Table ZS-7: ATC System Angular Stability Assessment for 2010 10-Year Assessment

	Facility Studied	# Units	Total Capacity (MW)	Last Year 0f Detail Study	Response Selected NERC Category B2-3, C3, C5, C8-9 and D2-3 Outages (NERC Reliability Criteria)				SPS	Note
					2010	2011~2014	2015	Appropriate for 2016~2020		
	Existing Units									
1	Pleasant Prairie	2	1208.0	2007	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	IPO Breakers; See note (4)
2	Paris	4	400.0	2008	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	
3	Oak Creak	7	1138.0	2007	Acceptable (5)	Acceptable (5)	Acceptable (5)	Yes	No	
4	Valley	2	280.0	2009	Acceptable (3)	Acceptable (3)	Acceptable (3)	Yes	No	See note (6)
5	Germantown	5	345.0	2005	Acceptable	Acceptable	Acceptable	Yes	No	See notes (7, 8)
6	Port Washington CC1	6	1080.0	2009	Acceptable (3)	Acceptable (3)	Acceptable (3)	Yes	No	
7	Point Beach	2	512; 514	2009	Acceptable (9)	Acceptable (9)	Acceptable (9)	Yes	Yes	
8	Kewaunee	1	579.0	2009	Acceptable (3)	Acceptable (3)	Acceptable (3)	Yes	No	IPO Breakers
9	Edgewater	3	773.0	2005	Acceptable	Acceptable	Acceptable	Yes	Yes	See Notes (10, 11)
10	S. Fond du Lac	4	352.0	2005	Acceptable	Acceptable	Acceptable	Yes	No	See Note (12)
11	Neevin	2	300.0	2005	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Yes	No	
12	De Pere	1	185.0	2005	Acceptable	Acceptable	Acceptable	Yes	No	See Notes (13, 14)
13	Pulliam	6	459.0	2005	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Yes	No	
14	West Marinette	4	240.0	2009	Acceptable (3)	Acceptable (3)	Acceptable (3)	Yes	No	
15	Fox Energy	3	672.3	2008	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	IPO Breakers
16	Sheboygan Energy	2	343.0	2005	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Yes	No	
17	Cypress	88	145.2	2009	Acceptable (3)	Acceptable (3)	Acceptable (3)	Yes	No	
18	Forward Energy Center	86	129.0	2008	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	
19	Columbia	2	1050.0	2005	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Yes	No	IPO Breakers
20	Christiana	3	544.5	2005	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Acceptable (1, 2, 3)	Yes	No	
21	Riverside	3	659.1	2005	Acceptable	Acceptable	Acceptable	Yes	No	See Notes (15, 16)
22	Rock River	5	132.0	2005	Acceptable	Acceptable	Acceptable	Yes	No	See Notes (17, 18)
23	Nelson Dewey	2	226.0	2010	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	See Note (19)
24	University	2	236.0	2008	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	
25	Concord	4	400.0	2008	Acceptable (2, 3)	Acceptable (2, 3)	Acceptable (2, 3)	Yes	No	
26	West Campus	3	147.2	2009	Acceptable (3)	Acceptable (3)	Acceptable (3)	Yes	No	
27	Presque Isle	5	431.0	2007	Acceptable (3, 20)	Acceptable (3, 20)	Acceptable (3, 20)	Yes	Yes	
28	Weston	5	552.6	2005	Acceptable (3, 21)	Acceptable (3, 21)	Acceptable (3, 21)	Yes	No	IPO Breakers, See Note (22)
	New / Future Units									
29	Elm Road Phase I	1	615.0	2007	Acceptable (6)	Acceptable (6)	Acceptable (6)	Acceptable (6)	No	IPO Breakers
30	Elm Road Phase II	1	615.0	2007		Acceptable (6)	Acceptable (6)	Acceptable (6)	No	IPO Breakers
31	Green Lake (wind)	108	160.0	2006		Acceptable (23)	Acceptable (23)	Acceptable (23)	No	
32	Bowers Road (wind)	70	105.0	2006		Acceptable (24)	Acceptable (24)	Acceptable (24)	No	
33	EcoMet (wind)	67	100.5	2008		Acceptable (25)	Acceptable (25)	Acceptable (25)	No	
34	Ledge (wind)	100	150.0	2008			Acceptable (26)	Acceptable (26)	No	

These shaded rows represent units at plants in which there have been a significant system topological change near the plant or significant parameter changes or updates to the dynamic models used in stability studies and are to be studied in the 2010 TYA as part the system angular stability analysis

Notes:

(1) Comparing 2008 TYA models with 2005 TYA models, no significant change has occurred near the generation station, other than the local load growth. Therefore, the stability results from the 2005 TYA are still applicable and are acceptable in the following years.

(2) Comparing 2009 TYA models with 2008 TYA models, no significant change has occurred near the generation station, other than the local load growth. Therefore, the stability results from the 2008 TYA are still applicable and are acceptable in the following years.

(3) Comparing 2010 TYA models with 2009 TYA models, no significant change has occurred near the generation station, other than the local load growth. Therefore, the stability results from the 2009 TYA are still applicable and are acceptable in the following years.

(4) Since 2009 TYA Pleasant Prairie Special Protection Scheme (SPS) study was completed on May 27, 2009 and concluded the SPS was no longer required and could be retired.

(5) "Final Facility Study Update – Revision 2 Phase I, II & III Milwaukee County, Wisconsin MISO #G051 (#36760-01)" dated January 15, 2007.

(6) Since 2009 TYA study work proceding to replace breaker failure relays with SEL-352 relays on lines 301, 302 and 311 and replace the existing three cycle oil breakers with two cycle gas breakers at positions 314, 321, and 324.

(7) Germantown plant data provided by the generator owner showed the parameter values for the exciter model of unit 5 had changed from current values in use.

(8) Stability simulations for the Germantown plant did not meet ATC requirements for single-phase to ground faults (C8-9) or three-phase faults with delayed clearing (D2). Action plan involves addition of redundent bus differential relays and reduction of delayed clearing times for zone 2 relaying or breaker failure.

(9) "Final ISIS Report Point Beach Generators Manitowoc County, Wisconsin MISO #G833/J022 (#39297-01), G834/J023 (#39297-02)" dated October 2, 2009.

(10) Edgewater plant data provided by the generator owner showed replacement of the exciter model on units 3 and 4. Inaddition, needed to evaluate performance since

not all 345 kV breakers are IPO breakers along with topological changes on 1-345 and 1-138 kV line.

(11) Stability simulations for the Edgewater plant did not meet ATC requirements for single-phase to ground faults (C9) with delayed clearing. Action plan involves addition of redundent bus differential relays by 2013 and in the interim improvement of clearing times to maintain stability.

Notes (Continued):

(12) South Fond du Lac plant data provided by the generator owner showed capacity changes for all 4 units. Inaddition, needed to evaluate performance since 345 kV breakers are not IPO breakers.

(13) De Pere plant data had significant 138 kV line impedance changes near plant, as well as capacity changes and the plant approaching the 5-year time line criteria.

(14) Stability simulations for the De Pere plant did not meet ATC requirements for single-phase to ground faults (C9) with delayed clearing. Action plan involves addition of redundent bus differential relays or reducing zone 2 clearing times at De Pere terminal.

(15) Riverside plant data provided by the generator owner showed the parameter values for the power system stabilizier (PSS) model of the steam unit had changed from current values in use. In addition, the PSS equipment for the combustion turbines units 1 and 2 are not active and hence required the current modeling in use be removed.

(16) Stability simulations for the Riverside plant did not meet ATC requirements for single-phase to ground faults (C9) with delayed clearing. Action plan involves addition of redundent bus differential relays or reducing zone 2 clearing times at Townline Road terminal.

(17) Rock River plant data had significant 138 kV line impedance changes near plant, as well as capacity changes with units G1 and G2 retired and the plant approaching the 5-year time line criteria.

(18) Stability simulations for the Rock River plant did not meet ATC requirements for single-phase to ground faults (C9) or three-phase faults with delayed clearing (D2-3). Action plan involves addition of redundent bus differential relays and reduction of delayed clearing times for zone 2 relaying or breaker failure.

(19) "Interconnection System Impact Study Report 50 MW Wind Generation Grant County, Wisconsin J084" dated June 24, 2010

(20) "Presque Isle Special Protection System “Remedial Action Tripping Scheme” (RATS)" Version 3.0 dated December 17, 2007. http://oasis.midwestiso.org/documents/ATC/PresqueIsleSPS-v3.pdf

(21) "Generator Interconnection Facility Study Report 550 MW Coal Generation - Addendum IV, Marathon County, Wisconsin; MISO #G144 (#37187-02)" dated June 16, 2005.

(22) "Weston Unit 4 Special Protection System Review Final Draft" Report, dated February 9, 2009 concluded SPS could be retired.

(23) "Interconnection System Impact Study Report - Addendum II 160 MW Wind Generation Green Lake; Fond du Lac County, Wisconsin - MISO #G376 (#37935-03)" dated May 31, 2006.

(24) "G546 Interconnection System Impact Study Report Revision 2 100 MW Wind Generation; Walworth County - MISO #G546 (#38605-01)" dated December 13, 2006.

(25) "Interconnection System Impact Study Report 99 MW Wind Generation; Calumet County, Wisconsin" - MISO #G611 (#38791-01)" dated October 24, 2008.

(26) "Interconnection System Impact Study Report 150 MW Wind Generation; Brown County, Wisconsin" - MISO #G773 (#39168-01)" dated June 30, 2008.