

POWER FLOW AND STABILITY SUMMARY TABLE

**Southwest MN--
>Twin Cities EHV:
Base Plan; 2000 MW
SW MN gen**

Case No.	17	18	19	20	21
Case Name	sd2-so03aa.GyvV4V4-nmz	sd2-so03aa.GyvV4V4-fh3	sd2-so03aa.GyvV4V4-lb3	sd2-so03aa.GyvV4V4-If3	sd2-so03aa.GyvV4V4-lh3
Disturbance	nmz	fh3	lb3	If3	lh3
Prior Outage	None	None	None	None	None
Date/Time	OCT 13 2005 14:46	OCT 13 2005 16:52	OCT 13 2005 16:35	OCT 13 2005 16:43	OCT 13 2005 17:00
Comments					
Steady State Flows					
NDEX / EAST BIAS	2213 / 377	2213 / 377	2213 / 377	2213 / 377	2213 / 377
MHEX / L20D	2174 / 229	2174 / 229	2174 / 229	2174 / 229	2174 / 229
ECL-ARP / PRI-BYN	836 / 865	836 / 865	836 / 865	836 / 865	836 / 865
MWSI / MNEX	1702 / 1567	1702 / 1567	1702 / 1567	1702 / 1567	1702 / 1567
D602F / F601C	1846 / 1985	1846 / 1985	1846 / 1985	1846 / 1985	1846 / 1985
B10T / MH>SPC	165 / 74	165 / 74	165 / 74	165 / 74	165 / 74
OH E-W / OH>MH	-202 / -196	-202 / -196	-202 / -196	-202 / -196	-202 / -196
R50M / OH>MP	153 / 150	153 / 150	153 / 150	153 / 150	153 / 150
G82R	-55	-55	-55	-55	-55
Dorsey BP1 / BP2	1508 / 1707	1508 / 1707	1508 / 1707	1508 / 1707	1508 / 1707
Dorsey Reserve / Wtrtn SVC	149 / 6	149 / 6	149 / 6	149 / 6	149 / 6
Forbes SVC / MSC	42 / 600	42 / 600	42 / 600	42 / 600	42 / 600
Steady State Vltgs					
Dorsey 500/Dorsey 230	1.038 / 1.045	1.038 / 1.045	1.038 / 1.045	1.038 / 1.045	1.038 / 1.045
Roseau 500/Forbes 500	1.068 / 0.989	1.068 / 0.989	1.068 / 0.989	1.068 / 0.989	1.068 / 0.989
Chisago 500/EauClaire 345	0.987 / 0.914	0.987 / 0.914	0.987 / 0.914	0.987 / 0.914	0.987 / 0.914
Int Falls 115/Badoura 115	1.014 / 0.991	1.014 / 0.991	1.014 / 0.991	1.014 / 0.991	1.014 / 0.991
Drayton 230/Groton 345	1.026 / 1.024	1.026 / 1.024	1.026 / 1.024	1.026 / 1.024	1.026 / 1.024
SS OS Relay Margins					
D602F at Forbes/Dorsey	212% / 336%	212% / 336%	212% / 336%	212% / 336%	212% / 336%
B2R at Rugby/L20D at Drayton	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%
R50M/F3M	908% / 316%	908% / 316%	908% / 316%	908% / 316%	908% / 316%
B10T	339%	339%	339%	339%	339%
Min/MaxTransientVltg					
Arrowhd 230	0.85 1.03	0.99 1.02	1.01 1.04	1.00 1.03	1.00 1.02
Boise 115	0.95 1.06	0.98 1.02	0.96 1.05	0.97 1.03	0.99 1.02
Dorsey 230	1.04 1.20	1.02 1.05	1.01 1.05	1.02 1.05	1.03 1.05
Forbes 230	0.96 1.03	0.97 1.01	0.96 1.01	0.97 1.00	0.98 1.02
Riverton 230	0.79 0.99	0.97 0.98	0.98 1.00	0.97 0.98	0.97 0.99
Coal Creek 230	0.91 1.10	1.00 1.06	1.01 1.06	1.00 1.06	1.00 1.06
Dickinson 345	0.89 1.08	0.97 1.03	1.01 1.06	0.99 1.05	0.99 1.03
Drayton 230	0.99 1.10	0.99 1.04	0.98 1.04	1.00 1.03	1.01 1.04
Groton 345	0.87 1.06	1.01 1.04	0.99 1.05	1.01 1.04	1.01 1.03
Tioga 230	0.99 1.07	1.02 1.05	1.00 1.05	1.02 1.05	1.02 1.05
Wahpeton 115	0.85 1.06	0.98 1.01	0.98 1.03	0.98 1.01	1.00 1.02
Watertown 345	0.89 1.05	1.03 1.05	1.01 1.05	1.02 1.05	1.03 1.04
Dynamic Voltage Warnings					
	67564 [DORSEY 2] 1.23	none	none	none	none
Worst Case Angle Damping					
	KING 3 / -30.50%	MNTCE3 / 60.75%	MNTCE3 / 6.65%	MNTCE3 / 15.61%	SHERC3 / 67.96%
Dorsey SUVP / UdHold					
	/ 0.133				
Forbes DC Red (DCAR)					
	507%	395%	507%	507%	383%
K22W (max +dP @ t, d-ang)	160.2@(2.74155,-71.3)	16.1@(3.56652,-8.0)	70.1@(2.50823,-38.0)	44.3@(2.60822,-28.6)	11.7@(3.58318,-3.5)
K22W (max -dP @ t, d-ang)	89.6@(0.23332,8.2)	22.1@(1.79159,12.2)	5.7@(0.23332,0.6)	6.9@(0.23332,0.8)	16.6@(1.70826,9.6)
K22W (max d-ang @ t, dP)	-123.5@(10.00807,65.6)	17.9@(1.22495,-8.2)	-68.2@(10.00807,26.7)	-49.3@(10.00807,17.1)	13.8@(1.11662,-3.9)
OS Rel Trip / Marg					
MH - OH					
D602F at Forbes/Dorsey	0.18333 sec / 0.18333 sec	134% / 205%	121% / 183%	130% / 198%	166% / 260%
B2R at Rugby/L20D at Drayton	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%
R50M / F3M	571% / 167%	670% / 276%	657% / 196%	683% / 217%	768% / 292%
B10T	87%	229%	131%	186%	233%
FSCAPS (SS/Unav/Final)					
Balta 230	(0 2 0)	(0 0 0)	(0 0 0)	(0 0 0)	(0 0 0)
Eau Cl 345 / Park Lk 115	(4 4 2) / (3 3 3)	(4 4 4) / (3 3 3)	(4 4 4) / (3 3 3)	(4 4 4) / (3 3 3)	(4 4 4) / (3 3 3)
Prairie 115 / Ramsey 230	(1 1 1) / (1 1 1)	(1 1 1) / (1 1 1)	(1 1 1) / (1 1 1)	(1 1 1) / (1 1 1)	(1 1 1) / (1 1 1)
Roseau 230 / Running 230	(2 2 0) / (0 2 0)	(2 2 1) / (0 1 1)	(2 2 0) / (0 2 1)	(2 2 1) / (0 1 1)	(2 2 1) / (0 0 0)
Shey 115 / Split Rock 115	(1 5 4) / (1 2 2)	(1 2 2) / (1 2 2)	(1 2 2) / (1 2 2)	(1 1 1) / (1 2 2)	(1 1 1) / (1 2 2)
Case					
Case	sd2-so03aa.GyvV4V4-nmz	sd2-so03aa.GyvV4V4-fh3	sd2-so03aa.GyvV4V4-lb3	sd2-so03aa.GyvV4V4-If3	sd2-so03aa.GyvV4V4-lh3
Disturbance	nmz	fh3	lb3	If3	lh3
System Response	OK	OK	OK	OK	OK
70% or 120% Violations	D				
ORWG Criteria Violations					
Line Tripping	(5T)(6T)				

NMORWG ND Operating Study Stability Grid Sheet Code Definitions

Any entry in a "cell" indicates a stability case was run for the powerflow/fault combination defined by the cell.
Each cell contains 4 lines of coded information which record the macro events which occurred during the simulation.
Each line may contain up to 4 characters. The coded information is defined as follows:

Line 1: Code to identify major system response.

USxx Unstable case, "xx" = gen group code of the unstable machine(s) or "aa" for entire coal fields, or
RAx Relay alarms, "x" = A, B, or C to identify the relay zone of greatest excursion, or
NCx Non-converged time steps, "x" = number of time steps reported, or
OK None of the above.

Line 2: Code to identify violation of <70%/>120% default transient voltage criteria.

G 70% violation, greatest excursion at Groton
H 70% violation, greatest excursion at Huron
J 70% violation, greatest excursion at Jamestown 345
etc. (codes to be defined as required)
O Any 120% violation
WMP 80% violation at MP buses in western MN (Hubbard 115, Badoura 115, etc)
blank No default transient voltage violations

Line 3: Code to identify violation of NMOSTF specific transient voltage criteria.

1 Dorsey 230
2 Forbes 230
3 Arrowhead 230
4 Riverton 230
5 Drayton 230
6 Wahpeton 230
7 Tioga 230
8 Dickinson 345
9 Coal Creek 230
A Watertown 345
B Groton 345
C Boise 115
> Impending violation eliminated by rounding
blank No NMOSTF specific transient voltage violations

If the violation is an overvoltage, the above codes should be followed by an "O," otherwise an undervoltage is implied.

If more than one violation occurs, record all undervoltage violations first in order of greatest severity followed by the overvoltages in order of greatest severity until the 4 character limit is reached. Greatest severity is defined as the difference between the violation and the specific criteria for a given bus.

Line 4: Code to identify any line tripping or relay margin violations other than normal control actions such as CU isolation.

1 Trip of the Ontario-Manitoba ties
2 Operation of the Forbes dc reduction relays (Schw. and/or DCAR)
3 Violation of L20D @ Drayton relay margin (25%)
4 Violation of L20D @ Prairie relay margin (25%)
5 Violation of D602F @ Forbes relay margin (50%)
6 Violation of D602F @ Dorsey relay margin (50%)
7 Violation of R50M relay margin (25%)
8 Violation of B10T relay margin (25%)
9 Violation of F3M relay margin (25%)
etc. (codes to be defined as required)

blank None of the above

If more than one event occurs, record all events in the order they occur until the 4 character limit is reached.