

POWER FLOW AND STABILITY SUMMARY TABLE

>Twin Cities EHV: System Alternative; 2000 MW SW Minn gen

(revised System Alternative with Twin Cities south "Outer Loop" and Brookings Co-Lyon Co at 345 kV)

Table with columns for Case No., Case Name, Disturbance, Prior Outage, Date/Time, Comments, Steady State Flows, SS OS Relay Margins, Min/Max Transient Vltg, Dynamic Voltage Warnings, Worst Case Angle Damping, OS Rel Trip / Marg, and FSCAPS (SS/Unav/Final).

Table with columns for Case Name, Disturbance, System Response, ORWG Criteria, and Line Tripping.

**POWER FLOW AND STABILITY SUMMARY TABLE**

**>Twin Cities EHV:  
System Alternative;  
2000 MW SW Minn  
gen**

1	Case No.	17
2	Case Name	py2-so03aa.GyvV4V4-nm
3	Disturbance	nmz
4	Prior Outage	None
5	Date/Time	OCT 13 2005 15:52
6	Comments	
7		
8	<b>Steady State Flows</b>	
9	NDEX / EAST BIAS	2099 / 358
10	MHEX / L20D	2170 / 235
11	ECL-ARP / PRI-BYN	841 / 887
12	MWSI / MNEX	1728 / 1976
13	D602F / F601C	1833 / 1966
14	B10T / MH>SPC	167 / 76
15	OH E-W / OH>MH	-204 / -198
16	R50M / OH>MP	152 / 149
17	G82R	-50
18	Dorsey BP1 / BP2	1508 / 1707
19	Dorsey Reserve / Wtrtn SVC	168 / 12
20	Forbes SVC / MSC	35 / 600
21	<b>Steady State Vltgs</b>	
22	Dorsey 500/Dorsey 230	1.039 / 1.045
23	Roseau 500/Forbes 500	1.068 / 0.992
24	Chisago 500/EauClaire 345	0.989 / 0.907
25	Int Falls 115/Badoura 115	1.014 / 0.990
26	Drayton 230/Groton 345	1.022 / 1.024
27	<b>SS OS Relay Margins</b>	
28	D602F at Forbes/Dorsey	217% / 345%
29	B2R at Rugby/L20D at Drayton	999% / 999%
30	R50M/F3M	921% / 319%
31	B10T	332%
32	<b>Min/MaxTransientVltg</b>	
33	Arrowhd 230	0.86   1.03
34	Boise 115	0.95   1.06
35	Dorsey 230	1.04   1.19
36	Forbes 230	0.97   1.04
37	Riverton 230	0.80   1.00
38	Coal Creek 230	0.91   1.10
39	Dickinson 345	0.89   1.08
40	Drayton 230	0.98   1.10
41	Groton 345	0.87   1.07
42	Tioga 230	0.99   1.07
43	Wahpeton 115	0.85   1.06
44	Watertown 345	0.90   1.05
45	<b>Dynamic Voltage Warnings</b>	
46		67564 [DORSEY 2] 1.22
47		
48		
49		
50		
51		
52		
53	<b>Worst Case Angle Damping</b>	KING 3 / -29.41%
54	Dorsey SUVP / UdHold	/ 0.133
55	Forbes DC Red (DCAR)	507%
56	K22W (max +dP @ t, d-ang)	159.0@(2.73322,-71.4)
57	K22W (max -dP @ t, d-ang)	88.6@(0.23332,8.1)
58	K22W (max d-ang @ t, dP)	-123.5@(10.00807,65.6)
59	<b>OS Rel Trip / Marg</b>	
60	MH - OH	
61	D602F at Forbes/Dorsey	0.18333 sec / 0.18333 sec
62	B2R at Rugby/L20D at Drayton	999% / 999%
63	R50M / F3M	580% / 171%
64	B10T	81%
65	<b>FSCAPS (SS/Unav/Final)</b>	
66	Balta 230	( 0   2   0 )
67	Eau Cl 345 / Park Lk 115	( 4   4   2 ) / ( 3   3   3 )
68	Prairie 115 / Ramsey 230	( 1   4   1 ) / ( 1   1   1 )
69	Roseau 230 / Running 230	( 2   2   0 ) / ( 0   2   0 )
70	Shey 115 / Split Rock 115	( 1   5   4 ) / ( 1   2   2 )

Case	py2-so03aa.GyvV4V4-nm
Disturbance	nmz
System Response	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.