

Table ZS-2
2016 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2016 Summer Peak Case		2016 70% Load Case		2016 90% Load Case		2016 105% Load Case		2016 65% High W-E Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
1	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
1	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	TRUE	--	FALSE	--	TRUE	System Intact
1	Council Creek 138-kV bus	--	104.9%	--	--	--	105.3%	--	--	--	105.4%	System Intact
1	Dartford 69-kV bus	--	91.2 - 91.4%	--	--	--	--	--	--	--	--	Ripon - Northwest Ripon Tap 69-KV line Metomen - Ripon 69-KV line
1	Petenwell 138/69 KV transformer	98.0 - 95.2%	--	--	--	--	--	98.1%	--	115.5%	--	Castle Rock - Quincy ACEC 69-KV line Hilltop - Buckhorn Tap 69-KV line Castle Rock - McKenna 69-kV line ¹ McKenna - Quincy ACEC 69-KV line
1	ACEC Badger West - Saratoga 138-kV line	--	--	95.2 - 96.8%	--	--	--	--	--	95.8 - 100.9%	--	Arpin - Eau Claire 345-kV line King - Eau Claire - Arpin 345-kV line ⁵
1	ACEC Badger West - Petenwell 138-kV line	--	--	98.2 - 99.8%	--	--	--	--	--	95.8 - 103.9%	--	Arpin - Eau Claire 345-kV line King - Eau Claire - Arpin 345-kV line ⁵
2	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
2	Base case voltage criteria exceeded	--	FALSE	--	TRUE	--	FALSE	--	FALSE	--	FALSE	System Intact
2	Mead and Chandler 69-kV buses	--	--	--	--	--	--	--	--	--	95.1 - 95.9%	System Intact
2	Munising, Alger, Alger-Delta 69-kV buses	--	--	--	105-105.5%	--	--	--	--	--	--	System Intact
2	Lakota Road 115-kV bus	--	--	--	105.30%	--	--	--	--	--	--	System Intact
2	Indian Lake 69-kV bus	--	--	--	--	--	--	--	--	--	92.0% 91.1% 91.6% 91.7%	Pleasant Prairie – Zion 345-kV line Pleasant Prairie – Zion 345-kV line ²⁷ Indian Lake 69-kV capacitor bank Perkins 138-kV capacitor bank
2	Indian Lake 138/69-kV transformer #1 Indian Lake 138/69-kV transformer #2	--	--	--	--	--	--	--	--	97.2-98.2%	--	Indian Lake 138/69-kV transformer #2 Indian Lake 138/69-kV transformer #1
2	Delta – Mead 69-kV line	102.3% 97.4% 97.1%	--	--	--	--	--	101.7% 96.8% 96.7%	--	--	--	Chandler – Lakehead Tap 69-kV line Masonville – Lakehead Tap 69-kV line Chandler - Lakehead - Masonville 69-kV line ²⁶
2	Chandler – Lakehead Tap 69-kV line Masonville – Gladstone 69-kV line Masonville – Lakehead Tap 69-kV line	112.8% 96.9% 108.5%	--	101.8% 90.7% 98.8%	--	108.6% 94.3% 104.7%	--	114.8% 97.9% 110.2%	--	103.9% 93.4% 101.1%	--	Delta – Mead 69-kV line
2	M38 – Atlantic 69-kV line	--	--	--	--	--	--	96.3% 96.5% 100%	--	--	--	M38 – Atlantic 138-kV line Atlantic 138/69-kV transformer M38 – Atlantic 69-kV line ²³
2	Engadine, Newberry, Newberry Hospital, Roberts, LouPac, Newberry Village, Hulbert and Eckerman 69-kV buses	--	90.3-90.7%	--	--	--	91.5-91.9%	--	91.3-91.7%	--	--	Hiawatha – Engadine 69-kV line
2	North Bluff, Bay View, Mead, Gladstone, Lakehead, Masonville 69-kV buses	--	84.7-91.8%	--	85.5-90.1%	--	84.9-89.6%	--	83.7-91.6%	--	82.3-90.5%	Delta – Mead 69-kV line
2	Empire - Presque Isle 138-kV line	--	--	--	--	--	--	--	--	100.6%	--	Split Empire 138-kV bus #23
2	Escanaba and West 69-kV buses	--	91.4-91.9%	--	--	--	--	--	--	--	--	Delta - West Tap 69-kV line
2	Nordic – Mountain 69-kV line	--	--	--	--	--	--	--	--	102.0% 110.5%	--	Empire – Forsyth 138-kV line Plains – Arnold 138-kV line

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		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
3	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
3	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
	Royster – Sycamore 69-kV line	98.2%	--	--	--	--	--	--	104.5%	--	--	Femrite 138/69-kV transformer
3	Verona 138-kV bus	--	89.4%	--	--	--	89.9%	--	88.8%	--	--	Verona – Oak Ridge 138-kV line
3	Huiskamp 138-kV bus	--	89.9%	--	91.7%	--	90.4%	--	89.9%	--	91.7%	Huiskamp – North Madison 138-kV line
3	Darlington – North Monroe 138-kV line	--	--	--	--	--	--	--	--	102.0 – 95%	--	Paddock 345/138-kV transformer Darlington 138/69-kV transformer Darlington – DPC Gratiot 69-kV line
3	Eden – Mineral Point 69-kV line	--	--	--	--	--	--	--	--	95.3%	--	Darlington – Lafayette Wind 138-kV line
3	South Monroe – Browntown 69-kV line	--	--	--	--	--	--	--	--	97.0%	--	Darlington – North Monroe 138-kV line
3	Concord 138-kV bus	--	--	--	--	--	--	--	96.0%	--	--	System Intact
3	Hubbard and Hustisford 138-kV buses	--	87.5% 88.2% 88.2%	--	87.1% 87.4% 87.4%	--	87.2% 86.5% 86.5%	--	--	--	87.2% 87.9% 87.9%	Rubicon – Hustisford 138-kV line Hustisford - Hubbard 138kV line Rubicon - Hustisford - Hubbard 138kV line
4	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
4	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
4	Manrap – Custer 69-kV line	--	--	--	--	--	--	95.4%	--	--	--	Dewey – Lakefront 69-kV line
4	Lau Road – Elkhart Lake 138-kV line	--	--	--	--	--	--	--	--	95.6% 95.6% 95.6%	--	Sheboygan Energy Center – Grandville 345-kV line Point Beach – Sheboygan Energy Center 345-kV line Point Beach 345-kV bus tie 1 - 2
4	Elkhart Lake – Saukville 138-kV line	--	--	--	--	--	--	--	--	106.7% 106.7% 106.6% 103.4% 102.9% 101.9 – 95.0%	--	Point Beach 345-kV bus tie 1 - 2 Point Beach – Sheboygan Energy Center 345-kV line Sheboygan Energy Center – Grandville 345-kV line Cypress – Arcadian 345-kV line Edgewater – Cedarsauk 345-kV line Plus other less severe contingencies
4	Gravesville - Glenview 138-kV line	96.7% 96.7% 96.6% -- --	--	--	--	--	--	--	102.9% 102.9% 102.9% 96.0% 96.0%	--	--	Tecumseh Road 138/69 kV Transformer* Tecumseh Road 138/69 kV Transformer Tecumseh Road - Ford Drive tap 69-kV line Ford Drive tap - New Holstein 69-kV line Tecumseh Road - New Holstein 69-kV line*
4	Sunset Point – Pearl Avenue 69-kV line	107.9% 107.9%	--	--	--	97.0% 96.9%	--	113.6% 113.4%	--	--	--	Ellinwood – 12th Avenue 69-kV line Ellinwood 138/69-kV transformer*
5	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
5	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
5	Bain 345/138-kV transformer #5	158.6% 111.4%	--	142.5% --	--	158.8% --	--	158.3% 106.4%	--	142.6% 127.1%	--	Split Pleasant Prairie 345-kV bus 34 Split Pleasant Prairie 345-kV bus 23
5	Oak Creek 345/230-kV transformer T895	104.2% 101.5%	--	--	--	104.4% --	--	104.3% 101.9%	--	--	--	Split Oak Creek 230-kV bus 78 Split Oak Creek 230-kV bus 67
5	Arcadian4 – Waukesha1 138-kV line	97.9%	--	114.1%	--	130.4%	--	98.5%	--	--	--	Arcadian6 – Waukesha3 138-kV line
5	Arcadian6 – Waukesha3 138-kV line	94.7% --	--	110.5% 100.4%	--	126.3% 112.7%	--	95.4% --	--	--	--	Arcadian4 – Waukesha1 138-kV line Split Waukesha 138-kV bus 12

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5	Arcadian 345/138-kV transformer #3	--	--	--	--	96.2% 99.6% 94.9%	--	--	--	--	--	Split Arcadian 345-kV bus 12 Arcadian 345-kV bus outage Arcadian 345/138-kV transformer #1
5	Bain – Kenosha 138-kV line	--	--	--	--	--	--	--	--	100.3%	--	Pleasant Prairie – Zion 345-kV line
5	Pleasant Prairie – Zion 345-kV line	--	--	--	--	--	--	--	--	96.8%	--	Zion – Arcadian 345-kV line ²⁷
5	Granville 345/138-kV transformer #1	--	--	--	--	108.2%	--	--	--	--	--	Split Granville 345-kV bus 23
5	Harbor – Kansas 138-kV line	--	--	110.4% 105.3% 102.5% 101.7%	--	100.0% -- -- --	--	--	--	--	--	Kansas – Norwich 138-kV line Dewey – Norwich 138-kV line Split Dewey 138-kV bus Dewey – Montana 138-kV line Plus Other Less Severe Outages
5	Albers – Kenosha 138-kV line	--	--	107.2%	--	105.6%	--	--	--	--	--	Albers – Bain 138-kV line
5	Edgewood – St. Martins 138-kV line	--	--	98.1%	--	--	--	--	--	--	--	Merrill Hills – Waukesha 138-kV line
5	Oak Creek – Ramsey 138-kV line Kansas – Ramsey 138-kV line Nicholson – Ramsey 138-kV line	--	--	--	--	101.0% 96.1% 95.1%	--	--	--	--	--	Oak Creek – Pennsylvania 138-kV line
5	Waukesha 138-kV bus 12	--	--	--	--	99.7%	--	--	--	--	--	Arcadian6 – Waukesha3 138-kV line
5	Kenosha – Lakeview 138-kV line	--	--	--	--	--	--	96.2%	--	126.9%	--	Pleasant Prairie – Zion 345-kV line
5	Lakeview – Zion 138-kV line	--	--	--	--	--	--	--	--	129.9%	--	Pleasant Prairie – Zion 345-kV line