

TABLE UP-4-W															
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – Overloaded Facilities, U.P. Western Zone															
U.P. Zone	Map Item #	Criteria Exceeded/Need	Facility Outage	Robust Economy		High Retirements		High Environmental		Slow Growth		DOE 20% Wind		Fuel & Invest. Limit.	
				2018 % of Facility Rating	2024 % of Facility Rating	2018 % of Facility Rating	2024 % of Facility Rating	2018 % of Facility Rating	2024 % of Facility Rating	2018 % of Facility Rating	2024 % of Facility Rating	2018 % of Facility Rating	2024 % of Facility Rating	2018 % of Facility Rating	2024 % of Facility Rating
Western	1	Atlantic-Henry St. Tap 69 kV	Base Case, Atlantic-M38 138 kV, Atlantic 138/69 kV	113%	128%-200%	144%	152%					107%	116%		
Western	2	M38-North Lake 138 kV	M38-Perch Lake 138 kV		100%	150%	156%					144%	Did not solve		
Western	3	M38-Atlantic 69 kV	M38-Atlantic 138 kV, Atlantic 138/69 kV, M38 138/69 kV, M38-Winona 138 kV	147%-148%	240%	100%-142%	101%-153%	119%	121%-122%			98%-113%	121%-146%	139%-140%	145%
Western	4	Ontonagon-UPSCO Tap 69 kV	Victoria-Rockland Jct. 69 kV, Rockland Jct.-Rockland, 69 kV Rockland-Mass 69 kV	132%-133%	114%-115%										
Western	5	Ontonagon 138/69 kV	Victoria-Rockland Jct. 69 kV, Rockland Jct.-Rockland, 69 kV Rockland-Mass 69 kV	102%-103%											
Western	6	Atlantic 138/69 kV	M38-Winona, M38 138/69 kV, Base Case		99%-108%	101%	96%-102%						98%		
Western	7	Osceola-Centennial Mine Tap 69 kV	Atlantic-M38 138 kV, Atlantic 138/69 kV, Base Case, M38-Perch Lake 138 kV		95%-146%		100%								
Western	8	Atlantic-Elevation St. Tap 2 69 kV, Elevation St. Tap 2-Osceola 69kV	Atlantic-Elevation St. Tap 1 69 kV		105%-122%										
Western	9	Winona-Twin Lakes 69 kV, Twin Lakes-Portage Tap 69 kV, Portage Tap-Atlantic 69 kV	Atlantic-M38 138 kV, Atlantic 138/69 kV		140%-145%										
Western	10	Aspen-Crystal Falls 69 kV	Iron Grove 138/69 kV		101%-122%										

TABLE UP-4A-W															
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – Low Voltages, U.P. Western Zone															
U.P. Zone	Criteria Exceeded/Need	Facility Outage	Robust Economy		High Retirements		High Environmental		Slow Growth		DOE 20% Wind		Fuel & Invest. Limit.		
			2018 % of Nominal Bus V	2024 % of Nominal Bus V	2018 % of Nominal Bus V	2024 % of Nominal Bus V	2018 % of Nominal Bus V	2024 % of Nominal Bus V	2018 % of Nominal Bus V	2024 % of Nominal Bus V	2018 % of Nominal Bus V	2024 % of Nominal Bus V	2018 % of Nominal Bus V	2024 % of Nominal Bus V	
Western	Keweenaw, Centennial Mine, Osceola, MTU 69 kV bus voltages; Atlantic, Winona 138 kV bus voltages	Base Case		92.5%-95.3%	94.7%-95.9%	94.2%-95.7%						94.1%-95.5%	91.3%-95.8%		
Western	Keweenaw, Centennial Mine, MTU, Osceola, Henry St., Elevation St., Portage, Atlantic 69 kV bus voltages; Atlantic 138 kV bus voltage	M38-Atlantic 138 kV, Atlantic 138/69 kV	79.8%-88.9%	48.3%-60.1%	76.0%-84.3%	71.8%-80.4%	89.3%	88.8%				79.7%-87.6%	63.7%-71.9%	87.0%	85.6%-91.9%
Western	Keweenaw, Centennial Mine, Elevation St., Osceola 69 kV bus voltages	Atlantic-Elevation St. Tap #1 69 kV, Elevation St. Tap #1-Osceola 69 kV, Atlantic-Elevation St. Tap #2 69 kV	89.2%-91.8%	79.0%-91.5%	90.3%-92.0%	90.1%-91.7%						90.0%-92.0%	86.5%-90.3%	-91.9%	91.9%
Western	Aspen, Iron Grove, Twin Lakes, Lakota Rd. 138 kV bus voltages	Plains-Aspen 138 kV, Aspen-Iron Grove 138 kV	90.3%-91.9%	89.6%-91.6%		91.8%	91.4%-91.8%	91.3%-91.8%	90.7%-91.9%	90.7%-92.0%	91.2%-91.7%	90.1%-91.6%	91.7%	91.6%-91.7%	
Western	Lakehead, Strawberry Hill, Iron Grove, Lincoln, Crystal Falls 69 kV bus voltages	Iron Grove 138/69 kV	88.0%-91.3%	81.8%-86.3%	91.5%-91.8%	90.8%-91.2%						90.8%-91.2%	87.2%-90.6%		91.7%-91.9%
Western	Conover, Lakota Rd., Land O'Lakes, Watersmeet, Bruce Crossing 69 kV bus voltages	Lakota Rd. 138/69 kV, Lakota Rd.-Conover 69 kV, Conover-Land O'Lakes 69 kV	88.8%-91.1%	74.8%-91.3%								86.2%-91.8%	Did not solve, 58.1%-70.9%		
Western	Keweenaw, Centennial Mine, MTU, Osceola, Henry St., Elevation St., Portage, Atlantic, M38, Baraga, L'Anse, Ontonagon, Twin Lakes, UPSCO, Winona, Lake Mine 69 kV bus voltages; Atlantic, M38, Winona, Stone Container, Ontonagon 138 kV bus voltages	M38-Perch Lake 138 kV		73.4%-90.9%	51.9%-67.2%	47.3%-63.4%						52.9%-67.5%	Did not solve		
Western	Keweenaw, Centennial Mine 69 kV bus voltages; Atlantic 138 kV bus voltage	M38-North Lake 138 kV		89.8%-91.2%	90.9%	90.6%						88.8%-91.2%	Did not solve		
Western	Winona, Stone Container, Ontonagon, Atlantic 138 kV bus voltages; Ontonagon, UPSCO 69 kV bus voltages	M38-Winona 138 kV, Winona-Ontonagon 138 kV			87.1%-91.9%	85.3%-89.7%	89.8%-90.2%	89.7%-90.0%				85.5%-90.2%	76.9%-85.1%		
Western	L'Anse 69 kV bus voltage; Atlantic 138 kV bus voltage	M38 138/69 kV				91.6%-91.9%						85.4%-90.6%	73.8%-85.8%		