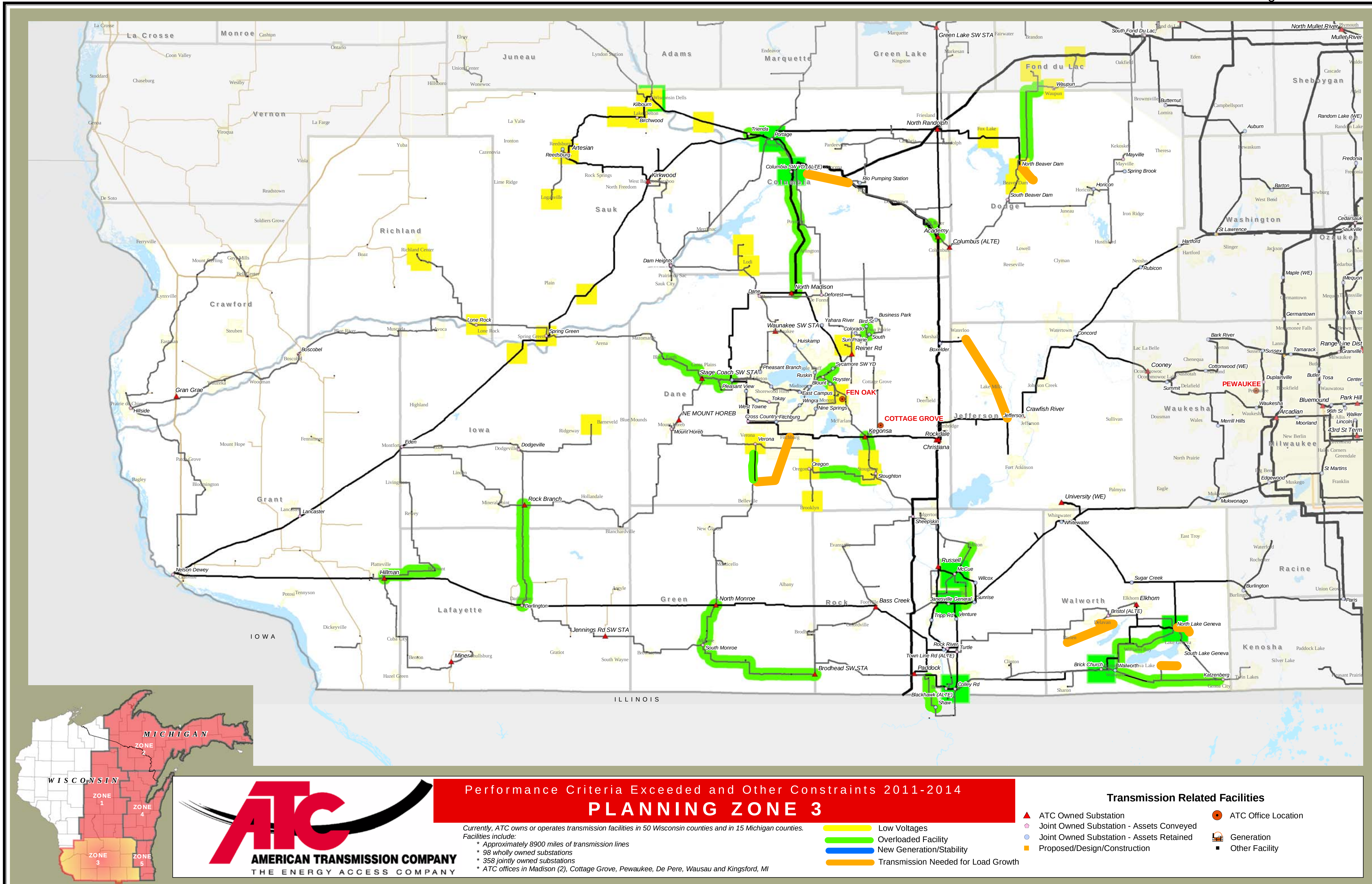


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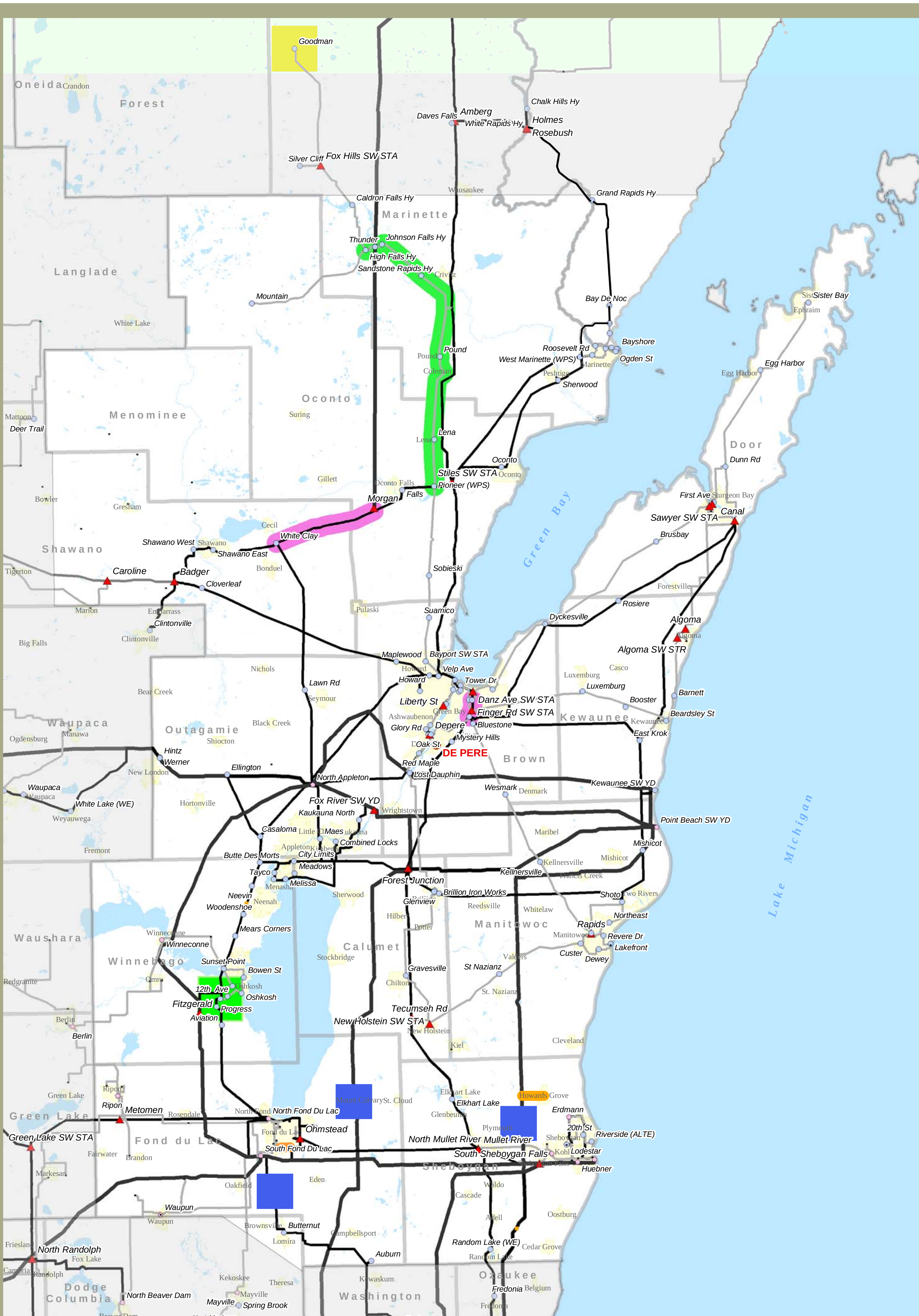
Figure ZS-10



Performance Criteria Limits Exceeded and Other Constraints 2005-2006

PLANNING ZONE 4

ATC AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

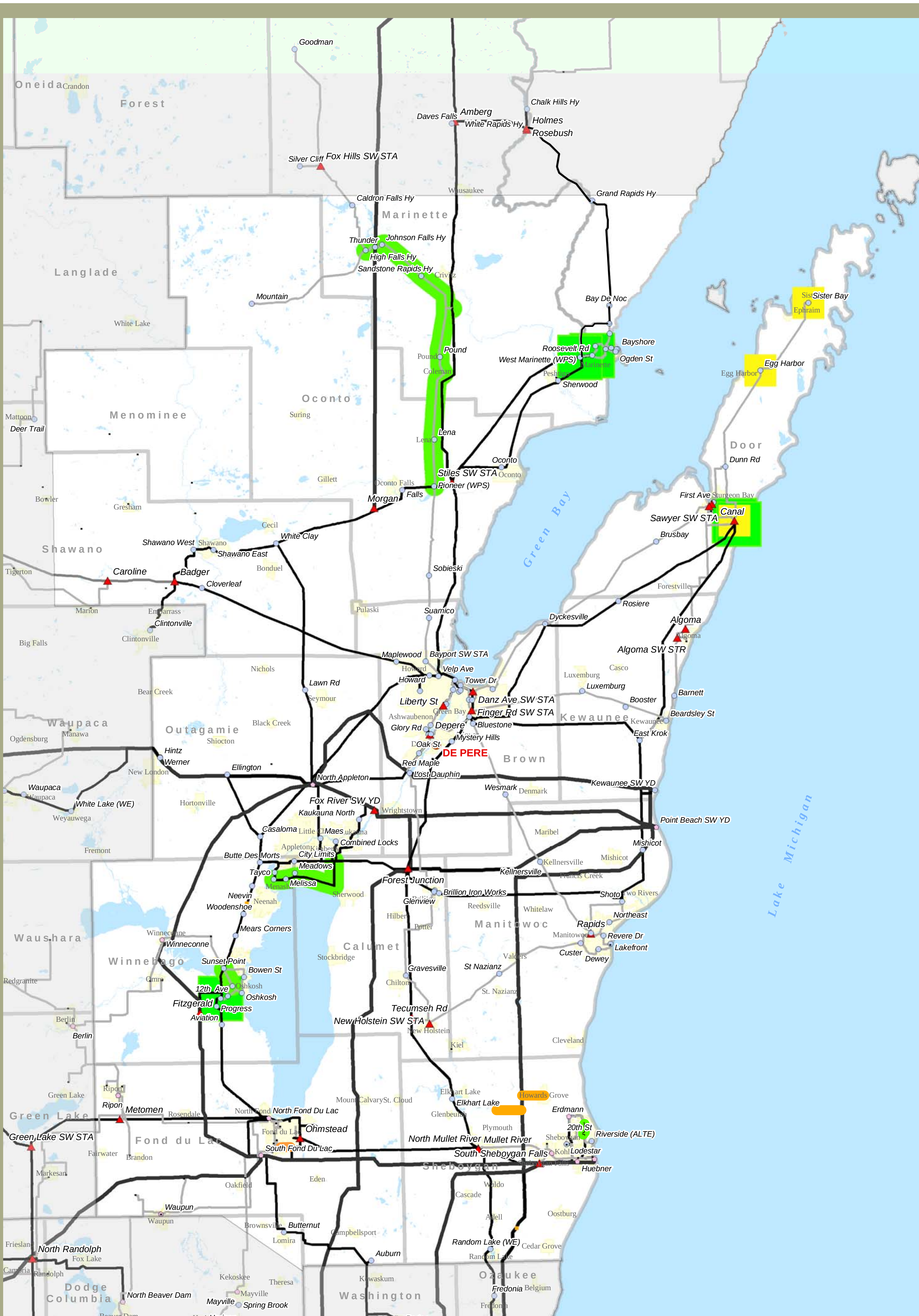
- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI*

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth
Transmission Service Limiter

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- Future Arrowhead-Gardner Park 345 kV line
- ATC Office Location
- Generation
- Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2007-2010

PLANNING ZONE 4

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

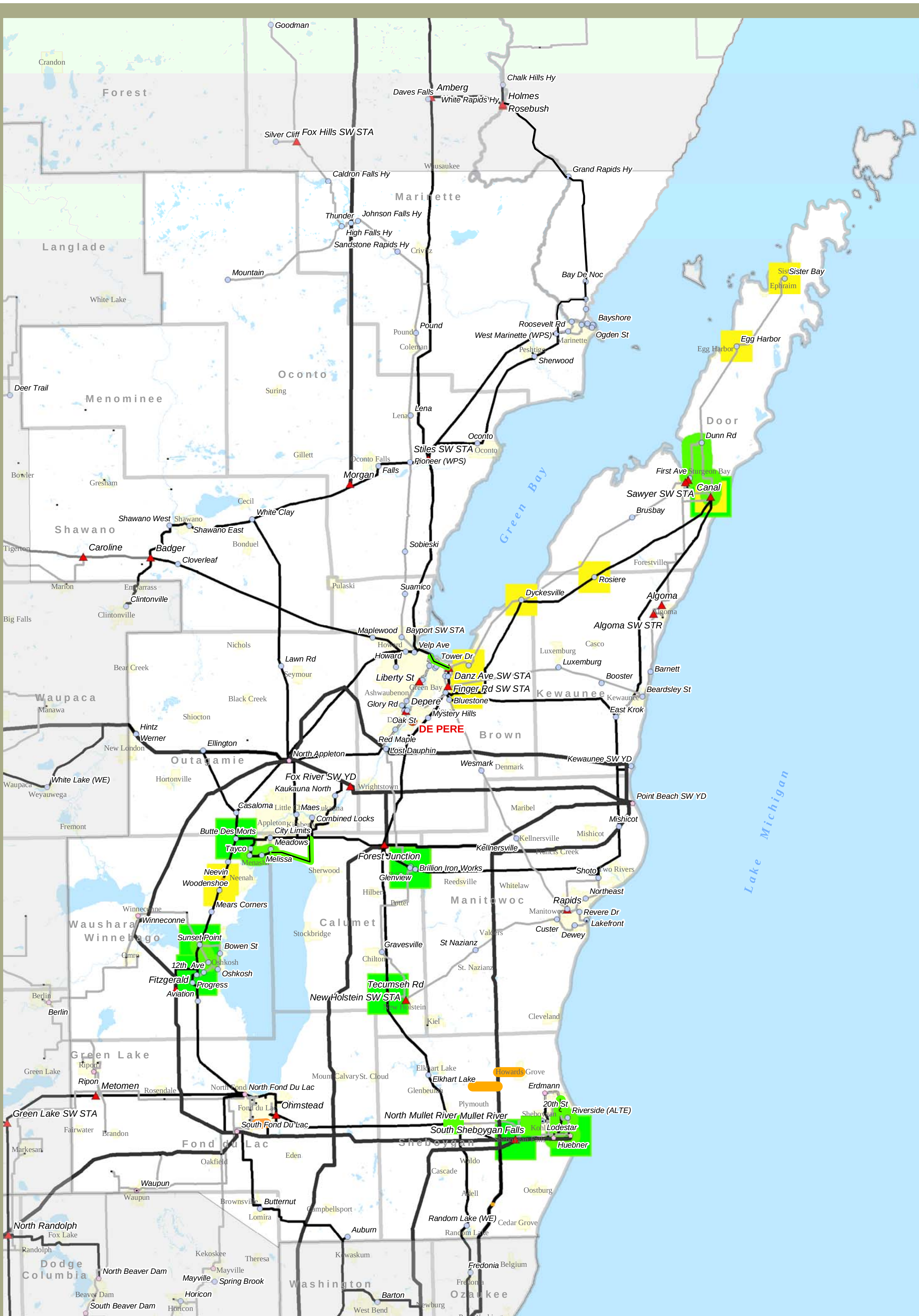
- Approximately 8900 miles of transmission lines
- 98 wholly owned substations
- 358 jointly owned substations
- Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- Future Arrowhead-Gardner Park 345 kV line
- ATC Office Location
- Generation
- Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



AMERICAN TRANSMISSION COMPANY

THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2011-2014

PLANNING ZONE 4

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI*

Low Voltages

Overloaded Facility

New Generation/Stability

Transmission Needed for Load Growth

Transmission Related Facilities

ATC Owned Substation

Joint Owned Substation - Assets Conveyed

Joint Owned Substation - Assets Retained

Proposed/Design/Construction

Future Arrowhead-Gardner Park 345 kV line

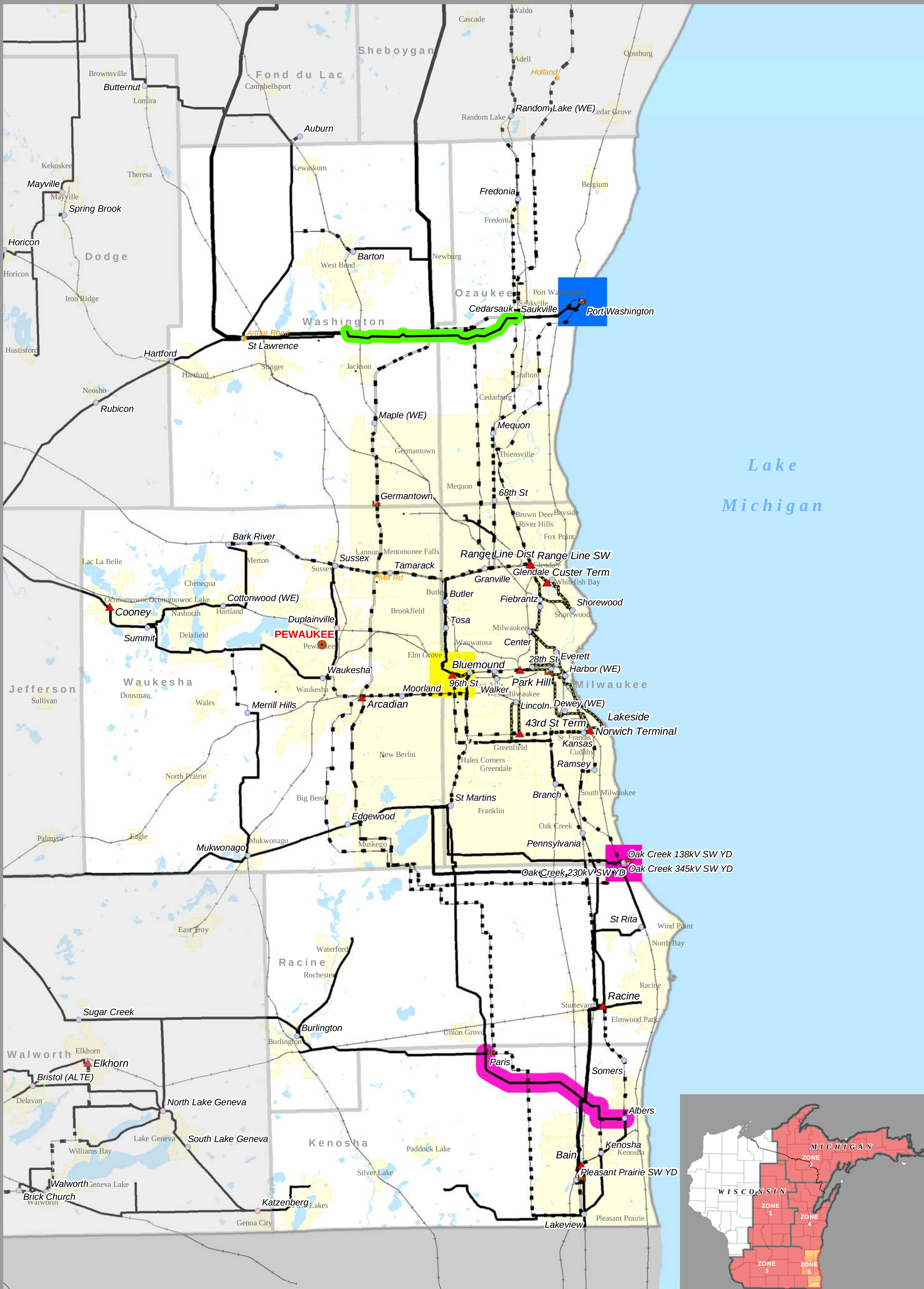
ATC Office Location

Generation

Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Figure ZS-13



Performance Criteria Limits Exceeded and Other Constraints 2005-2006

PLANNING ZONE 5

AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

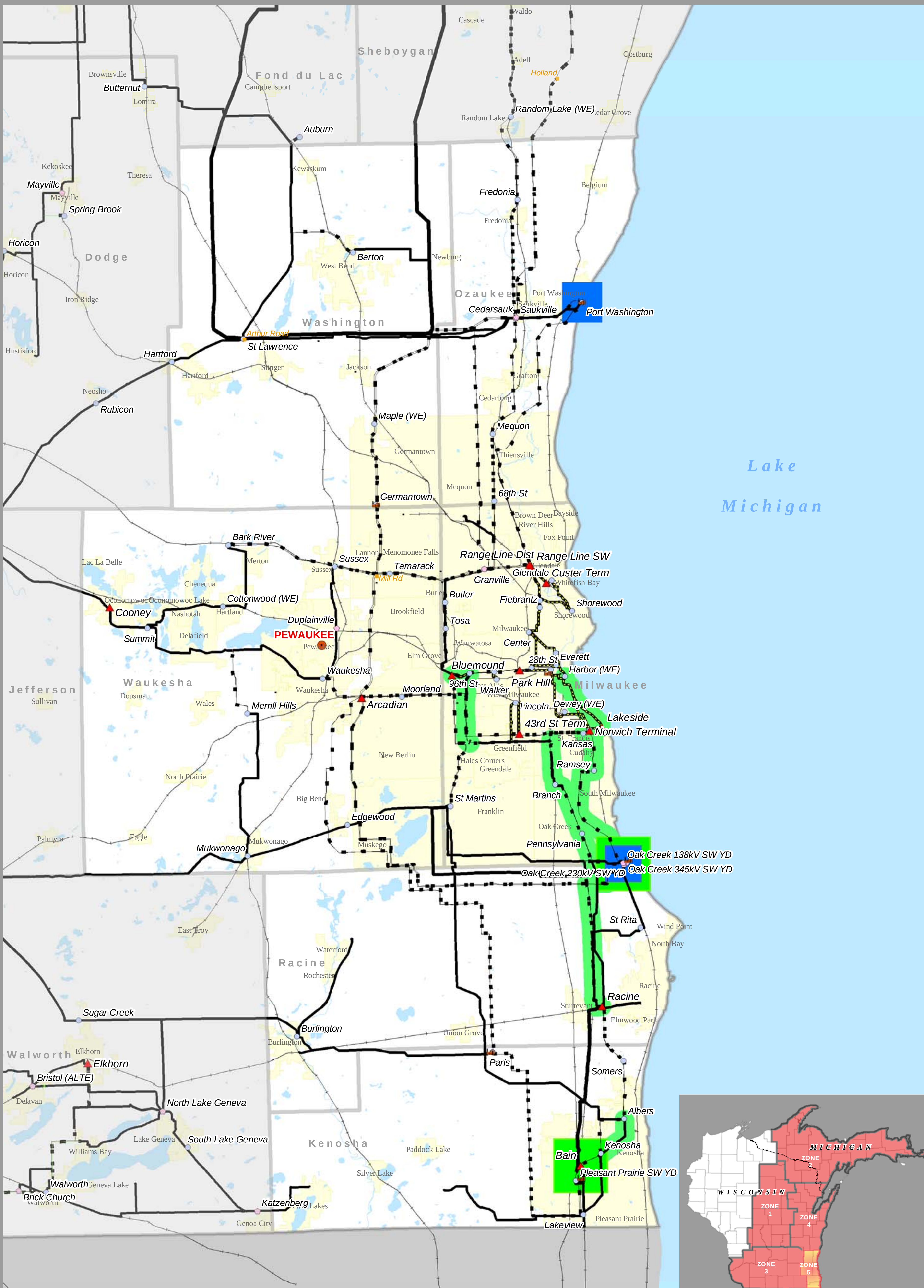
- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI*

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth
Transmission Service Limiter

Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Performance Criteria Limits Exceeded and Other Constraints 2007-2010

PLANNING ZONE 5

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

* *Approximately 8900 miles of transmission lines*
* *98 wholly owned substations*
* *358 jointly owned substations*
* *Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI*

Low Voltages
Overloaded Facility
New Generation/Stability
Transmission Needed for Load Growth

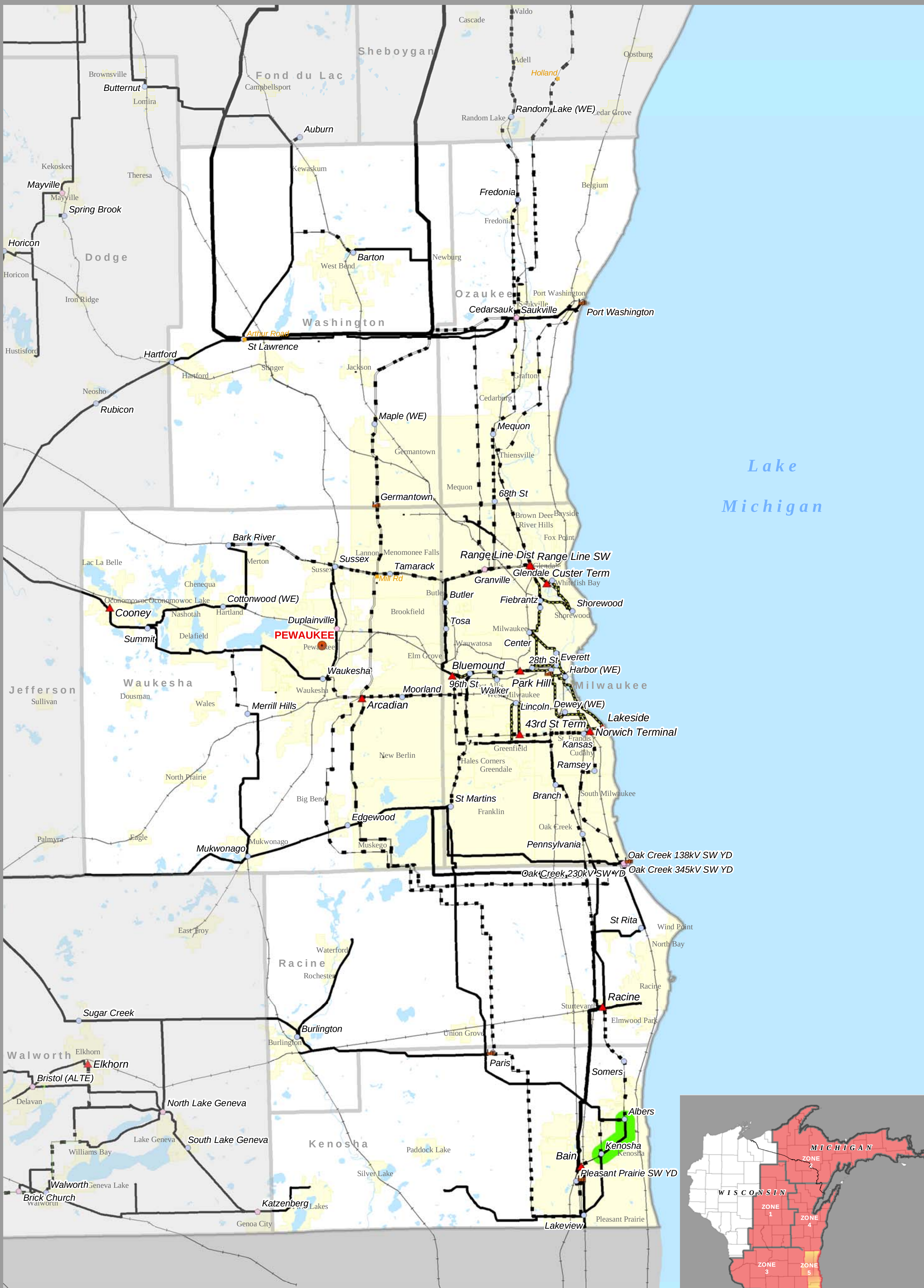
Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Zone5 11x17.mxd Modified: January 14, 2005

Figure ZS-15



Performance Criteria Limits Exceeded and Other Constraints 2011-2014

PLANNING ZONE 5

AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

* *Approximately 8900 miles of transmission lines*
* *98 wholly owned substations*
* *358 jointly owned substations*
* *Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI*

Low Voltages
Overloaded Facility
New Generation/Stability

Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.

Figure ZS-16 Cost Summary per Constrained Element in 2004

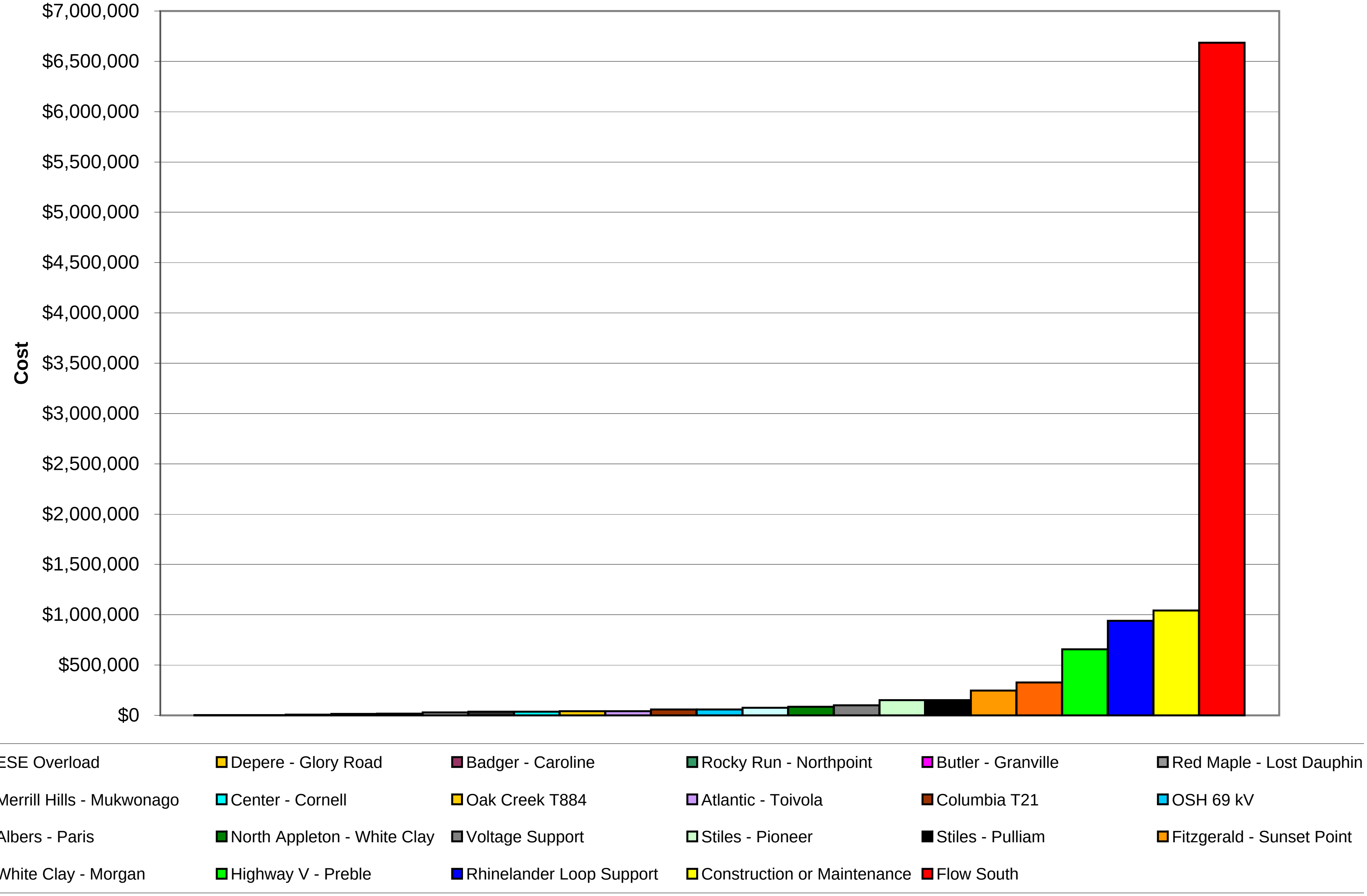
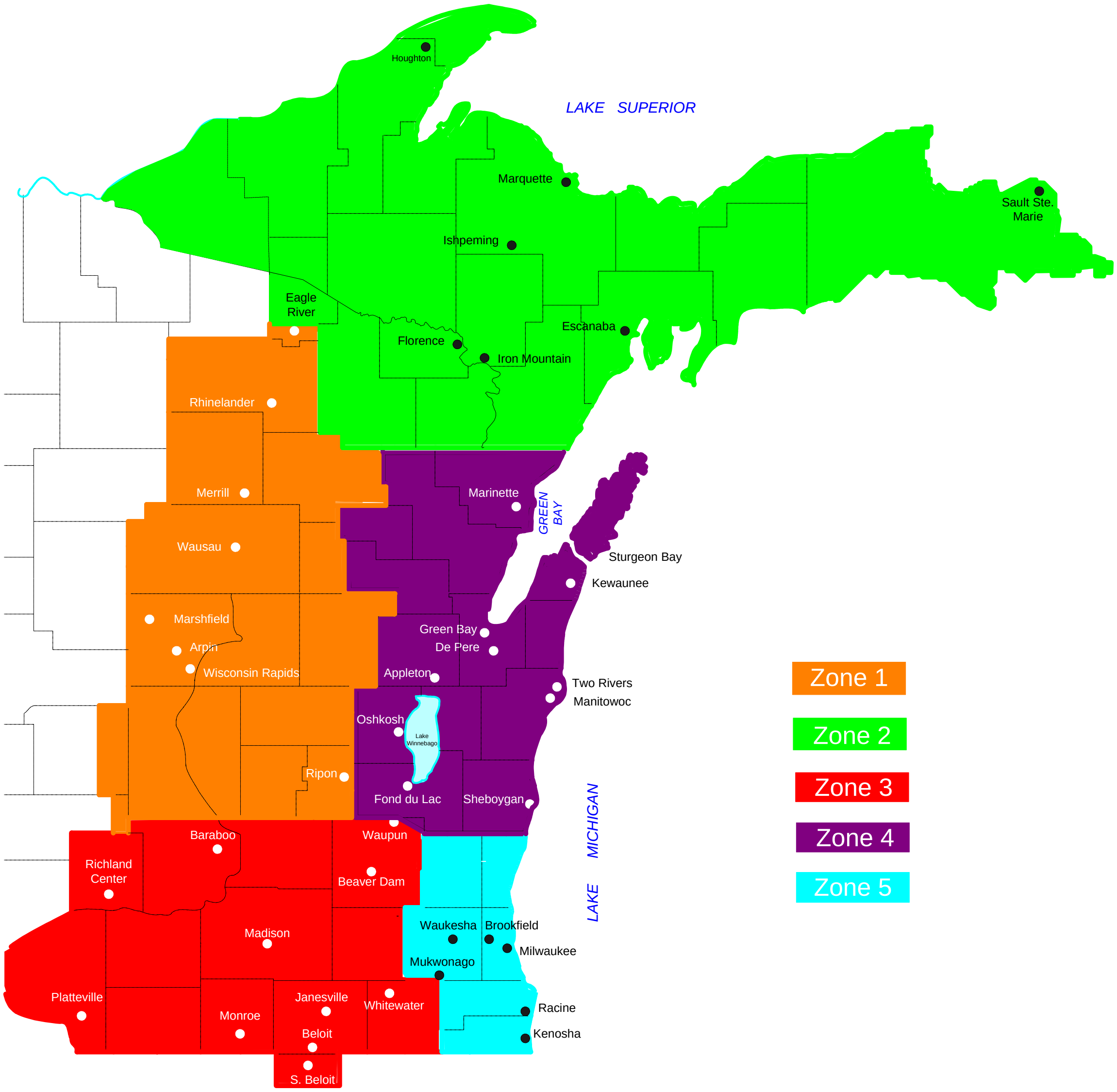


Figure ZS-17



LAKE SUPERIOR
Houghton
Marquette
Ishpeming
Sault Ste. Marie
Eagle River
Escanaba
Florence
Iron Mountain
Rhinelander
Merrill
Marinette
GREEN BAY
Wausau
Sturgeon Bay
Kewaunee
Marshfield
Arpin
Wisconsin Rapids
Green Bay
De Pere
Appleton
Two Rivers
Manitowoc
Oshkosh
Lake Winnebago
Ripon
Fond du Lac
Sheboygan
LAKE MICHIGAN
Baraboo
Waupun
Richland Center
Beaver Dam
Madison
Waukesha
Brookfield
Milwaukee
Mukwonago
Platteville
Janesville
Whitewater
Racine
Monroe
Beloit
Kenosha
S. Beloit
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5

ZONE & STUDY RESULTS > Regional Analysis

In addition to conducting internal ATC transmission system planning studies, we also are involved in external transmission planning studies that address regional reliability issues that can impact our system and customers. We currently are involved in the following five regional studies:

- MISO Exploratory - Iowa-Southern Minnesota Wind Study,
- Rochester - La Crosse Study,
- Alliant - Eastern Iowa Study,
- State of Minnesota - CAPX 2020 Effort, and
- State of Michigan - Capacity Need Forum and Transmission Transfer Capability.

Three different sets of studies are proceeding in the Minnesota area that could have an impact on our Access initiative:

- Iowa-Southern Minnesota Exploratory Study,
- Rochester-La Crosse Study, and
- CAPX 2020 effort.

MISO Exploratory – Iowa-Southern Minnesota Wind Study

According to MISO, the objective of the Iowa-Southern Minnesota Exploratory Study (ISMNEX) is to develop a high-level exploratory transmission plan, which provides increased transmission capability to facilitate the development and integration of wind generation resources in this area and addresses regional reliability issues. The study results will provide direction to MISO and transmission providers in the region on how to best develop the transmission system in this region. This exploratory study will not attempt to resolve underlying system issues, but develop an understanding of what bulk transmission improvements would be required to deliver significant amounts of generation. This study is a continuation of the MTEP-03 exploratory study. This study is an open and collaborative planning process with MISO staff, wind developers, wind advocates, utility planners, and state regulatory staff members in the stakeholder/study group.

Rochester - La Crosse Study

The objective of this study is to define the transmission deficiencies in the Southeast Minnesota (SE MN) and Southwest Wisconsin (SW WI) regions as determined by the study participants. In addition, the goal is to determine possible SE MN and SW WI regional solutions as defined by the study participants to address the deficiencies. It also will include performing a baseline ACCC, load flow, voltage profile and stability analyses of the existing transmission system in SE MN and SW WI. These analyses will be used to validate the model and be the baseline to evaluate and quantify improvements.

Alliant (Iowa – Interstate Power & Light) - Study of Eastern Iowa

Beginning in the latter part of the 1990s with the advent of the open access energy market, this area of the transmission system began to experience additional stresses as regional power flow patterns have increased from the south and southeast directions to the north and northwest. In February 2005, Interstate Power & Light (Alliant) initiated a transmission study of Eastern Iowa. The following excerpt from the study describes some of the background, including the scope:

A study of this region is desired for the following reasons:

- to identify bulk transmission (> 100 kV) needs for support of the areas sub-transmission system, with respect to load serving,
- to identify reliability concerns on the bulk transmission system due to the impacts of power transfers, and
- to address key operational issues in the region that have been seen over the last few years.

The goal of this study effort is two-fold:

- with thorough and comprehensive analysis, gain an understanding of the interactions of this area's transmission system with respect to varying load and market levels and their impacts on reliability for the near-term and long-term planning horizons, and
- develop a responsible, comprehensive and least-cost transmission plan for this area that will address all needs of the transmission system to accommodate both the near-term and long-term planning horizons.

CAPX 2020

Minnesota's electric transmission infrastructure—a network of high voltage transmission lines of 230 kV and higher—requires major upgrades and expansion over the next 15 years to support customers' growing demand for electricity. To ensure the backbone transmission system is developed and available to serve these growing needs, the five largest Minnesota transmission-owning utilities initiated the CapX 2020 project. Great River Energy, Minnesota Power, Otter Tail Power Company and Xcel Energy jointly formed CapX 2020 in the summer of 2004; Minnkota Power Cooperative, Missouri River Energy Services and Southern Minnesota Municipal Power Agency (SMMPA) subsequently joined this effort. CapX 2020 is an abbreviation for Capital Expenditures by the Year 2020.

CapX 2020's mission is to:

- create a joint vision of required transmission infrastructure investments needed to meet growing demand for electricity in Minnesota and the region; and
- work to create an environment that allows these projects to be developed in a timely, efficient manner, consistent with the public interest.

State of Michigan - Capacity Need Forum and Transmission Transfer Capability

On Oct. 14, 2004 the Michigan Public Service Commission issued on its own motion, *Case No. U-14231* to begin an investigation into the future generation capacity requirements in Michigan. The policy docket is designed to identify any needed modifications to the Michigan Commission polices or processes needed to facilitate construction of needed electric infrastructure.

The Capacity Need Forum (CNF) was created as a collaborative industry-wide process to assess the projected need for electrical generating capacity in Michigan over the short-, intermediate- and long-term future.

ATC participates in the Transmission and Distribution work group, which is responsible for compiling information on the existing transmission capacity. The group also is responsible for identifying any plans for immediate increase in capacity and to identify potential transmission investment options that can be used if additional electric capacity is needed.

The final CNF Staff report is due to the Michigan Commission on Jan. 1, 2006.

ZONE & STUDY RESULTS > Reactive power analysis

This section is new to our 10-Year Assessment. The goal was to determine the impact of a 10 percent reduction in MVAR capabilities for all generators in our footprint. Some reactive capabilities have not been tested due to safety or system conditions that may not allow for maximum reactive capability tests. In lieu of testing the generators, the maximum reactive capability values are calculated by the generation owners. MAIN recently introduced MAIN Guide 3C, which requires MAIN member generation owners to perform reactive capability testing of all generators over a period of five years. Other factors that may affect the maximum reactive capabilities of the generators, such as actual hydrogen pressure used, add to the uncertainty of the maximum reactive capabilities of the generators. To account for this uncertainty, the impact of a 10 percent reduction in the maximum reactive capabilities of the generators was studied using the 2010 summer peak model developed for this Assessment. The impacts of single transmission and generation contingencies were evaluated by the appropriate zone planners with respect to the previous full MVAR analysis and are summarized below.

Zone 1:
Reducing the maximum MVAR output of Zone 1 generators for the 2010 summer peak model essentially had no impact within Zone 1. A major reason for this is that the model assumed the completion of the new Weston 550-MW generator. As a result of the new generation, reducing the maximum MVAR output of the generators in Zone 1 did not create any new constraints under single contingency conditions.

Zone 2:
For the 2010 summer peak time period studied, the 10 percent reduction in maximum generation reactive capabilities had only a slight impact in the far western portion of the Upper Peninsula of Michigan. With most of the generation online and dispatched according to economic order, the 10 percent in the reduction reactive capability of the units is not a serious constraint under first contingency conditions for lines, transformers and generators throughout Zone 2. Voltages in the far western portion of the Upper Peninsula of Michigan are sensitive to megawatt generation levels of the few small units located within the area of concern. Capacitor bank projects are being proposed to support the voltage of the far western portion of the Upper Peninsula of Michigan for single contingency conditions.

Zone 3:
For the 2010 summer peak time period studied, the 10 percent reduction in maximum generation reactive capabilities had virtually no impact in Zone 3. With most of the generation online and dispatched according to economic order, reactive capability of the units is not a serious constraint under first contingency conditions for lines and transformers throughout Zone 3. That said, it is important to note the if one of the two Columbia units is offline at the time of summer peak, the remaining Columbia unit reaches its reactive capabilities and cannot supply enough reactive power to the northern, central and western portions of Zone 3. Two large-scale capacitor bank additions are planned at

Portage and at Spring Green to provide additional reactive support and reactive margins for importing power into these areas should one of the Columbia units be offline during the summer peak. See Zone 3 - 2010 study results for more information.

Zone 4:
For the 2010 summer peak time period studied, the 10 percent reduction in maximum generation reactive capabilities had almost no impact in Zone 4. The 2010 model includes Sheboygan Energy Center (320 MW) and Fox Energy Center (485 MW), which will provide additional reactive power support to the system. With the consideration of the new generation and the economic dispatch order, reactive capability of the units is not a serious constraint under first contingency conditions for lines, transformers and generation throughout Zone 4.

Zone 5:
Reducing the maximum reactive output of Zone 5 generators for the 2010 summer peak time period had virtually no impact in Zone 5. The model assumed the two groups of Port Washington combined-cycle generation and the first two Oak Creek units were available and online. As a result of the new generation, reducing the maximum reactive output of the generators in Zone 5 did not create any new constraints under first contingency conditions.

ZONE & STUDY RESULTS > Multiple outage analysis

The North American Electric Reliability Council (NERC) has established criteria for transmission system planning. We strive to adhere to NERC's criteria, which calls for transmission facility ratings and system voltages to be within prescribed limits for loss of a single transmission element (line, transformer or generator). While most of our system studies involve single contingency analysis, multiple outages occasionally are reviewed. The concern with multiple outages is the possibility of cascading outages or system instability occurring. The NERC criteria allows for interruption of service to firm contracts for loss of multiple elements simultaneously, as long as the loss of load can be contained; that is, it does not cause cascading outages or system instability. We conduct steady-state analysis and dynamic stability studies to ensure the transmission system meets multiple contingency criteria.

Steady-state analysis

As part of the continuing NERC compliance process, we conduct annual Category C assessments. NERC Category C contingencies are specific sets of multiple outages including lines, transformers and generators. In 2003, we contracted with Commonwealth Associates (CAI) to perform a steady-state analysis of the 345-kV transmission system in an attempt to identify NERC Category C type contingencies that potentially could lead to cascading. The double contingencies paired up 345-kV lines, transformers connected to the 345-kV system and generators connected to the 345-kV system. In addition, 345-kV bus section and breaker failure outages were reviewed. CAI's screening study, using a 2004 summer peak load model, identified a number of double contingencies that potentially could lead to cascading. We took those results and performed a more detailed analysis. Through the use of load shedding and generation redispatch, we determined that cascading could be reasonably ruled out for Category C contingencies on the 345-kV system in the 2004 model.

In 2004, CAI performed a more extensive steady-state Category C analysis on our transmission system. The 2004 analysis used a 2005 summer peak model and included all lines with an operating voltage above 100 kV, transformers connecting 100 kV and above systems, and generators with step-up transformers connected to buses 100 kV and above. Bus outages and breaker failure contingencies 100 kV and above also were reviewed. All told, more than 190,000 combinations of single contingencies were analyzed. CAI determined that 1,666 of these combinations could cause some problems. To determine the potential for cascading, CAI looked at the amount of load that would have to be shed to relieve voltage and loading problems. This resulted in our planners doing a detailed analysis on 162 combinations to determine if cascading was likely. As in 2003, we found through the use of specific load shedding and generation redispatch that cascading could be reasonably ruled out for Category C contingencies on our 2005 system.

Between 2005 and 2010, a number of system improvements are planned for our transmission system. To get a sense if these improvements would reduce the potential for Category C problems, we created a 2010 summer peak model with the new projects in the model. Category C outages that required some action to prevent cascading in the 2005 model were reviewed on the 2010 model. Fourteen Category C contingencies required more load to be shed in 2010, compared with 2005. ATC considers the required load shed in 2010 to be at a reasonable level for these specific multiple outage conditions.

For the 2005 10-Year Assessment, we revisited Category C events. Based on NERC compliance work performed in 2004, 130 multiple contingencies and four breaker failure contingencies were selected for restudy. The 2006 summer peak model created for the 10-Year Assessment was used. Physical Operational Margin (POM)-Optimal Mitigation Measure (OPM) software was used to determine the amount of load that needed to be shed to avoid cascading. Of the 130 events analyzed, 73 resulted in voltage problems or thermal overloads in 2006. Through the use of load shedding, we were able to resolve the low voltages or facility overloads, which should prevent cascading. Among the 73 events, 20 events aggravated the system problems in 2006 compared to the analysis of the 2005 model. Three breaker failure events involving Columbia and a single breaker failure event involving Rocky Run were tested by POM-OPM using the 2006 summer peak model. No system problems were identified.

To reassess the long-term planning horizon, the 73 double contingencies that caused voltage or overloads in 2006 were repeated using the 2010 summer peak model created for this 10-Year Assessment. Of the 73 double contingencies analyzed, eight Category C events had thermal overloads or low voltages in 2010. Two of the events resulted in overloads or low voltage problems that were more severe in 2010 than in 2006. Following are the two Category C contingencies that became worse in 2010 and the additional load that needed to be shed compared to 2006:

Category C contingencies	*Megawatt load shed in 2006*	*Megawatt load shed in 2010*	*Difference in megawatts*
M38–Perch Lake 138 kV and M38–Cedar 138 kV	39	48.5	9.5
Woodenshoe – Neevin and Fitzgerald 345/138 transformer	134	136	2

The minimal load shed increase required in 2010 compared to 2006 still is deemed to be at a reasonable level. There does not appear to be anything here that would indicate cascading is likely to occur in 2010.

System stability analysis

A major part of the analyses for a 10-Year Assessment deals with NERC standards for first contingencies that require power flow through transmission equipment to stay within applicable ratings and that require voltages remain within applicable ranges. NERC standards also include system stability criteria. We design our system to meet stability criteria that are more stringent than the NERC criteria. In the Planning Criteria section of this report, the transient and dynamic stability performance assessment discussion gives details about the ATC criteria for assessing system stability.

Reviewing our compliance with NERC stability criteria is a continuous process. Each year we add to our library of studies. For the 2004 10-Year Assessment, generator stability was screened at all major stations connected to our system. At the end of 2004, we also completed a comprehensive screening of NERC Category C outage impacts on generation stability. Numerous generator interconnection studies also added to our knowledge of ATC system stability response to Category C and D outages. A MAIN on-site review determined in December 2004 that we were complying with NERC standards for multiple outages (Category C), including standards for the system's stability response to multiple outages. This year we have revisited a select list of generating stations as described below and also added a voltage stability screening for Zone 2. As stability concerns arise, they are evaluated and appropriate corrective actions are implemented.

For this year's analyses the following specific power flows across selected interfaces were simulated for the applicable load level.

Zone 1 interface: Arpin-Eau Claire 345-kV line (8E5) and Wien-T-Corners 115-kV line (5E5)—700 MW west-to-east as measured at Eau Claire and T-Corners during peak demand periods, and 800 MW east-to-west as measured at Arpin and Wien during light demand periods.

Zone 3 interface: Paddock-Wempletown 345-kV line (W-9) and Rockdale-Wempletown 345-kV line (W-4)—1,400 MW south-to-north as measured at Wempletown during peak demand periods, and 1,000 MW north-to-south as measured at Paddock and Rockdale during light demand periods.

Zone 2 and 4 interface: Pulliam-Stiles 138-kV line (KK64441), Pulliam-Stiles 138-kV line (KK64451), and White Clay-Morgan 138-kV line (KK26522)—245 MW south-to-north as measured at Pulliam and White Clay during peak demand periods.

Zone 5 interface: Pleasant Prairie-Zion 345-kV line (L2221), Arcadian-Zion 345-kV line (L2222), and Kenosha-Lakeview-Zion-Waukegan 138-kV line (KK2801)—1,300 MW south-to-north as measured at Zion and Waukegan during peak demand periods, and 1,500 MW north-to-south as measured at Pleasant Prairie, Arcadian and Kenosha during light demand periods.

The following discussion provides a brief summary of the generator and voltage stability performance seen in this year's screening analysis of the ATC system.

Generator stability

Specifically for this 10-Year Assessment, the generator stability (angular) criteria was used to analyze existing generating stations with total output above 100 MW and associated transmission lines operating above 100 kV. These stability studies simulated 2006 peak and light load (50 percent of peak) system conditions with the specific power flows modeled across selected interfaces as previously described.

As shown in Table ZS-8, all studied generators in our area meet NERC Category C criteria. However, Paris generation would not meet stability requirements under 2006 light load for prior outage conditions involving either Paris-Albers or Paris-St. Martins 138-kV lines if these prior outages did not require a reduction in Paris generation (due to thermal overloads for the next contingency). Once this required generation reduction is simulated, stability requirements are met.

Several generators do not meet the more stringent ATC criteria under 2006 conditions. We are implementing specific projects that will allow some of these generators to meet our criteria and are evaluating other generators to determine what protective relay adjustments, operation guides, special protection systems (SPS) or transmission system upgrades may be necessary to meet this criteria.

Voltage stability

In the past, we observed certain indicators that voltage stability could become an issue in Zone 2. Therefore, this year we initiated a voltage stability screening study that we hope to expand to other zones in future years when indicators suggest that voltage stability may become a concern. Voltage stability studies were performed for selected NERC Category C outages. If the analysis identified potential instability, then the study was rerun using a similar Category B outage (less severe). The initial Category C outages analyzed in Zone 2 were select C7 and all C5 type outages for 100-kV and higher transmission lines. For the voltage stability analysis, 2006 and 2010 peak loads were modeled. Voltages were monitored and compared to our stability voltage criteria to determine if the voltage recovery was acceptable for the disturbances modeled. The selected bus voltages monitored represented an area of the system that indicators suggested might be susceptible to voltage collapse.

In Table ZS-9, certain single-phase faults with delayed clearing on the M38-Perch Lake, M38-North Lake, or Conover-Land O' Lakes lines create the potential for voltage collapse in the northwest area of Zone 2 with some reinforcements modeled. These faults should be investigated with all contemplated reinforcements to determine if other reinforcements, special protection systems or operating procedures are required. Other faults shown in the table do not meet our voltage recovery criteria and need to be investigated as well, but are less likely to lead to voltage collapse. The potential for voltage collapse is not expected to cause cascading outages outside this area of Zone 2.

The outages in Table ZS-9 were rerun as NERC Category B outages (single-phase faults with normal clearing). In these instances, even without some of the contemplated reinforcements in Zone 2, no voltage collapse was found. However, the responses to some of the faults exhibited insufficient voltage recovery, which can indicate the potential for instability. Additional investigation is necessary to determine if further mitigation is required beyond the contemplated reinforcements.

Conclusion

Based on these screening studies and numerous other studies, our network will meet NERC system stability standards assuming that reinforcements contemplated in this 10-Year Assessment, operating procedures and special protection systems are implemented.

Table ZS-8: ATC System Angular Stability Assessment for 2006

Facility studied	Response for selected NERC Category C outages	
	2006 summer peak load	2006 summer light load
Pleasant Prairie (1200.0 MW)	Acceptable	Acceptable
Paris (400.0 MW)	Acceptable	Acceptable*
Oak Creek (1135.0 MW)	Acceptable	Acceptable
Valley (267.0 MW)	Acceptable	Acceptable
Germantown (342.8 MW)	Acceptable	Acceptable
Port Washington (New 600.0 MW)	Acceptable	Acceptable
Point Beach (1116 MW-G1: 557 MW and G2: 559 MW)	Acceptable	Acceptable
Kewaunee (579.0 MW)	Acceptable	Acceptable
Edgewater (773.0 MW)	Acceptable	Acceptable
South Fond du Lac (352.0 MW)	Acceptable	Acceptable
Neevin (300.0 MW)	Acceptable	Acceptable
Skygen (185.0 MW)	Acceptable	Acceptable
Pulliam (459.0 MW)	Acceptable	Acceptable
West Marinette (240.0 MW)	Acceptable	Acceptable
Fox Energy (New 672.3 MW)	Acceptable	Acceptable
Sheboygan Energy Center (New 343.0 MW)	Acceptable	Acceptable
Cypress (New 160.0 MW)	Acceptable	Acceptable
Butternut (New 200.0 MW)	Acceptable	Acceptable
Columbia (1050.0 MW)	Acceptable	Acceptable
Christiana (544.5 MW)	Acceptable	Acceptable
Town Line Road (659.1 MW)	Acceptable	Acceptable
Rock River (262.0 MW)	Acceptable	Acceptable
Nelson Dewey (226.0 MW)	Acceptable	Acceptable
University (236.0 MW)	Acceptable	Acceptable
Concord (376.0 MW)	Acceptable	Acceptable
Walnut (New 147.2 MW)	Acceptable	Acceptable
Presque Isle (617.0 MW)	Acceptable	Acceptable
Weston (552.6 MW)	Acceptable	Acceptable

**Stable after generator reductions required for thermal limitations under outage conditions are implemented.*

Table ZS-9: ATC System Stability Voltage Criteria Assessment for 2006 and 2010 With Some Zone 2 Reinforcements Modeled

Faulted transmission facility	NERC Category C fault location	Meets ATC stability voltage criteria?		Potential mitigation plan
		2006 summer peak load	2010 summer peak load	
M38-Perch Lake 138-kV line	M-38	No	No	System upgrade or load shedding
M38-North Lake 138-kV line	M-38	No	No	System upgrade or load shedding
M38-Atlantic 138-kV line	M-38	No	No	System upgrade or load shedding
M38-Winona 138-kV line	M-38	No	No	System upgrade or load shedding
Perch Lake-Nordic 138-kV line	Perch	No	No	System upgrade or load shedding
Perch Lake-Presque Isle 138-kV line	Perch	No	No	System upgrade or load shedding
Perch Lake-M38 138-kV line	Perch	No	No	System upgrade or load shedding

ZONES & STUDY RESULTS > Planned reinforcement analysis

The zone analyses discussions presented in this Assessment provide a list of reinforcements that are beginning to optimize our reinforcement plans, at least at the one- or maybe two-zone level. Three important questions regarding this plan include the following:

- *How do the reinforcements for all the zones perform together?*
- *Does applying a solution in one zone create a problem that was not seen before in another zone?*
- *Are some zone solutions redundant when all the solutions are applied to the system?*

This year we have taken another step to more adequately address the first two questions. We have built year 2010 and year 2014 models that include reinforcements reflecting our best thoughts on all of the most likely planned, proposed and provisional projects to deal with the identified issues. First contingency analysis was performed on these two new models, including selected outages on neighboring systems. This analysis showed that the reinforcements in total did indeed deal with the issues identified and did not create any new issues to be resolved.

We recognize that we need to continue to develop our reinforcement optimization processes. The analyses described are not the only methods we use to optimize our plans and do not begin to address the third question. Also, access-driven reinforcements were not included in this analysis as we await more definition of the most likely projects. However, our project development process, including development of the access projects, does look to optimize the projects that are finally built.